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3

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Contents

Cuprins

Palestrica of the third millennium – Civilization and Sport
Vol. 16, no. 3, July-September 2015, 205–206

EDITORIAL

Promoting regional brands in sports and sports medicine
Promovarea brandurilor regionale în sport şi în medicina sportivă

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A brand in sport or in medicine applied to sports activities is a specific trademark representative of a region or a country. When brands represent personalities, they become even more valuable and important. Country sports brands should be formed by multiple strong county and regional brands. In Romania, it is a fact that country sports brands are not backed up by sufficient county or regional brands. These regional brands exist in sports and in some related areas such as medicine, but they are not promoted or are insufficiently promoted. Because the European concept of sport includes physical education as well as systematically practiced physical activities or sports for all, not only high performance sport, regional brands can be represented by outstanding promoters of these activities, even if they belong to sport related areas.

For the time being, we aim to approach aspects regarding the promotion of three brands associated with Cluj county and its bordering regions. Each of these brands can be transformed into projects for the development of the localities or communes where the brands originated, by the creation and equipment of didactic spaces with European funds, where county or regional sports activities as part of school or for all programs could be concentrated on a permanent basis. The projects may involve cultural, scientific meetings, anniversary symposia, with the participation of Associations/Societies, specialized journals. Volunteer students can also be involved in the organization of these events, and volunteer certificates can be awarded.

Gheorghe Moceanu is a well known personality, being considered as the first Romanian physical preparator. Born in Orman, Iclod commune, he left Transylvania early and settled in Bucharest, where he substantially contributed to education reforms in physical education, promoted by Spiru Haret in the period 1898-1904. He was a good gymnast, acrobat and folk dancer.

Prof. Dr. Iuliu Haţieganu, a first-rank brand of the University of Medicine and Pharmacy in Cluj-Napoca, was originally from Dârja, Panticeu commune. A prestigious internist, he promoted the inclusion of physical education in the university curriculum and the student sports movement in interwar Cluj. During his rectorship of the Cluj University, between 1931-1932, he took action for the introduction of physical education as a fully-fledged subject in the faculties of Cluj universities. Thanks to him, the University's sports park, currently the "Iuliu Haţieganu" Park, was built. He had an important contribution to the introduction of the sports movement in rural areas, through the Astra Association.

Prof. Ion Moina was born in Nimigea commune, Bistriţa-Năsăud county. He spent his childhood in Mociu commune, at 40 km from Cluj, and at the age of 16, he settled in Cluj. He was one of the athletes encouraged by Iuliu Haţieganu, who supported and guided him, dreaming of him becoming the first Olympic champion of Romania. He did not become an Olympic champion, but he was a multiple national and Balkan champion in athletics, in the 100 m, 200 m sprint running and relay running events, in 1946. Ion Moina was the first Merited Master of Sports in Romania and a university Professor.

A brand can be a name. Brands are characterized by several positive significances that they transmit: attributes, benefits, values, culture, personality, type of targeted consumer (Armstrong & Kotler, 2006). The proposed brands are based on the significance of the personalities evoked, and health benefits are imparted to sports activities consumers – the school and university population and the stable rural population. Brands can be proposed as annual projects, to be financed from European funds, by the County Council, in partnership with the County School Inspectorate and the County Authority for Sport and Youth. These projects should meet some requirements: an attractive title, justification of the need to implement the project, general and specific objectives of the project, activities for achieving the objectives, the project beneficiaries.

* * *

Un brand în sport sau în medicina aplicată la activităţile sportive este de fapt o marcă specifică, reprezentativă a unei regiuni sau a unei ţări. Iar, atunci când aceste branduri întruchipează personalităţi, acestea devin cu atât mai valoroase şi mai importante. Brandurile de ţară în sport ar trebui să se compună din multiple branduri puternice

judeţene şi regionale. România are, în domeniul sportului, branduri de ţară, dar constatăm că acestea nu au în spate suficiente branduri judeţene sau regionale. Aceste branduri regionale în sport şi în unele domenii de interferenţă, cum ar fi medicina, există, dar ele nu sunt promovate, sau sunt insuficient promovate. Deoarece, în noţiunea europeană de sport este inclusă şi educaţia fizică, precum şi activităţile fizice practicate sistematic sau sportul pentru toţi, nu numai sportul de performanţă, brandurile regionale pot fi reprezentate de promotori de seamă ai acestor activităţi, chiar dacă aceştia provin şi din domenii de interferenţă cu sportul.

Ne propunem deocamdată să abordăm aspecte legate de promovarea a trei branduri legate de judeţului Cluj şi de regiunile limitrofe judeţului Cluj. Fiecare din aceste branduri poate fi transformat în proiecte de dezvoltare ale localităţilor sau comunelor de provenienţă ale acestora, prin amenajarea şi dotarea din fonduri europene a unor spaţii didactice, care să concentreze apoi activităţi sportive judeţene sau regionale, cu caracter permanent, şcolare sau pentru toţi. Proiectele pot presupune manifestări culturale, ştiinţifice, simpozioane omagiale, cu implicarea în aceste evenimente a unor Asociaţii/Societăţi, reviste de specialitate. În organizarea acestor evenimente pot fi angrenaţi şi studenţi voluntari, cu acordarea unor certificate de voluntar.

Personalitatea lui *Gheorghe Moceanu* este bine-cunoscută, acesta fiind considerat primul preparator fizic român. Născut în localitatea Orman, comuna Iclod, s-a desprins de timpuriu de meleagurile transilvane şi s-a stabilit la Bucureşti, unde a contribuit substanţial la reformele din învăţământ privind educaţia fizică, promovate de Spiru Haret în perioada 1898-1904. A fost un bun gimnast, acrobat şi dansator popular.

Prof. Dr. Iuliu Haţieganu, brand de primă mărime al Universităţii de Medicină şi Farmacie din Cluj-Napoca, provine din localitatea Dârja, comuna Panticeu. Medic internist de prestigiu, a fost promotorul introducerii educaţiei fizice în învăţământul universitar şi unul din promotorii mişcării sportive studenţeşti din Clujul interbelic. A acţionat concret în perioada mandatului său ca rector al Universităţii clujene, în perioada 1931-1932, pentru introducerea educaţiei fizice ca materie de sine stătătoare în facultăţile universităţilor din Cluj. Lui i se datorează construirea parcului sportiv al Universităţii, actualul Parc „Iuliu Haţieganu". A avut o mare contribuţie la introducerea mişcării sportive la sate, prin intermediul Asociaţiei Astra.

Prof. Ion Moina s-a născut în comuna Nimigea, judeţul Bistriţa-Năsăud. A copilărit în comuna Mociu, la 40 km de Cluj, iar la vîrsta de 16 ani s-a stabilit la Cluj. A fost unul din sportivii încurajaţi de Iuliu Haţieganu, care l-a sprijinit şi îndrumat, visându-l şi dorindu-l primul campion olimpic al României. Nu a fost campion olimpic, dar a fost multiplu campion naţional şi balcanic în anul 1946 la atletism, în probele de viteză 100 m, 200 m, ştafete. Ion Moina a fost primul maestru emerit al sportului din România şi profesor universitar.

Un brand poate fi un nume. Brandul se remarcă prin câteve tipuri de semnificaţii pozitive transmise: atribute, beneficii, valori, cultură, personalitate, tip de consumator căruia i se adresează (Armstrong & Kotler, 2006). Brandurile propuse se bazează pe semnificaţia personalităţilor evocate, iar beneficiile sanogenetice se răsfrâng asupra consumatorilor de activităţi sportive - populaţia şcolară şi universitară şi populaţia stabilă de la sate. Brandurile pot fi propuse ca proiecte anuale, pentru a fi finanţate din bani europeni, de către Consiliul Judeţean, în parteneriat cu Inspectoratul Şcolar Judeţean şi Direcţia pentru Sport şi Tineret a Judeţului. Aceste proiecte trebuie să cuprindă câteva repere obligatorii, cum ar fi: un titlu atractiv, justificarea necesităţii implementării proiectului, obiective generale şi specifice ale proiectului, activităţile de realizare a obiectivelor şi cine sunt beneficiarii proiectului.

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Palestrica of the third millennium – Civilization and Sport
Vol. 16, no. 3, July-September 2015, 207–213

ORIGINAL STUDIES
ARTICOLE ORIGINALE

Perspectives to evaluate the impact of physical activity on mental health using a HPLC method for the monitoring of biogenic amine levels

Perspective pentru evaluarea impactului activității fizice asupra sănătății mintale folosind o metodă HPLC pentru monitorizarea nivelului de amine biogene

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Abstract

Background. Among multiple regulatory systems involved, changes in the homeostasis of neurotransmitters are strongly involved in the beneficial effects of exercises on mental health status. On the other hand, recent studies highlight the alarming prevalence of mental health disturbances among athletes. As biogenic amines are extremely sensitive to many factors, their analysis requires specific and very sensitive bioanalytical methods, justifying the development of new methods for their accurate analysis.

Aims. The aim of this study was the development of a reversed phase chromatographic method (RP-HPLC) with fluorescence detection (FLD) for the simultaneous analysis of epinephrine (E), norepinephrine (NE), dopamine (DA) and serotonin (ST).

Methods. A two-step derivatization reaction was applied using a mixture of benzylamine and 1,2-diphenylethylenediamine. Chromatographic separation of the fluorescent derivatives was developed and optimized using: an internal standard, a new C_{18} stationary phase, acetonitrile and a 10 mM acetate buffer containing 1 mM heptane-1-sulfonic acid sodium salt (pH=5.30) in gradient mode with 0.80 mL/min flow rate. Fluorescent derivatives were detected at λex=345 nm/λem=480 nm.

Results. Chromatographic analysis of biogenic amines was performed in 16 min run time at ng/mL level. The relative standard deviation was found to be lower than 3%, when testing repeatability and reproducibility. Additionally, the regression analysis proved the method linearity in a range of 2.5 to 15.2 ng/mL for NE, 30 to 210 ng/mL for ST, 6.8 to 15.8 ng/mL for E and 10.8 to 63.0 ng/mL for DA, with regression coefficients greater than 0.999 for all derivatives.

Conclusions. A RP-HPLC-FLD method, which allows simultaneous quantification of biogenic amines, was developed and pre-validated. After complete validation, this method will be applied for the analysis of biogenic amines in urine.

Keywords: athletes, catecholamines, serotonin, fluorescence derivatization, HPLC, psychiatric disorder.

Rezumat

Premize. Alături de alte sisteme de reglare, modificările în homeostazia neurotransmițătorilor sunt puternic implicate în efectele benefice ale exercițiilor fizice asupra stării psihice. Pe de altă parte, studii recente evidențiază prevalența alarmantă a tulburărilor de sănătate mintală în rândul sportivilor. Întrucât aminele biogene sunt extrem de sensibile la diferiți factori, analiza lor necesită metode bioanalitice specifice și foarte sensibile, fapt care justifică dezvoltarea de noi metode de analiză.

Obiective. Obiectivul acestei lucrări a fost elaborarea unei metode cromatografice de lichide de înaltă performanță pe fază inversă cu detecție de fluorescență, pentru analiza simultană a epinefrinei (E), norepinefrinei (NE), dopaminei (DA) și serotoninei (ST).

Metode. A fost aplicată o reacție de derivatizare în două etape cu benzilamină, respectiv 1,2-difeniletilendiamină. Dezvoltarea și optimizarea metodei de separare cromatografică a derivaților fluorescenți a presupus utilizarea unui standard intern, a

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unei faze staționare C_{18} de ultimă generație, acetonitril și un tampon acetat 10 mM conținând sarea acidului heptan-1-sulfonic (pH=5,30) ca fază mobilă în gradient cu debit de 0,80mL/min. Fluorescența derivaților a fost monitorizată la λex=345nm/ λem=480nm.

Rezultate. Analiza cromatografică a fost efectuată în timp de 16 minute la nivele de ng/mL. Deviația standard relativă a fost sub 3% pentru repetabilitate și reproductibilitate. Liniaritatea metodei a fost demonstrată pe baza coeficientului de corelație de 0,999 obținut pentru toate aminele biogene în următoarele domenii 2,5-15,2 ng/mL pentru NE, 30-210 ng/mL pentru ST, 6,8-15,8 ng/mL pentru E și 10,8-63,0 ng/mL pentru DA.

Concluzii. A fost dezvoltată și prevalidată o metodă cromatografică de înaltă performanță de fază inversă cu detecție de fluorescență pentru analiza simultană a aminelor biogene. După validare, aceasta va fi aplicată la analiza aminelor biogene din urină.

Cuvinte cheie: sportivi, catecolamine, serotonină, derivatizare, fluorescență, HPLC, boli psihice.

Introduction

There is clear evidence that the most important mainstay of mental health disease prevention for all people is physical activity. Moderate and regular physical activity has been proved to maintain mental health status (Peluso & Guerra De Andrade, 2005; Lin & Kuo, 2013; Dunn & Jewell, 2010), and even to have therapeutic benefits for psychiatric illnesses (Archer et al., 2014; Ruo et al., 2004; Rimer et al., 2012; Bruja et al., 2013; Dunn & Jewell, 2010) and neurodegenerative diseases (Sahlin & Lexell, 2015).

As recently reviewed (Lin & Kuo, 2013), the levels of biogenic amines, such as catecholamines norepinephrine (NE), dopamine (DA) and the indoleamine serotonin (ST) change after performance of exercise. Moderate exercise increases DA and ST levels, while NE levels decrease, but on the other hand, overtraining stimulates the hyperactivity of biogenic amines and causes fatigue (Carfagno & Hendrix, 2014; Lin & Kuo, 2013).

More accurately, the interconnection of the NE system and exercise is supported by an enhancement of neuronal adaptation against stress stimuli. An explanation of the protective effect against stress is attributed to the secretion of galanin after exercise and the consequent inhibition of NE release, which reduces anxiety. Regarding exercise and the DA system, it has been shown that exercise increases DA levels. Furthermore, it determines calcium/ calmodulin-dependent DA synthesis after tyrosine hydroxylase activation, increases DA and DA receptor binding affinity and also has a protective effect against the toxicological degradation of DA neurons. The ST system is also modulated by exercise. ST levels increase only after intense exercise and determine central fatigue, while after moderate physical activity they remain unaltered. Among the properties of the ST system, its antidepressant and anxiolytic roles support the benefits of exercise for mental health status. Above all, biogenic amines modulate the activity of each other, sustaining their common interplay in physical exercise (Lin & Kuo, 2013).

Although moderate and regular exercises have proved to counteract symptoms of depression (Archer et al., 2014; Ruo et al., 2004; Rimer et al., 2012; Bruja et al., 2013), genetic susceptibility seems to be a cause for the development of depression (Haslacher et al., 2015), anxiety and panic disorder (Sardinha et al., 2011), neurological disabilities (Sahlin & Lexell, 2015), and even neurocognitive dysfunction in bipolar disease. Recent studies highlight the alarming prevalence (46.4%) of mental health disturbances among athletes (Gulliver et al., 2015). Thus, the prevalence of depression ranged up to 27.2% (Gulliver et al., 2015; Gouttebarge et al., 2015; Weigand et al., 2013) in active athletes and up to 39% in former athletes (Gouttebarge et al., 2015; Weigand et al., 2013). Other depression related conditions among athletes were also observed: eating disorders (22.8%), general psychological distress (16.5%), social anxiety (14.7%), generalized anxiety disorder (7.1%) and panic disorder (4.5%) (Gulliver et al., 2015).

Furthermore, the idealization of athletes and their health status has led to the generalized assumption of a low prevalence of depression experienced by athletes and above all, athletes themselves are taught to be tough and to focus on physical performance. From the research findings, it is well understood that an athlete's mental state plays a crucial role in their ability to perform (Bar & Markser, 2013). Therefore, well documented causes of depression among athletes, such as: a high pressure environment focused on winning and achieving progress, overtraining syndrome (Carfagno & Hendrix, 2014), concussions and injuries (Vargas et al., 2015; Roiger et al., 2015), support that mental health among athletes has gained increasing attention in recent years.

Unfortunately, evaluation of the mental health status of athletes relies on online self-reported questionnaires such as: a self-report Internet-based survey (Gulliver et al., 2015), the Distress Screener, the Utrecht Burn-Out Scale, the 12-item General Health Questionnaire, Rosenberg's Self-Esteem Scale (Gouttebarge et al., 2015), a cross-sectional online survey including Wakefield Depression Inventory (Weigand et al., 2013) and The Beck Depression Inventory (Vargas et al., 2015), while no clinical parameter was included in these assessments.

The main disadvantage of these tools is their partiality. The patients' interpretation of their emotional terms and cultural conception of depression influences screening reliability. Therefore, under- or overreporting of symptom severity often occurs, leading to inaccurate evaluation. Moreover, these questionnaires cannot be completed by individuals with physical debility or compromised cognitive function, such as injured athletes (Kerr & Kerr, 2001).

The clinical relevance of these studies could be significantly increased by applying a biological parameter analysis, such as the simultaneous analysis of biogenic amines from urine, due to the fact that biofluids such as urine are an easy, rapid and non-invasive matrix to collect.

Given that biogenic amines are characterized by extremely low concentrations, low chemical stability, high susceptibility for spontaneous oxidation and decomposition

at high pH level, their analysis requires specific and very sensitive bioanalytical methods. Concurrent studies showed tremendous interferences from the matrix (such as plasma, serum or urine), which affected both the sensitivity and specificity of the developed methods (Bicker et al., 2013).

Radioenzymatic and immunological assays were replaced by more sensitive and selective chromatographic methods, while high-performance liquid chromatography represents the standard method for separation and quantification in biological samples, coupled with electrochemical (Patel et al., 2005; Duncan et al., 1984; Holmes et al., 1994; Raggi et al., 1999; Unceta et al., 2001; Willemsen et al., 2003; Sabbioni et al., 2004; Kumar et al., 2011), fluorescence (Mitsui et al., 1985; Jeon et al., 1992; Ishida et al., 1993; Kehr, 1994; Yamaguchi et al., 1998; Fujino et al., 2003; Zhao & Suo, 2008), chemiluminescence (Nalewajko et al., 2007) or mass spectrometry detection (Törnkvist et al., 2004; Bourcier et al., 2006; De Jong et al., 2007; Gu et al., 2008; Cai et al., 2010; Clark & Frank, 2011; He et al., 2011; He & Kozak, 2012; Fang et al., 2012).

One successful approach for both eliminating interferences and increasing selectivity and sensitivity relies on a derivatization step prior to analysis. Two derivatization agents, benzylamine (BA) and 1,2-diphenylethylenediamine (DPE), were used in several HPLC-FLD methods for the derivatization of biogenic amines.

DPE was proposed as a derivatization agent for the simultaneous analysis of NE, E and DA, and the method was employed for the evaluation of catecholamine levels in plasma from healthy humans (Mitsui et al., 1985) and urine from patients with Alzheimer's disease (Liu et al., 2011). Several parameters, such as additional buffers, new reagents and even automatization of the derivatization process, were documented (Liu et al., 2011; Kehr, 1994).

BA was used as a derivatization agent for the simultaneous determination of 5-hydroxyindole-3-acetic acid (5HIIA), ST, NE and E in human urine, under mild conditions (Yamaguchi et al., 1998). A postcolumn derivatization method with BA was developed for the monitoring of basal ST release in rat brain microdialysates. This method employed for the first time an ion-pairing reagent in the mobile phase and ensured applications for low volume samples (Yoshitake et al., 2001).

The combination of these two derivatization reagents, BA and DPE, and the chemistry behind it (Yoshitake et al., 2006) allow the simultaneous derivatization of NE, E, DA, ST and some of their metabolites. A HPLC-FLD method was developed to quantify biogenic amines from rat prefrontal cortex microdialysate samples after treatment, in a run time of about 40 min (Fujino et al., 2003; Yoshitake et al., 2004).

Hypothesis

Since biogenic amines are strongly related to the effects of exercise on health status, an accurate evaluation of these effects should be based on the monitoring of biogenic amine levels from biofluids. The aim of this study was the development of a new reversed phase chromatographic method (RP-HPLC) with fluorescence detection for the simultaneous analysis of E, NE, DA and ST in a shorter run time, using recent advances in the chemistry of stationary phases.

Material and methods

Chemicals: deionized and bidistilled water purified with a Millipore Milli-Q50 system, 0.1 N hydrochloric acid (HCl), methanol (MetOH) (Chimopar), acetonitrile (ACN) HPLC gradient grade, acetic acid 100%, benzylamine hydrochloride(BA),3-cyclohexylamino-1-propanesulfonic acid (CAPS), meso- 1,2-diphenylethylenediamine (DPE), Glycine (Gly) (Sigma-Aldrich), potassium hexacyanoferrate (III) ($K_3[Fe(CN)_6]$), sodium acetate trihydrate, sodium heptane-1-sulfonic acid salt (Merck), epinephrine (E), norepinephrine (NE), dopamine DA (Fluka), serotonin ST, (−)-3,4-dihydroxynorephedrine DHN (internal standard) (Sigma-Aldrich).

Reagents: 0.3M BA and 0.3M CAPS pH=10.00 in water:methanol (90:10v/v); 20 mM $K_3[Fe(CN)_6]$ in water:methanol (50:50v/v), 0.05 M DPE in 0.1 M HCl, 0.3 M Glycine in water; Derivatization reagents (DR): DRI was a mixture of 0.3 M BA: 0.03 M CAPS: 0.02 M $K_3[Fe(CN)_6]$: methanol 2:6:3:24 (v/v) and DRII was a mixture of 0.05 M DPE: 0.3 M Gly 2:1 (v/v).

Standard solutions: 1 mg/mL E, NE, DA, ST, DHN in 0.1 M HCl and further diluted with water to desired concentrations before use.

Equipment: HPLC system (Waters 2695 Alliance), fluorescence detector (Waters 2475 Multi λ Fluorescence Detector), chromatographic column: XBridge C_{18} (4.6x150 mm, 3.5 µm), XBridge guard column (4.6x20 mm, 3.5 µm).

Derivatization was performed as described (Fujino et al., 2003). In brief, 40 µl of DRI were added to 100 µl of an aqueous mixture of epinephrine (20 ml), norepinephrine (20 ml), dopamine (20 ml), serotonin (20 ml) and internal standard (20 ml) placed in a 1.5 mL test tube. After reacting at room temperature for exactly 2 min, 40 µl of DRII were added; the test tube was homogenized, tightly sealed and heated at 50ºC for exactly 20 min. The derivatization reaction was quenched by transferring the mixture to a pre-cooled amber vial with 300 µl insert and kept on ice for 20 min. For the blank sample, 220 µl water were subjected to the same procedure; 20 µl of each sample were injected into the chromatograph.

Stability of the fluorescent derivatives was evaluated by analysis of the same sample at t=0 (immediately after derivatization), t=4 h and t=24 h while stored at 5°C in the autosampler.

Chromatographic conditions. Biogenic amine fluorescent derivative separation, on the new chromatographic column XBridge C_{18}, 4.6x150 mm, 3.5 µm, protected by a guard column XBridge 4.6x20 mm, 3.5 µm (Waters), was evaluated in terms of peak resolution, retention time (t_R) and peak area (fluorescence intensity).

The mobile phase for isocratic elution was acetonitrile (mobile phase A): acetate buffer (10 mM acetate buffer, 1 mM heptane-1-sulfonic acid sodium salt, pH=5.30) (mobile phase B) in a ratio of 35:65 (v/v). The flow rate was set to 0.8 mL/min and the column was kept at 30°C. The elution gradient was from 32% (0 min) to 52% A (20 min), using the same mobile phases, flow rate and column

temperature.

The samples were maintained in an autosampler set at 5ºC during analysis, and detection was at λex=345 nm/ λem=480 nm.

Method validation. The linearity, accuracy and precision of the developed method were evaluated according to the accuracy profile method (Hubert et al., 2007; Hubert et al., 2004; Hubert et al., 2008).

Results

Fluorescent derivative stability in time was the first parameter evaluated. We measured the fluorescence intensity (peak area) of the same mixture at the two points in time (t=0 h and t=4 h). After derivatization, the vial with the test mixture was kept in the freezer (-22°C) for 20 min. Data showed that the peak areas of NE, E and DHN slightly increased, ST was constant, while DA decreased (Figure 1).

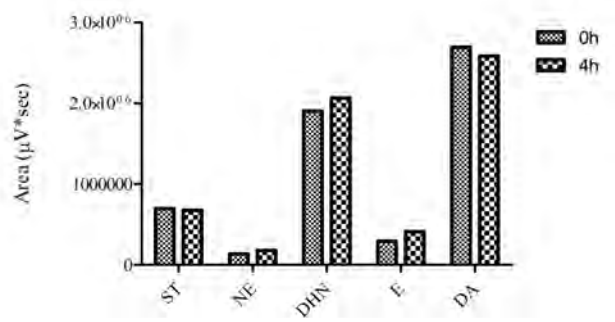

Fig. 1 – Evaluation of biogenic amine fluorescent derivative stability.

Based on the variation observed, we conducted a comparative evaluation of reaction quenching effectiveness: transferring the mixture after derivatization to a vial and placing it on an ice bath or transferring the mixture directly to a pre-cooled (-22°C) vial and keeping it on the ice bath for 20 min. The last reaction quenching method led to 24 h stable derivatives stored at 5ºC.

In isocratic mode, the fluorescent derivatives of all biogenic amines, ST, NE, E, DA, and the internal standard DHN eluted at the following retention times: NE t_R=6.29 min, ST t_R=7.26 min, DHN t_R=8.94 min, E t_R=14.63 min and DA t_R=22.44 min (Figure 2).

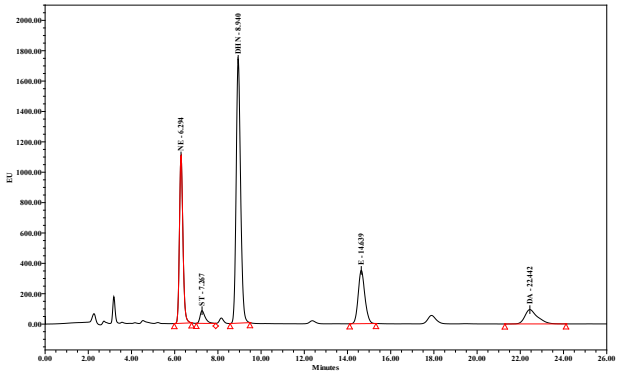

Fig. 2 – Separation of biogenic amine fluorescent derivatives in isocratic elution NE 49.50 ng/mL, ST 56.50 ng/mL, DHN 49.86 ng/mL, E 47.83 ng/mL and DA 50.08 ng/mL.

Isocratic elution resolved separation of all analytes in a 26 min run time with a good resolution, but with low sensitivity and peak symmetry, especially for DA. In order to improve separation, a gradient elution was chosen.

The separation achieved in gradient elution and the corresponding retention times are shown in Figure 3, where: NE t_R=6.70 min, ST t_R=7.35 min, DHN t_R=8.48 min, E t_R=11.77 min and DA t_R=15.26 min. Also, we detected additional peaks on the chromatogram, corresponding to the excess of derivatization reagents.

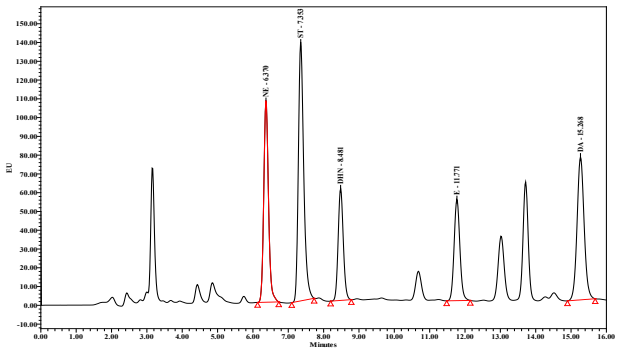

Fig. 3 – Separation of biogenic amine fluorescent derivatives in gradient elution NE 6.75 ng/mL, ST 90.00 ng/mL, DHN 3.12 ng/mL, E 6.82 ng/mL and DA 28.80 ng/mL.

Further, we evaluated the linearity, accuracy and precision of the developed method.

The linear relation between peak areas and concentrations across the range of 2.5 to 15.2 ng/mL for NE, 30 to 210 ng/mL for ST, 6.8 to 15.8 ng/mL for E and 10.8-63.0 ng/mL for DA was estimated (Table I). The correlation coefficient, y-intercept and slope of the regression line for each biogenic amine were: y=9.10e-001x-2.52E-001, r=0.999 for NE, y=9.04E-002x-4.08E-001, r=0.999 for ST, y=5.58E-001x-2.17E001, r=0.999 for E and y=2.08E-001x+1.10E-001, r=0.999 for DA.

Accuracy was evaluated at three levels of concentration for each analyte and the results are presented as recovery in Table I. Repeatability was evaluated for each analyte at one level of concentration based on three runs and the coefficients of variation were: 1.66% for NE, 2.36% for ST, 1.46% for E and 2.25% for DA.

Also, the detection limit and quantification limit for each analyte were calculated based on calibration curve slopes and standard deviation of area at the lowest concentration of calibration curves (low limit of detection (LLOD) and low limit of quantification (LLOQ) (Table I).

Table I

Evaluation of accuracy, limit of detection and limit of quantification.

Compound	Concentration (ng/mL)	Calculated value	Recovery (%)	LLOD (ng/mL)	LLOQ (ng/mL)
NE	2.587	2.666	103.054	0.225	0.560
	4.725	4.620	97.778		
	15.197	15.179	99.882		
ST	31.500	31.107	98.752	2.250	4.500
	90.000	90.577	100.641		
	213.750	213.564	99.913		
E	6.825	6.940	101.685	0.210	0.525
	12.600	12.523	99.389		
	15.750	15.967	101.378		
DA	10.800	10.481	97.046	0.900	2.250
	19.800	19.911	100.561		
	63.000	61.894	98.244		

Discussions

The most common mental health disorder is depression, which has a significant negative effect on the quality of life of more than 350 million people of all ages worldwide, according to a 2012 report of the World Health Organization. By 2030, depression will be the leading cause of disease burden globally (1).

Since the 1960's, depression has been linked to imbalances in the brain with regard to biogenic amines represented by catecholamines - epinephrine, norepinephrine, dopamine and the indoleamine - serotonin, which act as neurotransmitters and hormones both at peripheral and central level. This "monoamine deficiency" theory (Coppen, 1967) is still supported considering that the high-affinity transporters for these amines are primary targets for antidepressant drugs and the increase in extracellular levels of these biogenic amines induces therapeutic benefits (Hensler et al., 2013).

As recently reviewed (Haenisch & Bonisch, 2011), disturbances in the fine balance between biogenic amines can be monitored in biofluids, which can support their role as potential clinical screening tools and biomarkers for diagnosis, prediction or prognosis of depression (Marc et al., 2011; Hensler et al., 2013).

The aim of this study was to develop a new separation and quantification method with fluorescence detection for the simultaneous analysis of epinephrine, norepinephrine, dopamine and serotonin. The main advantages of this method are its shorter run time and the possibility of quantifying low ng/ml concentrations, using recent advances in the chemistry of stationary phases.

Biogenic amines are low-molecular weight molecules with a very polar nature and positive charge under acidic conditions. Although a great diversity of chromatographic columns are available, reversed-phase C18 columns are still the standard choice because of the fast elution of polar compounds and the relatively short run time (Bicker et al., 2013).

A high-resolution separation, in only 16 min run time, and very symmetrical peaks were obtained. Also, the method allows the quantification of biogenic amines with good linearity, accuracy and precision. Furthermore, the range of quantification for all biogenic amines makes this method suitable for simultaneous monitoring of biogenic amines in urine and the shorter run time is an advantage for routine clinical use. In current laboratory analysis, urinary levels of biogenic amines are employed for the diagnosis of pheochromocytoma (2),(3) and physiological concentrations are reported to be found at ng/mL level.

Considering this, the developed method can be successfully applied for the evaluation of the impact of physical exercise on biogenic amine levels in urine and its effects on the mental health status of athletes.

Conclusions

1. In conclusion, we developed a new RP-HPLC-FLD method for simultaneous determination of biogenic amines. The method is simple, rapid, accurate, sensitive and suitable for routine analysis, ensuring a very good separation and quantification of E, NE, DA and ST at ng/mL levels.

2. It will undergo complete validation using urine as a matrix and will be further employed as an excellent clinical tool for biomarker discovery. It will serve as a promising tool that will help clinicians to monitor the effects of exercise on mental health status in athletes and their predisposition to depression or its onset, and to guide the selection of the most effective therapies.

Conflict of interest

The authors confirm that this article content has no conflict of interest.

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Effects of tramadol treatment on aerobic exercise capacity in subjects with chronic non-specific low back pain

Efectele administrării de tramadol asupra capacității aerobe de efort la subiecți cu lombosacralgie cronică nespecifică

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Abstract

Background. Chronic non-specific low back pain is a common disorder associated with a high degree of physical deconditioning.

Aims. To assess the effect of tramadol administration on pain and aerobic exercise capacity in human subjects with chronic non-specific low back pain.

Methods. The study was conducted from June to December 2015, at the Clinical Rehabilitation Department of the Elias Emergency University Hospital in Bucharest. The study population consisted of 25 subjects suffering from chronic non-specific low back pain. They were divided into a placebo group and a tramadol group. The medication consisted of tramadol (50 mg) capsules, and placebo respectively, disposed as identical capsules. Both tramadol and placebo were administered orally twice a day, for a period of seven days. All subjects completed the visual analogue scale and underwent cardiopulmonary exercise testing using a cycle ergometer with progressively increasing work rate until the exercise was symptom limited at the baseline and at the end of the study. For each subject, pain response, peak oxygen uptake (VO_2 max), aerobic contribution to exercise (VO_2/WR), ventilatory efficiency (VE/VCO_2) were investigated baseline and after 7 days of treatment.

Results. The results of VAS were significantly lower for the tramadol group; in this group, VO_2 max and VO_2/WR significantly increased. The ventilatory efficiency improved, the VE/VCO_2 values significantly decreasing in the tramadol group.

Conclusions. In chronic non-specific low back pain subjects, tramadol reduces pain, improves aerobic exercise capacity and effort tolerance.

Key words: tramadol, deconditioning, low back pain.

Rezumat

Premize. Lombosacralgia cronică nespecifică este o afecțiune comună, asociată cu un grad înalt de decondiționare fizică.

Obiective. Evaluarea efectelor administrării de tramadol asupra durerii capacității aerobe de efort fizic, la subiecți umani cu lombosacralgie cronică nespecifică.

Metode. Studiul s-a desfășurat în perioada iunie-decembrie 2015, la Clinica Recuperare Medicală a Spitalului universitar de Urgență Elias, București. 25 subiecți umani cu lombosacralgie cronică nespecifică au intrat în studiu. Au fost randomizați în 2 loturi: Martor și Tramadol. S-a administrat tramadol capsule 50 mg, respective placebo în aceeași condiționare farmacologică timp de 7 zile. Toți subiecții au completat scala visual analogă de evaluare a durerii și au fost testați la efort cu ajutorul cicloergometrului cu putere progresiv crescândă, la momentul inițial și după 7 zile de tratament. Pentru fiecare subiect s-au urmărit răspunsul la durere, evoluția volumului maxim de oxigen (VO_2 max), contribuției aerobe la efort (VO_2/WR), coeficientului ventilator al dioxidului de carbon (VE/VCO_2) și a frecvenței cardiace, inițial și la sfârșitul celor 7 zile de studiu.

Rezultate. În lotul care a primit tramadol s-a constatat o ameliorare semnificativă statistic a valorilor volumului maxim de oxigen inspirat, a contribuției aerobe la efort, precum și a echivalentului ventilator al dioxidului de carbon. Nu s-au produs modificări în frecvența respiratorie la momentul final al studiului. Analiza statistică de corelație susține efectul tramadolului asupra parametrilor evaluați.

Concluzii. Administrarea de tramadol la subiecții umani cu lombosacralgie cronică nespecifică a redus durerea, a crescut capacitatea aerobă de efort și toleranța la efortul fizic.

Cuvinte cheie: tramadol, decondiționare, lombosacralgie.

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Introduction

Pain is one of the most important factors in limiting exercise capacity. About 80-85% of back pain episodes have no known aetiology. Low back pain (LBP) is a common problem and a major cause of disability among adults worldwide. It affects over 80% of persons at some point of their life (Harstall & Ospina, 2003). Evidence suggests that for less than 15% of patients with LBP it is possible to assign a specific back pain category, such as trauma, mechanical injury, spinal cord injury, inflammation, infection, and tumours. In the majority of patients, LBP is non-specific (Kool J et al., 2004). Chronic non-specific low back pain (CNSLBP) is pain localized to the lower back without radiation (Manusov, 2012), lasting for more than 12 weeks (Koes et al., 2010).

In time, progressive decrease in physical activity in patients with CNSLBP lowers their aerobic capacity. Deconditioning induces, in turn, even more pain, loss of function and disability in these subjects (Hodlemans et al., 2004; Duque et al., 2009). Tramadol, a centrally acting synthetic analgesic, produces its effect by binding to opioid receptors and by inhibiting reuptake of noradrenaline and serotonin. It is an effective drug for the treatment of moderate to severe pain in a variety of acute and chronic conditions. Tramadol does not have a depressant effect on respiration like most opioids do, and has low abuse potential (Cucuieț et al., 2008). Furthermore, the National Institute for Health and Care Excellence recommended tramadol for people with CNSLBP not responding to other treatment options (1).

Physical exercise is complex stress (neuromuscular, oxidative, respiratory and cardiovascular, endocrine and metabolic, emotional) and a physiological activator of the endogenous opioid system, therefore pain suppression could be considered an adaptive response (Tache & Staicu, 2012).

The effects of tramadol on exercise capacity in human subjects have not been studied. Moreover, there are no other studies regarding the influence of tramadol on exercise capacity in persons suffering from CNSLBP.

Hypothesis

The aim of the present study was to explore the effects of tramadol treatment on pain and aerobic exercise capacity in patients with CNSLBP, and to collect data guiding the design of a larger hypothesis-testing study, based on previous positive experimental observations regarding the effects of chronic tramadol administration on exercise capacity (David et al., 2007), the high prevalence of CNSLBP and WHO recommendations for its management.

Material and methods

Cardiopulmonary exercise testing (CPET) allows simultaneous evaluation of the cardiovascular and respiratory systems performing their major function, that is, gas exchange between cells and the environment. The success of these organ systems in achieving this function is reflected in the O_2 uptake and CO_2 output in response to a specific work rate and their relation to heart rate, ventilation, and to one another. Exercise requires an integrative cardiopulmonary response in order to support the increased respiratory demands (O_2 consumption and CO_2 production) of the muscles in contraction.

Therefore, gas exchange measurements are fundamental in order to understand the causes of exercise limitation (Wasserman et al., 2012).

Research protocol

a) Period and place of the research

The study was conducted in accordance with ethical standards on human experimentation and with the Helsinki Declaration of 1975, as revised in 1983. Following the approval of the Ethical Committee of the "Elias" Emergency University Hospital (Bucharest), the informed consent was obtained from all 25 persons enrolled. The study and the measurements were carried out between January and June 2014.

b) Subjects and groups

The patients were recruited one by one during 6 months, in order of their presentation to the Rehabilitation Department of our hospital. Technically, 25 subjects with CNSLBP joined the study. The subjects were randomised into two groups of 12 and 13 patients, by a computer-generated random number. As shown in the flow chart number 1, 35 subjects were enrolled, 10 were excluded (of which 5 did not meet the inclusion criteria, 3 declined to participate, 1 was not compliant to medication, and 1 reported adverse effects – nausea and vomiting).

Group I: Control, 12 subjects, receiving placebo capsules 50 mg orally, twice a day

Group II: Tramadol, 13 subjects, receiving tramadol capsules 50 mg orally, twice a day

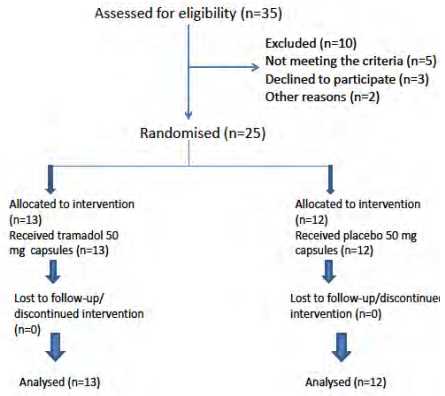

Fig.1 – Flow diagram of progress through the phases of the study (i.e, enrolment, intervention, allocation, follow-up, and data analysis).

The including criterion was the diagnosis of moderate intensity CNSLBP, age 20-60 years. Beyond this, all the subjects were clinically healthy.

Exclusion criteria included known allergy or sensitivity to the drug, obesity, hypertension, cardiac failure, renal insufficiency, diabetes mellitus, viral hepatitis, hepatic cirrhosis, metabolic syndrome, ongoing therapy with sustained-release opioids, MAOI, SSRI, tricyclic antidepressants, neuroleptics, and seizure disorders. Patients who were under treatment with other analgesics, steroidal or non-steroidal anti-inflammatory drugs or

vitamins were also excluded.

c) Tests applied

A single-blinded randomised controlled trial was conducted. The study medication consisted of placebo in group I, and tramadol (50 mg) capsules in group II. Both the placebo and tramadol were given under the same pharmacological conditioning, orally, twice daily for a period of 7 days.

All patients completed the visual analogue scale (VAS) and underwent CPET using a cycle ergometer (Ergoline 100/200, with Cosmed Quark PFT Ergo, produced by Cosmed Italia, Via Pianni de Monte Savello, Rome, Italy), with progressively increasing work rate until the exercise was symptom limited at baseline (T_0) and at the end of the study period (T_1). Practically, the subject exercised on a cycle ergometer while measurements of gas exchange were made, breath by breath, at rest (1 minute), during 2 minutes of low level exercise (warm-up), and while the work rate was increased each minute. The patient was encouraged to continue as long as he/she felt able. To determine the work rate increase, we used the recommended standard procedure.

The following parameters were assessed:

1. VAS - an adapted visual analogue questionnaire, scaled from 1 (no pain) to 6 (worst pain ever)

2. Peak VO_2 (VO_2 max) - highest VO_2 achieved during maximal effort in an increasing work rate exercise test. It is expressed in O_2 milliliters/minute/kilogram. The peak VO_2 is the first measurement to be examined and it establishes whether the patient's physiological responses allow normal maximal aerobic function.

3. Aerobic contribution to exercise (VO_2/WR) - it measures the aerobic work efficiency. The VO_2-work rate relationship describes how much O_2 is utilised by the exercising subject in relation to the quantity of external work performed. It may decrease in cardiovascular diseases.

4. Ventilatory efficiency (VE/VCO_2) - indirect measure of effort tolerance. It measures the efficiency or inefficiency of CO_2 elimination. It has high values in respiratory diseases with ventilation-perfusion mismatching that causes ventilation to be inefficient in eliminating CO_2 from the body (Wasserman et al., 2012).

d) Statistical processing

For data processing, we used StatsDirect v.2.7.2. and Microsoft Office Excel 2007, with comparison statistics as described below.

Results

The two investigated groups were compared. There were no statistical differences between the two groups regarding age and the body mass index.

Subsequently to questionnaire administration (i.e., VAS), data centralisation and processing, the following results, presented in Table I, were obtained: pain was reduced in group I with placebo administration on the last day of study in a statistically non-significant manner. As compared with group II, pain was significantly reduced by tramadol and exercise administration at the end of the study.

The statistical analysis of exercise capacity indicators yielded the following results: peak VO_2 decreased for group I, in a non-significant manner, but it was significantly higher for group II (Table II); aerobic contribution to exercise (VO_2/WR) was smaller for group I, and significantly increased for group II (Table III), ventilatory efficiency (VE/VCO_2) decreased for group I, in a non-significant manner, and it significantly increased for group II (Table IV).

Table I

Comparative analysis of pain indicators studied in the two groups and statistical significance.

Parameter	Group	Time	Mean	SE	Median	SD	Minimum	Maximum		*P*	
VAS	I	T0	3.57	0.137	4	0.514	3	4	T0-T1	T0	0.3550
		T1	2.5	0.139	2.5	0.519	2	3	0.0002	I-II	
	II	T0	3.31	0.151	3	0.602	2	4	T0-T1	T1	< 0.0001
		T1	1.13	0.085	1	0.342	1	2	< 0.0001	I-II	

Table II

Comparative analysis of peak VO_2 studied in the two groups and statistical significance.

Parameter	Group	Time	Mean	SE	Median	SD	Minimum	Maximum		*P*	
VO_2 max	I	T0	21.61	1.225	22.74	4.585	12.8	26.51	T0-T1	T0	0.4475
		T1	20.05	0.983	20.44	3.678	12.8	26.39	0.1465	I-II	
	II	T0	20.75	1.632	18.77	6.528	11.19	33.3	T0-T1	T1	0.1271
		T1	22.92	1.534	22.52	6.136	13.47	36.45	0.0011	I-II	

Table III

Comparative analysis of VO_2/WR studied in the two groups and statistical significance.

Parameter	Group	Time	Mean	SE	Median	SD	Minimum	Maximum		*P*	
VO_2/WR	I	T0	8.21	0.454	8.6	1.7	4.2	10.2	T0-T1	T0	0.0986
		T1	6.67	0.456	6.85	1.706	3.6	9.8	0.0002	I-II	
	II	T0	7.34	0.433	7.75	1.733	4.2	9.8	T0-T1	T1	0.0045
		T1	8.84	0.532	9.35	2.129	5.6	12.7	1.23×10^{-5}	I-II	

Table IV

Comparative analysis of VE/VCO_2 studied in the two groups and statistical significance.

Parameter	Group	Time	Mean	SE	Median	SD	Minimum	Maximum	*P*		
VE/VCO_2	I	T0	26.321	0.719	25.95	2.690	21.7	30.7	T0-T1	T0	0.9939
		T1	26.26	0.673	26.3	2.520	22.3	30.9	0.9447	I-II	
	II	T0	26.33	1.058	25.65	4.232	17.1	35.7	T0-T1	T1	0.1038
		T1	24.21	1.016	23.7	4.065	15.1	32.3	9.68×10^{-5}	I-II	

Discussion

To our knowledge, there are no other clinical studies on the effects of tramadol therapy on exercise capacity in CNSLBP patients.

The aim of this pilot study was to investigate the effect of the administration of 50 mg tramadol on pain and exercise capacity in clinically healthy subjects with CNSLBP.

It was found that tramadol improved all the evaluated parameters. This is also supported by the results of correlation analysis.

Our results are in agreement with experimental studies which have shown that tramadol improves exercise capacity, the psychological state and redox status in trained rats. These findings were explained by the antioxidant and antidepressant effects of this drug (David et. al., 2007; Ionescu & Tache, 2011). As we previously stated, chronic pain is associated with a decrease in exercise capacity, a depressant state (Kool et al., 2004) and mood changes, so the increase in exercise capacity may be a result of the antidepressant action of tramadol.

The analgesic effect of moderate intensity exercise is a well studied issue. Our results are in accordance with these findings (Frontera, 2015). Moreover, tramadol administration reduces pain in human subjects with CNSLBP in the context of physical exercise.

Other studies have shown that tramadol does not have depressant effects on respiration, like most opioids do, suggesting that mechanisms other than opioid receptor activity play a significant role in producing analgesia. Moreover, tramadol was reported to have antitussive effects as shown in a double-blinded randomised, controlled study (Elmawgoud, 2013). In agreement with these findings, our study indicates that tramadol improves VO_2 max and VE/VCO_2 values in patients with CNSLBP.

Pain regulation by the endogenous opioid system and its receptors has been the purpose of many studies starting with 1960. However, documentation is more extensive for those pertaining to the μ-oipioid receptor, as this is the site of action of opiate analgesics (including tramadol) and the receptor most associated with pain suppression (Zubieta, 2009).

Moreover, there are studies demonstrating that the endogenous opioid system may regulate adrenaline and serotonin secretion during physical exercise (Pallazo et al., 2006). Tramadol induces its analgesic effect through two mechanisms. One mechanism relates to a weak affinity for μ-opioid receptors (6000-fold lower compared to morphine). The non-opioid mechanism appears to be related to the ability of tramadol to raise the synaptic levels of the neurotransmitters serotonin and norepinephrine (Raffa & Friederichs, 2003).

Furthermore, serotonin is secreted from the posterior horn in the following conditions: stimulation of the sciatic nerve, inflammatory and chronic pain (Pallazo et al., 2006).

An experimental study has shown that tramadol provides a cardioprotective effect against myocardial ischemia-reperfusion in isolated rat heart (Billir et al., 2007). This is in agreement with our finding that tramadol improved VO_2 max and VO_2/WR (indirect cardiovascular marker) values.

Tramadol, as a weak opioid, is prescribed for any patient suffering from moderate to severe pain including athletes, because the World Anti-Doping Agency (WADA) list available does not include tramadol (2). CNSLBP may disable the individual, decrease exercise capacity and reduce sports performance.

Conclusions

1. Our results indicate that tramadol reduces pain, has a positive effect on aerobic exercise capacity, and improves exercise tolerance when administered to patients suffering from CNSLBP.
2. Taking into account the aforementioned, it could be speculated that tramadol has ergotropic effects and it should be carefully prescribed to athletes because it could be a doping agent. It would be interesting to find out if tramadol would enhance aerobic exercise capacity in athletes too, as a key learning of our study for the design of a future study.
3. Further studies are necessary in order to elucidate the mechanisms by which tramadol improves exercise capacity, as well as to add other clinical applicability to the information obtained.

Conflicts of interest

Nothing to declare.

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The present article processes data from the doctoral thesis of the first author.

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The possible side effects of High Intensity Laser
Efectele adverse posibile ale laserului de înaltă intensitate

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Abstract

Background. High Intensity Laser Therapy (HILT) is a recent rehabilitation therapy, which is succesfully used at present in posttraumatic diseases of the locomotor system including sport injuries, due to its fast efficacy and its non-invasive mode of action. HILT has not been studied until recently in clinical studies and not studied at all yet in terms of possible side effects.

Aims. 1) To select a program on a HILT device with standard parameters, in a standard application area; in this case it was a knee application; 2) to select the possible side effects or unpleasant reactions of HIL; 3) to evaluate the impact of HIL on the specific area, from the point of view of side effects or unpleasant reactions; 4) to analyze the data and to make an interpretation of the reached results.

Methods. The study comprised 20 volunteers, aged between 20-65, with no major recent surgeries or trauma, no major organ illnesses, skin type I, II, III or IV, with an apparently healthy knee joint, in the Rehabilitation Department of the Colentina Clinical Hospital of Bucharest. A Czech device: BTL-6000 High Intensity Laser, 12w, 1064 nm, in standard parameters was used to identify the side effects. We selected a group of parameters that were chosen to demonstrate, from the point of view of side effects or unpleasant reactions of heating, the impact of each application during 6 sessions: presence/absence of side effects such as: erythema, hyposensitivity, hypersensitivity, petechiae or the unpleasant sensation of heating, using the same scale: 0=absent; 1=present.

Results. No side effects of any applications were identified. An unpleasant sensation of heating was encountered in 5% of applications.

Conclusions. 1) The results do not identify any side effects of HIL applications. Only an unpleasant sensation of heating was encountered in 5% of cases, which is rather an individual intolerance to the duration of application and it is necessary to adapt the therapy time, in order to avoid it. 2) Further studies should be realized on a larger group, trying to evaluate the side effects of all the most used protocols existing in the machine manual.

Key words: High Intensity Laser, side effects, unpleasant sensation of heating.

Rezumat

Premize. Terapia cu laser de înaltă intensitate (High Intensity Laser Therapy-HILT) este un mijloc de reabilitare recent introdus în arsenalul terapeutic de recuperare. HILT este folosit în prezent cu succes în patologia post traumatică a aparatului locomotor, inclusiv după traumatismele sportive, datorită efectelor benefice instalate rapid şi a modului de acțiune non-invaziv, fiind încă puțin studiat în studii clinice şi deloc studiat din punctul de vedere al efectelor adverse.

Obiective. 1) Selectarea unui program de aplicaţie a laserului de înaltă intensitate, cu parametrii standard, precum şi selectarea unei zone de aplicaţie bine definite, în acest caz la nivelul genunchiului; 2) selectarea posibilelor efecte adverse sau reacţii neplăcute ale aplicaţiilor de HIL; 3) evaluarea impactului aplicaţiilor de HIL din punctual de vedere al efectelor adverse sau al reacţiilor neplăcute; 4) analizarea datelor şi interpretarea rezultatelor.

Metode. Studiul a fost realizat pe un grup de 20 de voluntari, cu vârste cuprinse între 20-65 de ani, care nu au avut intervenţii chirurgicale sau traumatisme recente, cu fototipul de piele din clasele de tip I, II, III sau IV conform scalei Fitzpatrick (pielea neagră sau brun închis a fost exclusă), cu articulaţia genunchiului aparent sănătoasă, din punct de vedere clinic, în cadrul Secţiei de Recuperare Medicală a Spitalului Clinic Colentina din Bucureşti, folosind un dispozitiv BTL-6000 High Intensity Laser, 12w, 1064nm, şi un protocol specific al aplicaţiilor în vederea identificării posibilelor reacţii adverse. Am înregistrat un grup de parametri care să arate, din punctul de vedere al efectelor adverse sau al reacţiilor neplăcute, impactul HIL, după fiecare aplicaţie, timp de 6 şedinţe: prezenţa/absenţa efectelor secundare care pot apărea: eritem, hipoestezie, hiperestezie, peteşii sau senzaţie neplăcută de căldură, folosind aceeaşi scală pentru toţi aceşti parametri:0 = absent; 1 = prezent.

Concluzii. 1) Rezultatele nu au identificat efecte secundare ale aplicaţiei HIL. Doar senzaţia neplăcută de căldură a fost găsită în 5% din cazuri, dar aceasta este, de fapt, un efect de intoleranţă al aplicaţiei HIL-faza II "biostimularea", fiind necesară reducerea timpului aplicaţiei, în funcţie de toleranţa individuală, în vederea evitării senzaţiei neplăcute de căldură. 2) Efectuarea unui studiu pe un grup mai mare, cu încercarea de a evalua efectele secundare a celor mai folosite protocoale existente în manualul de utilizare.

Cuvinte cheie: laser de înaltă intensitate, efecte secundare, senzaţie neplăcută de căldură.

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Introduction

High Intensity Laser Therapy (HILT) is a recent rehabilitation therapy successfully used in orthopedic diseases and sports medicine, due to its fast efficacy, with rapid and permanent relief of pain and the resulting reduction of the recovery time (Mondardini, 2002; Valent, 2009; Santamato, 2009). Compared with low level laser therapy (LLLT), whose effects are well studied (Karu, 2005; Hawkins, 2007; Stergioulas, 2008; Ribeiro, 2015), HILT is a new non-invasive laser therapy that has been less studied in clinical studies and not studied at all yet in terms of possible side effects. The properties of laser beam are: absorption, transmission, scattering, and reflection (Fig. 1).

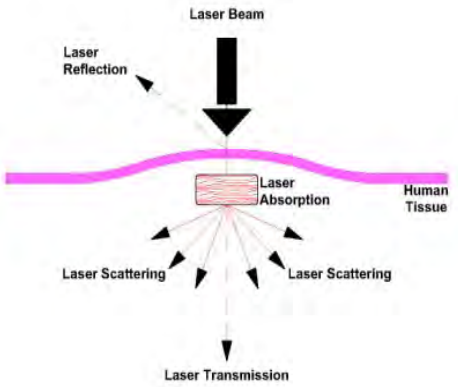

Fig. 1 – Interactions between laser beam and human tissue.

The most important physiological effects of HIL (High Intensity Laser) are (Tuner & Hode, 2010; Prouza et al., 2013; Pryor, 2009): increase in the activity of many intracellular enzymes, specifically in the Krebs cycle, increase of oxygen transportation and also, of glucose utilization, stimulation of DNA synthesis, activation of the Na/K membrane pumps, increase of fibroblast activity, increase of phagocytosis activation, activation of metabolic cellular processes, local changes in some important inflammation mediators (such as histamine and prostaglandins) and in endorphin levels. The most important clinical effects are: analgesia and biostimulation. The analgesic effect is produced by high-power pulsed applications, which create inside the body photomechanical waves that reach the subcutaneous pain receptors, stimulate the A fibers and close the gate for pain transition (according to the gate control theory described by Melzack). The biostimulation effect is the ability to biostimulate cell growth and cell repair (Tuner & Hode, 2010; Prouza et al., 2013; Pryor, 2009). Other effects of HIL are: support for bone formation - migration and proliferation of osteoblasts (Kim et al., 2010; Vescovi et al., 2008; Ninomiya et al., 2003), regenerative processes in cartilaginous tissue such as a high amount of proteoglycans (Zati, 2011), thermal induced effects such as muscular relaxation and pain relief in the trigger points.

In terms of adverse effects, it is commonly accepted that this laser therapy has no known side effects when used by a properly trained professional (Boyraz et al., 2015; Viliani et al., 2010; Viliani et al., 2010).

The contraindications for HIL are: applications in the eye area – possibility of direct eye irradiation and retinal damage, tumor diseases, irradiation of malignancies and potential precancerous growths, irradiation of patients with cochlear implants, irradiation of endocrine glands, patients with febrile conditions, epilepsy, pregnancy, irradiation of freckles or tattoos, sensory deficit in the treatment area, photosensitive medication, direct application above metallic implants.

Other warnings and precautions are: the therapy parameters have to be adjusted according to the Fitzpatrick scale to avoid heating, scar tissue is associated with poor circulation and reduced cooling through heat transport by blood, sensitive skin may be hypersensitive to heat, redness can be associated with increased temperature and increased absorption properties of the skin, excessive fat tissue is known to transmit heat without much attenuation, no ointments, creams, lotions or heating lotion patches should be used at or in close proximity of the treated area, no therapies that could change body temperature (ultrasound, thermal therapy and electrotherapy) should be used prior to laser treatment.

Objectives

To select a program on a HILT device with standard parameters, in a standard application area; in this case it was a knee application; to select the possible side effects or unpleasant reactions of HIL; to evaluate the impact of HIL on the specific area, from the point of view of side effects or unpleasant reactions; 4) to analyze the data and to make an interpretation of the reached results.

Hypothesis

HIL is a new non-invasive laser therapy that produces no side effects at all. Still, in clinical practice there has been some concern regarding its tolerance and its possible unknown adverse effects because of its deep tissue penetration and maximum power over 50 times higher than in LLLT (low level laser therapy) (Pryor, 2009). Also, because in sport injuries both young and older people are affected, it was interesting to know if there was a difference in the presence/absence of any side effects.

Material and methods

Research protocol

The research was conducted with the approval of the Ethics Commission of the Colentina Clinical Hospital of Bucharest and with the informed consent of the subjects included in the study.

a) Period and place of the research.

From September to December 2014, we selected a group of volunteers, with apparently healthy knee joints, in the Rehabilitation Department of the Colentina Clinical Hospital of Bucharest.

b) Subjects and groups

We selected 20 volunteers, with apparently healthy knee joints. Inclusion criteria: age between 20-65, no major recent surgeries or trauma, no major organ illnesses, no pregnancy, no menstruation, skin type I, II, III or IV according to Fitzpatrick phototyping scale (dark brown and black skin was excluded).

c) Tests applied

A Czech device was used: BTL-6000 High Intensity Laser, 12 w, 1064 nm (Fig. 2).

Fig. 2 – BTL-6000 High Intensity Laser device used in the Rehabilitation Department of the Colentina Clinical Hospital, Bucharest (***, 2014a).

The device has a laser unit, a foot switch control and a hand piece which is precisely applied on the knee area in two phases, in every session: phase I - analgesia, and phase II - biostimulation. The group of volunteers followed an individualized medical prescription including 6 sessions of a single application of high intensity laser per day, on the anterior region of one knee, 3 sessions per week. For phase I -analgesia, the application was made by using continuous circular movements (Fig. 3).

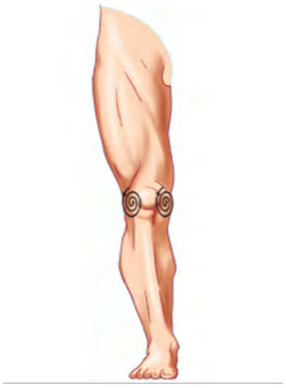

Fig. 3 – Phase I - analgesia (***, 2014b).

The device was manually set to the L-7129 program, with a power of 10 W, pulsed application with a frequency of 25 Hz, dose 12 J/cm2, total energy 300 J, wave length 1064 nm, area to be treated 25 cm2, for 2 minutes.

After the first phase, the device was manually set for phase II - biostimulation. In this case, the application was made by using continuous movements (Fig. 4).

Fig. 4 – Phase II - biostimulation (***, 2014b).

The device manual settings were to the L-7130 program, with a power of 5 W, frequency - density of 120 J/cm2, total energy 300 J, wave length 1064 nm, area to be treated 25 cm2. The recommended duration was 2-4 minutes and the application lasted for 4 minutes. During the procedure, the patient should feel pleasant warming-up of the skin in the application area.

The possible side effects described in the user's manual of this HIL device are: erythema that can temporarily occur in the treated area, temporary hyposensitivity, temporary hypersensitivity and petechiae. It is also necessary to monitor the unpleasant sensations of heating during phase II -biostimulation.

d) Statistical processing

We recorded a group of parameters that can illustrate, from the point of view of side effects or unpleasant reactions, the impact of HIL after each application during 6 sessions of therapy: presence/absence of local side effects that can temporarily occur, such as erythema, hyposensitivity, hypersensitivity, petechiae or an unpleasant sensation of heating, with the same denotation for all these parameters: 0=absence, 1=presence.

Results

After 6 sessions of daily HIL application, we obtained the following results regarding the number of patients, number of applications, and average values, as shown in Table I.

Table I
Results including the number of patients, number of applications, and average values.

Parameters	Number of patients	Number of applications with denotation 1=presence	Average %
Erythema	0	0	0
Hyposensitivity	0	0	0
Hypersensitivity	0	0	0
Petechiae	0	0	0
Unpleasant sensation of heating	1	6	5

The unpleasant sensation of heating was encountered in only 6 applications (on average in 5% of cases) and in those situations it was necessary to interrupt the application. Just 1 patient had an unpleasant sensation of heating, and this sensation appeared at the end of every session of phase II - biostimulation. On the other hand, no side effects - erythema, hyposensitivity, hypersensitivity or petechiae - occurred after the applications.

Discussion

The side effects of HIL were evaluated by using 5 parameters that were monitored for every patient after each session of HIL application. The results are in accordance with those of other studies performed for testing HILT efficacy, which reported the absence of side effects (Boyraz et al., 2015; Viliani, Martini, 2010; Viliani, Ricci, 2010). The results showed that an unpleasant sensation of heating was experienced in only 5% of the cases in the study; however, this effect is not a side effect, but rather

an intolerance to the duration of application of phase II - biostimulation. In this case, it can be recommended to shorten the period of application to a minimum, to avoid the unpleasant effect of heating.

Conclusions

1. The study was performed on a group of 20 volunteers, aged between 20-65, with no major recent surgeries or trauma and skin type I, II, III or IV, with an apparently healthy knee joint, in the Rehabilitation Department of the Colentina Clinical Hospital of Bucharest – CDPC, using a BTL-6000 High Intensity Laser and a specific protocol for applying the therapy, in order to identify possible adverse reactions to HIL therapy.

2. The results showed that no side effects to the HIL applications occurred, and HIL can be safely used in both young and older persons, aged between 20-65 years, a very common age interval for sport injuries.

3. The results evidenced that an unpleasant sensation of heating was encountered in only 5% of cases, which was rather an individual intolerance to the duration of application of phase II - biostimulation.

4. In HIL applications, it is necessary to adapt the therapy time to individual tolerance, in order to avoid the unpleasant sensation of heating.

5. Further studies should be conducted on larger groups, aiming to evaluate the side effects of all the most used protocols existing in the machine manual.

Conflicts of interests

There were no conflicts of interests.

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Physical training, an important factor in the training of junior female volleyball players

Pregătirea fizică, factor determinant în pregătirea jucătoarelor de volei junioare

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Abstract

Background. Recently, in order to achieve an optimal physical condition specific to sport games, volleyball professionals have tried to change the physical training plan starting at the junior level. Female volleyball players who are still in the period of physical development require a very good physical training which has an important role both in improving their functional capacity and in avoiding sport accidents, all these being essential for their future life as professional volleyball players.

Objectives. This research consists of the planning and experimental implementation of a physical training program with the aim of optimizing the physical condition of female junior volleyball players, in order to obtain best performances for long periods of time.

Methods. The research comprised two groups: the experimental group including twelve junior volleyball players of CSS Tg. Mures, and the control group formed by the junior volleyball players of CSS Sibiu. The motor capacity evaluation tests were: vertical jump with take-off and reaching the maximum point with one hand, 4 m lateral movement from lateral lunge by touching the line with the hand, combined balance and arm muscle strength test on the gym ball (fitball).

Results. The research results contributed to confirm the hypothesis that female volleyball players in the experimental group were superior compared to the control group, in all three sport tests. In the vertical jump test, the progress of the experimental group between the two evaluations (initial and final) was of 0.08 cm, and the control group obtained a difference of 0.03 cm.

In the 4 m lateral movement test, the subjects in the experimental group recorded a difference of 2.84 reps, compared with the control group, who obtained a difference of just 0.83 reps.

In the combined balance and strength test, the experimental group players achieved a progress of 4.08 executions, compared with the control group players, who improved their performance by just one execution.

Conclusions. The methods used in the case of the experimental group are much more efficient than the classical method used in the case of the control group.

Key words: volleyball, junior, physical training, elaboration, development.

Rezumat

Premize. În ultima perioadă, pentru obţinerea unui nivel de pregătire fizic optim specific jocurilor sportive, specialiştii din domeniul voleiului au încercat modificarea planurilor de pregătire fizică încă de la nivelul junioarelor. Jucătoarele de volei junioare a căror dezvoltare fizică nu este finalizată, pentru îmbunătăţirea capacităţii motrice şi funcţionale, dar şi pentru evitarea accidentărilor, au nevoie de o foarte bună pregătire fizică, aceasta stând la baza formării lor ca viitoare jucătoare profesioniste.

Obiective. Această cercetare constă în elaborarea şi implementarea experimentală a unui program de exerciţii, orientat spre optimizarea pregătirii fizice a jucătoarelor de volei, categoria junioare, în vederea valorificării optime şi îndelungate a capacităţii de performanţă.

Metode. Cercetarea s-a efectuat în perioada iunie 2014- decembrie 2014, şi a cuprins 2 grupe: grupa experiment formată din 12 voleibaliste junioare ale echipei CSS Tg - Mureş şi grupa control, compusă din voleibalistele de CSS Sibiu. Testele de evaluare a capacităţii motrice au fost: săritură pe verticală, cu elan, cu atingerea punctului maxim, cu o mână, deplasare laterală pe 4 m – din fandare laterală cu atingerea liniei cu mâna, testul combinat de echilibru şi de forţă a musculaturii braţelor, pe mingea de gimnastică (fitball).

Rezultate. Rezultatele cercetării au contribuit la confirmarea ipotezei, progresele înregistrate de sportivele grupei experiment au fost superioare grupei de control la toate cele trei probe. La proba de săritură pe verticală sportivele grupei exeperiment au înregistrat un progres de 0,08 cm între testarea iniţială şi cea finală, iar sportivele grupei control au realizat o diferenţă de 0,03 cm între cele două testări. În proba de deplasare laterală, sportivele grupei experiment au înregistrat o diferenţă de 2,84 execuţii, iar sportivele grupei control 0,83 execuţii între cele două testări. În proba combinată de echilibru şi forţă sportivele grupei experiment au realizat un progres de 4,08 execuţii, comparativ cu sportivele din grupa control, care au reuşit îmbunătăţirea rezultatului de la testarea iniţială, cu o singură execuţie.

Concluzii. Rezultatele cercetării obţinute demonstrează faptul că mijloacele şi metodele folosite în pregătirea echipei experiment sunt mult mai eficiente faţă de metodele clasice de antrenament.

Cuvinte cheie: volei, junioare, pregătire fizică, elaborare, valorificare.

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Introduction

To obtain better results ”volleyball requires the review of training concepts so they may simultaneously take into account all the components of training” (Cojocaru & Cojocaru).

Volleyball is a sport that requires strength in the upper and lower limbs. Many experts have approached this subject in a number of studies (B. Forthomme, J.L. Croisier, G. Ciccarone, J. Crielaard, M. Cloes – 2005; M.C. Marques, R. Tillaar, J.D. Vescovi, J.J. Gonzalez-Badillo – 2008; F.R. Noyes, S.D. Barber-Westin, S.T. Smith, T. Campbell – 2011; Pereira A., A.M. Costa, Patricia Santos, Teresa Figueiredo, Paulo Vicente João – 2015).

Development of muscle strength and some specific technical skills of the volleyball game are particularly important for junior players as essential factors in achieving success (G. Ciccarone, J.L. Croisier, G. Fontani, G. Martelli, A. Albert, L. Zhang, et al. – 2008, G.G. Malousaris, N.K. Bergeles, K.G. Barzouka, I.A. Bayios, G.P. Nassis, M.D. Koskolou – 2008).

Approaching physical training and the development of individual motor capabilities is almost useless when this approach is not considered in the context of the particularities of a specific sport (Neagu, 2012).

In terms of physical capacity of the players, current requirements establish the following characteristics for junior volleyball players:

- increased specific resistance;
- attack hit executed at a greater height;
- lateral, forward and backward movements are more often seen in the play sequences;
- reaction and motor capacity is proportional to the speed of the ball, which is increasingly higher (FIVB, 2013, p.12).

Given the high level of the game and superior physical fitness at international level, as well as the low level of both the game and the players' physical fitness in Romania, we consider as advisable a change in physical training plans starting with junior players.

With regard to the strategies for regaining a top place in the elite of this game, experts estimate that the main interventions required must be focused on the problem areas of the game actions and model, selection strategy and player prototype, along with the use of the most efficient training methodologies (Cojocaru et al., 2013).

The physical training level of volleyball players has a major role in the game economy and the performance of each player. The technical level of players is also conditioned by the physical fitness level.

Some experts (1) feel that in the volleyball game, physical training plays a major role and it must be focused on the development of motor skills, especially the development of maximal strength and specific strength. To this end, it is recommended to use exercises with certain accessories: fitball, Trx, dumbbells, weights.

No special attention is paid to the physical training of junior volleyball players and as such, their muscles are not sufficiently developed. The implementation of a complex physical training routine will contribute to the development of skills specific to volleyball.

Based on the studies conducted by experts (Kraemer & Fleck, 2007), it was concluded that the age of juniors (16-18 years) is ideal for intensifying physical training. Mc Bride et al. (2002) stated that muscularity well developed by exercises with certain accessories contributes to the development of the players' speed, to an increase of lower limb strength and consequently, to the increase of the jumping height. Kotzamanidis et al. (2005) have shown that heavy training targeted on the development of strength, associated with sessions dedicated to speed development, contributes to obtaining major benefits in terms of strength, as well as speed. At the same time, it is recommended to use simple exercises which can be executed naturally. Păcuraru et al. (2000) show that ”general physical training of the athlete is aimed at a comprehensive education of the physical attributes which, although are not specific to this discipline, are conditioning one way or another sports activity success”.

In the volleyball game, the purpose of physical training is to optimize the effort capacity, given that optimal and specific physical fitness will play a key role in the biomotor capacity of volleyball players. According to Mureşan (2005), ”physical training is aimed at the development of motor skills by global work-out exercises and selective exercises for the segments and for the major functions of the body, consistent with the volleyball-specific effort”. With regard to physical training specific to volleyball, Mârza (2006) states that this game ”requires the development of basic motor skills and their specific aspects, balanced physical development and preparation of joints and major body segments for the volleyball game”.

The importance of this study consists of the design of an adapted exercise routine of functional training and aerobic gymnastics which will positively influence general physical development, as well as the development of motor and functional capacity in junior volleyball players.

Junior volleyball players, aged between 16-18 years, whose physical development is not completed, require very good physical training in order to improve their motor and functional capacity and avoid injury; this represents the foundation of their formation as future professional volleyball players.

To obtain high quality parameters for motor skills, it is recommended to include in the physical training of junior players more complex and more comprehensive exercises based on using teaching sports materials of the latest technology, such as fitball, dumbbells, weights, etc.

The advantage of these exercises is that they involve several muscle groups for each movement, providing a good muscular and postural balance.

By using a large range of functional accessories: medical balls, suspensions (TRX, gymnastics rings), dumbbells, weights, obstacles, skipping ropes, kettlebells, etc., in addition to the motor and functional effects, volleyball players also gain mental motivation stimulated by the diversity and amenity of these accessories' design.

Objectives

The objective of this study is to improve the physical condition of junior volleyball players by selecting the action means, designing and applying an exercise routine focused on optimizing their physical training. The designed routines were structured depending on the training period: preparation period (general physical training period and

specific physical training period), competition period (specific technical and tactical training period), and transition period.

Hypothesis

It is assumed that the selection and adaptation of physical training improvement means will have a positive influence on the motor capacity of volleyball players. The implementation of exercise routine specifically designed for the experimental group determines an improvement of physical training, leading to positive results in official matches, as well as in friendly matches (performance objectives).

Material and methods

We declare on our own responsibility that we received from the Ethics Committee of the University of Medicine and Pharmacy the approval to conduct this research.

Research protocol

a) Period and place of the research

This research was conducted over a period of 7 months: June - December 2014, during the round of the 2014-2015 National Junior Volleyball Championship, and included 24 players, divided into two groups: the experimental group and the control group.

The subjects of the experimental group trained on the court of "Constantin Brâncuşi" Technological High-School in Târgu-Mureş, while the subjects of the control group trained in Sala Mică near Radu Stanca Theatre in Sibiu.

b) Subjects and groups

The research sample was composed of: the experimental group, including 12 players aged between 16-18 years, and the control group including 12 players of the same age. Both groups executed 5 training sessions per week.

The experimental group players trained using specially designed means, while the control group players trained using traditional means and analytical methods.

c) Tests applied

The tests used to assess the motor capacity of the players were the following:

- *vertical jump*, with take-off and reaching the maximum point with one hand;
- *4 m lateral movement,* with lateral thrust and reaching the line with the hand;
- *combined balance and arm muscle strength test,* on the fitball.

d) Statistical processing

This study used the following statistical-mathematical indices: arithmetic mean, standard deviation, variation coefficient, Student t test.

In order to calculate the Student t test and the correlation coefficient, the GrahpPad Prism program was used in this study.

The experimental group players trained based on the routines designed with more complex and complete exercises, using the latest sports accessories: TRX, fitball, dumbbells, weights.

Thus, at the end of each training session, a special exercise routine was introduced, for 25 minutes each day, working with various sports accessories (Monday - TRX, Tuesday - stepper, Wednesday - fitball, Thursday - dumbbells, Friday - weights) (Table I).

Table I

Weekly planning for functional training.

Day	Activity type	Targeted training objective	Reps/ Duration	Series	Intensity %
Monday	Total resistance exercise (TRX)	Strength development	RMI	2	65
				2	65
				2	65
				2	65
				2	65
				2	65
				2	65
				2	65
		Mobility development	20 sec.	2	RCT
			20 sec.	2	RCT
			20 sec.	2	RCT
		Balance development	20 sec.	2	RCT
			20 sec.	2	RCT
			20 sec.	2	RCT
Tuesday	Step aerobics	Strength development	RMI	2	RCT
				2	65
				2	65
				2	65
				2	65
				2	65
				2	65
				2	65
				2	65
		Speed development	RMI	2	65
				2	65
		Coordination development	RMI	2	65
		Balance development	20 sec.	2	65
Wednesday	Fitball	Strength development	RMI	2	RCT
				2	65
				2	65
				2	65
				2	65
				2	65
				2	65
				2	65
		Coordination development		2	65
				2	65
		Balance development		2	65
				2	65
				2	65
Thursday	Exercises with dumbbells	Strength development	RMI	2	65
				2	65
				2	65
				2	65
				2	65
				2	65
				2	65
		Coordination development		2	65
		Mobility development	20 sec.	2	RCT
		Balance development	20 sec.	2	RCT
			20 sec.	2	RCT
Friday	Exercises with dumbbells	Strength and jumping height development	RMI	2	65
				2	65
				2	65
				2	65
				2	65
				2	65
				2	65
		Mobility development		2	65
		Coordination development	20 sec.	2	65
		Balance development	55 min.	2	RCT
Saturday	Aerobics	Strength and jumping height development	16	2	40-60
			12	2	40-60
			8	2	40-60
			8	2	40-60
			8	2	40-60
			8	2	40-60
			8	2	40-60
			8	2	40-60
			12	2	40-60
			8	2	40-60
		Mobility development	20 sec.	2	40-60
			20 sec.	2	40-60
			10 sec.	2	40-60
			10 sec.	2	40-60
			10 sec.	2	40-60
		Coordination development	8	2	
			8	2	
			8	2	
			8	2	
		Balance development	20 sec.	2	
			20 sec.	2	

(Ciulea, 2015)

Legend: RMI – Maximum individual reps; RCT – Reps against the clock; Reps - reprises; TRX - Total resistance exercise.

In the weekly sampling of exercise routines used for the experimental group, the routines not used on the relevant day were shaded.

Diagonal reading of non-shaded columns represents the weekly training plan.

Results

Table II

Statistical indices for the vertical jump with take-off.

Groups	Test moment	X	Difference	CV	Student t	p
Experimental group	Ti Tf	2.26±0.01 2.34 ±0.01	0.08	2.42 2.39	3.44	0.002
Control group	Ti Tf	2.25±0.01 2.28±0.01	0.03	1.67 1.71	1.980	0.06

The experimental group showed an increase of 0.08 cm in the arithmetic mean value for the two tests, generated by the original mean value of 2.26 m and the final test value of 2.34 m, according to the data presented in Table II. As indicated in Table II, for the control group the arithmetic mean value showed a lower difference between the two tests, the original value being 2.25 units and the final value 2.28, with a difference of 0.03 cm.

Table III

Statistical indices for 4 m lateral movement.

Groups	Test moment	X	Difference	CV	Student t	p
Experimental group	Ti Tf	26.42±0.19 29.33±0.25	2.91	2.42 2.84	9.09	0.001
Control group	Ti Tf	26.25±0.25 27.08±0.33	0.83	3.15 4.11	1.98	0.05

By comparing the results obtained for the two experimental and control groups, as shown in Table III, the evolution of the experimental group mean in the final test increased to 2.91 executions, while the evolution of the control group was of 0.83 executions.

Table IV

Statistical indices for balance and arm muscle strength .

Groups	Test moment	X	Difference	CV	Student t	p
Experimental group	Ti Tf	18.42±0.28 22.50±0.23	4.08	5.18 3.39	11.08	0.0001
Control group	Ti Tf	16.83±0.36 17.83±0.42	1	7.21 7.87	1.78	0.08

In this combined test, designed to test the balance and strength of the arm muscles, the players of the experimental group recorded a progress of the arithmetic mean value of 4.08 executions when comparing the two tests, while the players in the control group achieved a progress of 0.83 executions, according to the data in Table IV.

In the matches between these two groups, the experimental team won both matches against the control team.

Discussions

The purpose of this presentation was to elaborate and experimentally implement a workout program aimed at optimizing the physical training of junior female volleyball players in order to obtain best performances for long periods of time.

By comparing the results of the players in the two groups, it can be seen that the experimental group achieved a better progress in all three motor tests as opposed to the progress achieved by the control group.

In the test of the vertical jump with take-off and reaching the maximum point with one hand, the experimental group players improved their original testing result by 0.08 cm, while the control group players achieved a 0.03 cm progress between these two tests, according to the data in Table II.

In the test of 4 m lateral movement, with lateral thrust and reaching the line with the hand, the experimental group players improved their original result by 2.91 executions, while the control group players improved their original result by 1 execution, according to the data in Table III.

In the combined test of balance and arm muscle strength on the fitball, the experimental group progressed by 4.08 executions, while the control group achieved a progress of 1 execution, according to the data in Table IV.

Conclusions

1. By reviewing the results obtained by the players in both groups, we can conclude that the means used in the physical training of players in the experimental group provided a higher efficiency of the junior players' training.

2. It can be concluded that the selection and adaptation of physical training improvement means have a positive influence on the motor capacity of volleyball players. The implementation of an exercise routine specifically designed for the experimental group determines an improvement of physical training, leading to positive results in official matches, as well as in friendly matches (performance objectives).

Conflicts of interests

There were no conflicts of interests.

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Factors involved in adherence to physical activity among Israeli physiotherapists
Factorii implicați în aderarea fizioterapeuților israelieni la activitatea fizică

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Abstract

Background. As professionals working in the field of health, physiotherapists (PT's) are in an excellent position to promote and educate physical activity (PA) in the many clients who come to them for physiotherapy, with problems that could be averted were they to lead a more active lifestyle.

Aims. 1) To identify the factors involved in adherence to PA among PT's in Israel. 2) To identify the connection between factors.

Methods. The population in this mixed-methods research were all officially certified PT's, who are active in their profession. The comparison was between two separate groups (group 1: adherence to PA; group 2: non-adherence to PA). Research tools were a close-ended questionnaire, physical tests and in-depth interviews.

Results. There was a positive correlation between the reasons for undertaking and adherence to PA, and also a positive correlation between the adherence and subjective reporting of leisure time PA (LTPA) and non-LTPA. There was a positive correlation between a sense of self-efficacy and adherence to PA and a positive correlation between age and adherence to PA. A positive correlation was also found between the objective state of health and adherence to PA, and finally, an insignificant correlation was found between adherence and some physical fitness data. More findings were that adherence to PA among PT's is characterized by a gap between their knowledge of the significance of PA and their actual engagement in this area.

Conclusions. The conceptual conclusions create a model that demonstrates the process of making a decision with regard to lifestyle change - and undertaking/adhering to PA among PT's. The process begins when a culture of adherence is created through the integration of three areas: social, value-based and behavioral. In addition, the combination of age, health status and PA (leisure time and during the day) and self-efficacy creates a synergy which leads to the creation of a culture of adherence to PA.

Key words: physical activity, physiotherapist, self-efficacy.

Rezumat

Premize. Profesioniştii care lucrează în domeniul sănătăţii, cum sunt fizioterapeuţii (PT), trebuie să fie într-o formă fizică deosebită, pentru a promova şi educa prin activitatea fizică (PA) diferiţii clienţi care merg la ei pentru fizioterapie. Problemele de sănătate ale fizioterapeuţilor ar putea fi evitate dacă aceştia ar avea un stil de viaţă mai activ.

Obiective. 1) Identificarea factorilor implicaţi în aderarea la activitatea fizică (PA) a fizioterapeuţilor (PT) din Israel; 2) Identificarea legăturii dintre aceşti factori.

Metode. Instrumentele de cercetare folosite au fost: chestionar închis, testele fizice şi interviurile aplicate.

Rezultate. Există o corelaţie pozitivă între motivele pentru începerea practicării activităţii fizice şi aderarea la activitatea fizică (PA) şi, de asemenea, o corelaţie pozitivă între aderenţă şi raportarea subiectivă a timpului liber PA (LTPA) şi non-LTPA. Există o corelaţie pozitivă între un sentiment de auto-eficacitate şi aderarea la PA şi o corelaţie pozitivă între vârstă şi aderarea la PA. A fost găsită o corelaţie pozitivă şi între starea obiectivă de sănătate şi aderarea la activitatea fizică (PA) şi, în final, o corelaţie nesemnificativă a fost găsită între aderenţă la activitatea fizică şi unele date ale fitness-ului fizic. De asemenea, aderarea la activitatea fizică (PA) printre fizioterapeuţi (PT) se caracterizează printr-un decalaj între cunoştinţele lor şi implicarea efectivă a acestora în acest domeniu.

Concluzii. Acestui studiu arată necesitatea creării unui model pentru fizioterapeuţi (PT), în vederea realizării unui stil de viaţă sănătos, prin practicarea activităţii fizice (PA). Acesta se poate realiza în momentul în care aderarea fizioterapeuţilor la activitatea fizică se realizează prin integrarea a trei domenii: social, bazat pe valori şi comportamental. În plus, combinaţia de vârstă, starea de sănătate şi activitate fizică (PA) în timpul liber şi auto-eficacitate creează o sinergie, care conduce la crearea unei culturi de practicării a activităţii fizice (PA).

Cuvinte cheie: activitate fizică, fizioterapeuţi, autoeficacitate.

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Introduction

A well-known researcher in the field of Physical Activity (PA) made this statement. He called the world to consider seriously the phenomenon of a gradual and significant decrease in the level of PA within the population due to western lifestyle, and the severe implications of this phenomenon for public health, longevity and prevalence of chronic diseases.

The lack of PA is considered to be a significant contributor to the frequency of non-communicable diseases in Western countries, and a factor that is rising significantly in countries with low and middle income (Bauman et al., 2012).

The absence of PA is responsible for more than 3 million cases of deaths per year around the world (Pratt et al., 2012), with non-communicable diseases (as a result of physical inactivity) accounting for 60% of all cases of death worldwide, and for more than 80% of deaths in countries with a low to middle income per capita (Pratt et al., 2012). In epidemiological terms, there has been a change in calculating the economic burden of contagious diseases with that of non-communicable diseases (as a result of physical inactivity) in countries with low to moderate incomes, a process which was in the past characteristic of moderate-high incomes (Miranda et al., 2008).

Thus, it is important to understand which factors are connected with adherence to PA among PT's, so that they can serve as advocates of an active lifestyle for their clients (Shirley et al., 2010).

The public interest in halting this rising trend of physical inactivity is by treating the accompanying health risks: between 6-10% of deaths which are due to non-communicable diseases could be connected to the lack of PA, and this rate is even higher with reference to specific diseases such as arteriosclerosis (Lee et al., 2012).

The literature defines two types of PA: LTPA - Leisure time PA - defined in the literature as: "PA performed during exercise, recreation or any time other than those associated with one's regular occupation, housework or transportation" (Yu-Pei et al., 2011); NLTPA - Non-leisure time PA - PA that pertains to the daily routine activities such as mobility, cleaning the house, PA as part of one's job and so forth. NLTPA includes walking or cycling for transportation; occupational activity is PA performed at work, including housework.

PA among health professionals

Naturally, we expect people who engage in health, with the relevant education, to engage in PA at a rate that is significantly higher than that in the general population. Rogers et al. (2006) examined the percentage of those who meet WHO recommendations among internal medicine resident physicians and found that only 41% were physically active according to recommendations, concluding that most internal medicine resident physicians may not be adequate role models for promoting exercise adherence.

Further examination of PA among PT's was conducted by Chevan & Haskvitz (2010). This research found that the rate of those engaging in routine PA among PT's and students was 67%-72% compared to the general population rate, which was measured using the same measurement tools, evidencing that only 36% engaged in routine PA. Additionally, a study by Black et al. (2012), which examined the rate of PA among PT's and physiotherapy students in the U.S., found that 80% were routinely physically active, a finding that is relatively high compared to that of Chevan & Haskvitz (2010). This difference probably stems from the use of different questionnaires.

A review of studies in the field confirms the great importance of the influence of "health care providers" or by their other name "health professionals" on patients with regard to PA. Studies have yet to identify a particularly good way to promote PA among patients in the health system, but this research suggests that health care professionals can improve the situation in relation to PA by evaluating and encouraging patients regularly and routinely.

There are a number of recommendations for improving the relationship between health care providers and patients in the context of PA:

Firstly, attention should be paid to the training of health profession students on this issue because recommendations vary and are updated from time to time, and time and resources should be devoted to training after graduation. In addition, exercise evaluation and recommendations in this area, and evaluation of health professionals in their fields should be part of the examination. If part of a new patient's admission interview were to include questions in the field of PA, it would both serve as a reminder and would raise the importance of the issue.

In addition, it is important to inform health professionals on any development in their field of work in order to facilitate their patient referrals to activities tailored to their needs and inform the patient of the range of options available to him. Finally, patient time with a doctor is usually rather short, so there is room to develop frameworks in which the patient can receive comprehensive advice in the field of PA, in physical therapy, for instance. Hence it is important to examine this issue among PT's who spend a relatively long time with each patient compared to doctors.

Unfortunately, the number of people engaging in PA among health professionals in Israel has not yet been studied, and this research will be groundbreaking and will provide preliminary data on the percentage of PT's engaging in PA in Israel.

Definition of adherence to PA

An extensive review of the literature engaging in adherence to PA reveals that there is no uniform standard definition of adherence to leisure time PA as a function of time, but rather of adherence to recommendations for performance of PA.

This gap in knowledge led us to conduct this study, as the topic is still not clear enough and research is required in order to understand adherence to PA as a social phenomenon.

Huberty et al. (2008) defined women's adherence as medium-intensity PA of 150 minutes per week throughout the year. But is long-term PA that is shorter than the recommended time not considered adherence?

Additional research by Garmendia et al. (2013) defines adherence to PA as participation in 24 PA groups per year, meaning an average frequency of twice a month. Another

definition is that suggested by McAuley et al. (2007), the number of times that a person has trained in a three month period (the score is 0-36). In other words, maximum adherence is LTPA three times a week.

We can conclude that adherence to PA has different definitions, but what is important is the dimension of time rather than the intensity of the activity.

Quite a few reviews have attempted to examine the circumstances of adherence to PA. In the context of this research, it is important to discuss these factors because they can provide conceptual grounds for the research findings and help in understanding the phenomenon under investigation in the Israeli context.

Seven categories have been found to be linked to adherence to PA: 1) Demographic conditions - age, gender, ethnicity, and socioeconomic status. 2) Health factors - chronic diseases, poor health and excessive weight. 3) Cognitive and psychological factors - barriers to PA, lack of enjoyment of the activity, low expectations of the benefits of PA, poor mental health, a low sense of self-efficacy in the context of PA, low motivation for PA, lack of readiness to change, poor physical fitness. 4) Behavioral factors - PA in the past, smoking and type A character. 5) Social factors - lack of contacts in a group training together, lack of support and encouragement from the health care system, lack of social support of PA. 6) Factors related to the intervention program - high intensity of activity, duration of activity - too long. 7) Environmental factors - lack of access and low safety in the context of parks and sports facilities.

As professionals working in the field of health, PT's are in an excellent position to promote PA in the many clients who come to them for physiotherapy, with problems that could be averted were they to lead a more active lifestyle. Thus, it is important to understand which factors are connected with adherence in PT's, so that they can serve as advocates of an active lifestyle for their clients (Shirley, 2010).

Hypothesis

On this basis, 2 goals were set for the present study: 1) To identify the connection between factors for starting and adhering to PA among PT's in Israel; 2) To identify the factors involved in adherence to PA among PT's.

The present study seeks to contribute to existing knowledge regarding the factors for beginning and adhering to PA in general, by relating to the professional population, whose job entails a significant part in the promotion of a healthy lifestyle. Understanding the process, as it relates to PT's, can strengthen and deepen the process of change for instilling a healthy lifestyle among a much larger population. Consequently, 2 main areas were marked for this study: firstly, understanding the factors involved in undertaking PA, and secondly, understanding the factors involved in adhering to PA. Obviously, the picture based on the data in the present research does not presume to present a comprehensive overall picture, but rather only to gleam certain major insights and point out certain directions.

Material and methods

The approval of the Ethics Commission for conducting opinion research was obtained, as well as the informed consent of the participants in the study. Israeli physiotherapists, who are active in their profession, were divided into 2 groups: those adhering and those not adhering to physical activity.

Research protocol

a) Period and place of the research

The research was conducted between 2013-2014.

A mixed methods approach was chosen as the appropriate approach for this research, as it allows the researcher to maximize the possibilities for cooperation and interdisciplinary work so that future problems of the research goals can be averted. There is great importance in choosing the best way to combine qualitative and quantitative methods and there is a great challenge in combining the two methods (Creswell & Plano Clark, 2007).

b) Subjects and groups

The quantitative section of this research included a closed questionnaire and physical fitness tests: The structured questionnaire was anonymous and close-ended, and was sent online to approximately 600 PT's in Israel.

The purpose of the questionnaire was to gather data in the area of PA, adherence, self-efficacy and demographic details about the respondents. This questionnaire provided quantitative data for both research questions at the same time: the connection between the factors for starting PA and then adhering to it, and the factors involved in adhering to PA among PT's in Israel.

c) Tests applied

Physical fitness tests were performed on approximately 100 participants, with the aim of examining the connection between adherence to PA and physical fitness. The physical fitness tests included:

- Tecumseh Step Test (a multiple choice sub-maximal aerobic fitness test);
- a HGST test (Hand Grip Strength Test);
- resting-pulse, weight, and height tests

All of the above tests are valid and reliable physical fitness tests for use in the field.

After completing quantitative data collection, the collection of qualitative data was initiated by conducting in-depth interviews with approximately 30 PT's.

The qualitative research part was based on semi-structured in-depth interviews, which enabled the systematic study of topics and questions considered important and central to the research, on the one hand, and on the other hand, the construction of categories and concepts emerging from the field itself, with maximal openness to additional components and points that the researcher did not anticipate. Understanding the context and the circumstances which led to undertaking and adhering to PA in contrast with other areas of life that require adherence (studies, work, marital status, etc.) necessitates the examination of different aspects in the personal context. These data can provide a full picture for understanding the process of adherence and all that is associated with it in the field of PA (Table I, mixed methods research).

d) Statistical processing

Statistical processing was performed using the Excel application (Microsoft Office 2007), with the StatsDirect v.2.7.2 program.

Table I

Summary of the research design: mixed methods research.

Stages	Aim	Research Tool	Sources of Information / Research Population
Stage 1: Quantitative Research	The connection between the causes of undertaking PA and adherence, and causes of adherence among PT's in Israel	1. PA and adherence questionnaire	Existing diagnostic tools adjusted to the current research were administered to about 1300 PT's
		2. Physical fitness tests	Existing diagnostic tools examined some 100 PT's
Stage 2: Qualitative Research	Deepening the knowledge and understanding of the circumstances that influence undertaking PA and adherence to it	Semi-structured interviews	Structured interviews with 30 PT's.
Statistical analysis which will help understand the causes of undertaking PA and adhering to it among PT's in Israel			

Results

The main socio-demographic data of the research are presented below in Table I.

The adherence variable is a continuous variable which was calculated as the average number of minutes of PA per week in the last month multiplied by the number of months of activity times (Table II).

Table II

Socio-demographic data obtained from the questionnaires.

Variable	Items	N	%	M	SD
Adherence – Dichotomy	Non-Adhering	58	18.5		
	Adhering	256	81.5		
Gender	Male	81	25.6		
	Female	236	74.4		
Age	Up to 30	75	23.8	40.18	11.09
	31-45	140	44.4		
	46+	100	31.7		
Marital Status	Married/steady partner	176	80.0		
	Single	36	16.4		
	Divorced/ Widowed	8	3.6		
Place of Residence	Urban	219	69.5		
	Rural	85	27.0		
	Kibbutz	11	3.5		
Seniority in Physiotherapy	Up to 10 years	167	53.9	13.65	11.37
	11-20 years	64	20.6		
	21 + years	79	25.5		
Health Status in Last Month	Excellent	139	44.0		
	Very Good	125	39.6		
	Good	44	13.9		
	Medium	8	2.5		
A disease that limits PA	Yes	30	9.5		
	No	286	90.5		
Access to Sports Facilities	Not at all (0)	7	2.2	8.32	2.25
	Very Low (1-2)	6	1.9		
	Low (3-4)	7	2.2		
	Medium (5-6)	24	7.6		
	High (7-8)	91	28.8		
	Very High (9-10)	181	57.3		
Time of Aerobic Activity per Day	Less than 5 minutes	21	6.9		
	5-15 minutes	51	16.8		
	15-30 minutes	91	30.0		
	30-45 minutes	72	23.8		
	More than 45 minutes	68	22.4		
Minutes Activity per Week	Up to 50	24	9.1	169.58	96.27
	51-100	54	20.5		
	101-150	68	25.9		
	151-200	38	14.4		
	201-300	79	30.0		

This is how we calculated the total minutes a person engaged in PA (naturally, it is not exact, but rather an appraisal based on the participant's self-report), which was calculated as a *score*. An *adhering* participant was one who reported that he or she undertook PA and did not quit. Participants who reported undertaking PA and quitting, or those who had never been physically active were considered *non-adhering* (Table III).

The sample of the first part of this research evidenced that 81.5% adhered to PA, while 18.5% did not adhere to any specific PA. It is important to note that the adherence score did not divide the participants according to the types of PA, but rather in a dichotomous way: adhering or not adhering.

In terms of activity type, there were two main categories in this research: aerobic activity such as swimming, running and cycling, and anaerobic activities such as Yoga, Pilates, strengthening muscles and more (Table IV).

The following table presents the correlation between the reasons for undertaking PA and adherence.

Table IV

Pearson analysis between PA habits and adherence.

Indicator	Adherence	Variables				
		1	2	3	4	5
PA at Work: Objective	-.102					
PA at Work: Subjective	.079	-.406**				
PA Leisure: Objective	-.006	.092	-.050			
PA Leisure: Subjective	.236**	.019	.177**	-.415**		
Routine PA - NLTPA	.153*	.033	-.185**	.142*	-.215**	
Accessibility	.075	-.107	-.026	.216**	-.168**	.045

* $p < .05$. ** $p < .01$. *** $p < .001$

The research hypothesis regarding a positive correlation between the strength of the medical reason and adherence to PA was *refuted*. A non-significant negative correlation was found between the two. Nevertheless, a significant

Table III

Correlation between the reasons for undertaking PA and adherence.

Indicator	Adherence	Reasons						
		1	2	3	4	5	6	7
Recommendation/Medical problem	-.09							
Wish to lose weight	.36**	-.07						
Wish to look better	.57**	.13*	-.01					
Previous habit I recently quit	.16**	.17*	.17**	-.23**				
Social Reasons	.19**	.14*	.14*	.12*	-.09			
Through the workplace	.41**	.16**	.00	.11	.23**	-.05		
Practice towards competition	.35**	.30**	.14*	.07	.07	.01	-.05	
Setting an example for the children	.19**	.24**	.18**	.23**	.26**	.18**	.29**	.08

* p < .05 ** p < .01 *** p < .001

positive correlation was found between adherence and the "wish to lose weight" (Table V).

Table V
Pearson analysis between personality aspects and adherence.

Indicator	Ambition	Self-Efficacy	Adherence
Self-efficacy	.208**		
Ambition	.166*	.739**	
Sociability	.063	.168**	.120*

* $p < .05$. ** $p < .01$. *** $p < .001$

A significant positive correlation was found between adherence and the level of PA (NLTPA) ($p<.05$) - the more one is active during the day, the more one adheres to PA.

The table below presents the correlation between personality aspects of self-efficacy, ambition and sociability and adherence to PA.

The examination of the correlation between personality aspects and adherence yielded a significant positive correlation ($p<.01$) between a sense of self-efficacy and adherence as stated in the research hypothesis, "There is a positive correlation between one's sense of self-efficacy and the level of adherence to PA".

The following table depicts the correlation between age and Health 1 - objective aspect and adherence to PA.

Table VI
Pearson analysis between health and adherence.

Indicator	Adherence
Age	.233**
Health 1	.209**

* $p < .05$. ** $p < .01$. *** $p < .001$

There is a significant positive correlation ($p<.01$) between age and adherence to PA. This finding *confirms* the research hypothesis maintaining that "There is a positive relationship between age and the degree of adherence to PA", which means that adherence to PA improves with age (Table VI).

The figure below depicts the differences among the three age groups regarding adherence to PA, when physical fitness is good, but no direct and positive correlation was found between them.

Discussions

It was found that motivation for participation is *a complex outcome of personal, social and situational factors acting simultaneously*. Personal variables (such as personality traits, experience, role perception and more) mutually interact with contextual variables (such as opportunity, awareness, interaction with significant others) to create the intention to participate in the activity. These variables constitute the door or the *entrance* to the process of PA.

According to Table IV, we can see that except for the reason of "Recommendation/Medical problem", there is a positive correlation between the reasons listed above and adherence to PA. All correlations were found to be significant ($p<.01$), where the reasons "wish to look better", "wish to lose weight", "through the workplace", and "practice towards competition" were the most positively correlated compared to "social reasons", "previous habit I recently quit" and "setting an example for the children".

This model supports the findings of this research which show that aesthetic reasons (such as looking better, losing weight) as well as social reasons such as activity in the workplace or setting an achievement goal such as a competition – all motivate the decision to undertake PA. Sometimes the wish to lose weight disrupts PA due to a state of being overweight. The literature states that obesity is significantly associated with physical inactivity and poor health - Centers for Disease Control and Prevention, (***, 2007). For example, a study by Brownson et al. (2000) found that overweight women engaged in significantly less PA than women whose weight was within the norm. The complex relationship between reasons for undertaking PA and, eventually, for adhering to it (where adherence relates to continuing with the activity) depends on a number of previously mentioned psychological theories. According to the Theory of Planned Behavior (TPB), a person's intention is the prime and direct stimulus for adhering to an activity. Intention is influenced by people's views regarding activity, their abilities to enjoy it and their desire to learn new skills. That is to say that the more positive feelings experienced towards sporting activity, the greater the enjoyment that will be derived and the higher the desire and ability to adhere. This theory cannot fully explain the complexity of adherence, and one has to rely on Bandura's Social Cognitive Learning Theory.

An active lifestyle that does not necessarily relate to PA means living in a conscious state of activity. Movement and activity are part of our daily routine and do not require special effort; thus, the transition from NLTPA to LTPA can be natural. The distinction between the two types is crucial since the focus solely on LTPA often lowers the evaluation of PA among women who are very active in NLTPA - mostly in housework (Kandula & Lauderdale, 2005). In a particular population, for example immigrants, the reported level of LTPA is very low, whereas the level of NLTPA is relatively high. Another important concept related to PA described in the literature is *sedentary behavior*. Sedentary behavior is another aspect of the physical inactivity epidemic. The definition of this concept is the amount of time a person spends sitting per day. Similarly to PA, sedentary behavior takes place in a number of settings during the day: for example at work, during leisure watching television, surfing the Internet, social gatherings, etc.

In summary, it can be seen that the examination of the reasons for undertaking PA yielded significant differences between the group of those who adhere to PA and those who do not regarding some of the reasons for undertaking PA; with regard to the correlation between the reasons for undertaking PA and adherence, positive correlations were obtained between the reasons "wish to look better", "wish to lose weight", "through the workplace" and "practice toward competition". In other words, the more the professional seeks to improve his or her appearance, the more he or she will engage in PA, etc. These findings confirm the research hypotheses regarding the positive correlation between the wish to lose weight and adhering to PA as well as between social reasons and adherence.

Sedentary behavior is expressed not only at work, but

also in leisure activities and comes at the expense of daily PA; for instance, using a car instead of riding a bicycle, taking the elevator instead of the stairs, prolonged sitting in front of a computer, shopping online instead of going to the supermarket, using a robotic vacuum cleaner instead of sweeping the floor, and more. In light of the above, the thought arises whether encouraging PA in daily life can lead to adherence to leisure time PA. Perhaps an active, not necessarily sporting lifestyle, allows for and reduces fear of sporting PA, enhances the sense of self-efficacy and improves adherence.

Self-efficacy is a person's belief in his/her ability to perform a specific task. Self-efficacy is based on one's expectations regarding one's capabilities (Bandura, 1994). Bandura listed four different ways where self-efficacy influences human performance:

1) The cognitive process or the processes which are expressed in the process of "acquisition, organization and use of information". 2) Self-efficacy strongly influences the process of motivation, such as in the case of setting goals, developing strategies and appraising and adjusting different goals. 3) The third way is the additional psychological process which is influenced by self-efficacy called "Affective Process", which regulates such feelings as anxiety or depression (Bandura, 1994). 4) The last process discussed by Bandura is the process of choice.

In summary of the interview analysis and congruently with the research hypotheses, it can be stated that adherence to PA among PT's is characterized by a gap between their knowledge of the significance of PA and their actual engagement in this area. Also, causes of undertaking PA and adherence to PA among PT's are influenced by extrinsic motivation, but intrinsic motivation has a greater effect on adherence to PA. Finally, adherence to PA among PT's can improve.

There are many factors that influence the connection between self-efficacy and adherence including enjoyment, which was a recurring theme in interviews with professionals and on which I expanded in the chapter dealing with qualitative findings.

In addition, the findings of the present research correlate with Bandura's conclusions (Bandura, 1977; Bandura, 1994). Bandura found that a person with a high self-efficacy has a better ability to cope with difficulties and succeed in meeting different challenges. Additional research in this area conducted by Hagger et al. (2001) also reinforces these findings, and adds that not only is self-efficacy positively connected to the level of PA, but it also correlates positively with active participation. In other words, the influence is in decreasing the negative attitude towards PA. All these studies can be connected to Bandura's theory maintaining that a high sense of self-efficacy helps overcome barriers and difficulties. For instance, a common barrier to engaging in PA is a low socioeconomic status. Kloek et al. (2006) examined how this barrier can be overcome so as to take part in PA frameworks. Among all the factors that were examined, it was found that self-efficacy plays a most significant role and the higher the sense of self-efficacy, the higher the rate of participation. In other words, self-efficacy is the key for helping people with low socioeconomic status to overcome the barrier and take part in regular PA.

Creating a culture of adherence in physical activity among PT's is a process that is made up of a number of factors responsible for undertaking and adhering to PA.

The process begins when a culture of adherence is created through the integration of three areas: social, value-based and behavioral. In addition, the combination of age, health status and PA (leisure time and during the day) and self-efficacy creates a synergy which leads to the creation of a culture of adherence to PA. The CAPA Model describes all of the above.

This model demonstrates the process of making a decision with regard to lifestyle change - and undertaking PA among PT's. The reasons for undertaking PA are social and/or value-based and/or behavioral such as Recommendation/Medical problem, Desire to lose weight, Desire to look better, Previous habit I recently quit, Social reason, Through the workplace, Practice for a competition and more. In order to adhere to PA, factors related to adherence are considered: NLTPA, LTPA, health status, age, and self-efficacy. Two areas which were not found to influence adherence in this research are physical fitness and knowledge - awareness of the importance of PA among professionals.

Conclusions

1. The connection between reasons for undertaking and adherence to PA pertains to a complexity of aspects involving social, value-related and behavioral factors.
2. Moreover, it seems that adherence to PA is directly and positively connected to the extent to which one dedicates time to LTPA.
3. This positive correlation derives from positive feelings of pleasure, success and high self-efficacy. Also, adherence to PA is directly and positively connected to the extent to which one dedicates time to NLTPA. The discussion of the qualitative findings shows that adherence to PA among PT's is characterized by a gap between their knowledge of the significance of PA and their actual engagement in this area.
4. Additionally, causes of undertaking PA and adherence to PA among PT's are influenced by extrinsic motivation, but intrinsic motivation has a greater effect on adherence to PA. Moreover, adherence to PA among PT's is influenced by barriers that are agreed upon in the literature and pertain to the overall population.
5. Furthermore, adherence to PA among PT's can improve when physical fitness is good, but no direct and positive correlation was found between them.
6. No significant correlation was found in the attempt to examine whether there was a correlation between adherence and some physical data, but there was an apparent negative correlation in most tests, which is reasonable, as the longer one adheres to PA, the more likely it is that the resting heart rate will be lower. The same is true for BMI and more.

Conflicts of interest
There are no conflicts of interest.

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Influence of water gymnastics on strength development
Influenţa gimnasticii în apă asupra dezvoltării forţei

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Abstract

Background. The carrying out of physical activities in various environments, terrestrial and aquatic, through the influences they imprint on the effort made, coupled with the technological innovation of materials, can trigger positive responses of the body, with connotations on the movement ability.

Aims. Improvement of the conditional movement ability parameters by implementing within the physical education classes of first year students from non-sportive specialties, water activities: aquagym and aqua-pullpush-gym.

Methods. The study was conducted during the academic year 2012-2013 and comprised three groups: 2 experimental groups (E1 - Aquagym and E2 - Aqua-pullpush-gym) made up of 24 subjects each and a control group (C) composed of 48 female students. The movement tests targeted the back muscle strength and the abdominal muscle strength.

Results. Following the research performance and the statistical-mathematical analysis of the individual values, it was observed that all research indicators in the two testing sessions recorded obvious progress between the two tests, but the experimental groups' progress was higher than the figures related to the control group. Considering the difference between the average values of the tests, the Aqua-pullpush-gym E2 group recorded when assessing the back muscle strength a significant progress, namely 4.54 executions, and 4.34 executions for the abdominal muscle strength, due to additional demands for the exclusive handling of the pullpush plates. The Aquagym E1 group recorded a progress of 3.16 executions related to back strength and 2.50 executions for the abdominal muscle strength, lower than the E2 group but higher than the control group, whose values were 1.63 executions and 1.83, respectively.

Conclusions. Practicing water gymnastics in its various forms: aquagym and aqua-pullpush-gym, using technological innovation in terms of materials, contributes to improving the components of the conditional ability.

Key words: water gymnastics, aquatic environment, movement ability, strength.

Rezumat

Premize. Desfăşurarea de activităţi fizice în medii variate, terestru şi acvatic, prin influenţele pe care acestea le imprimă efortului depus, corelate cu inovaţia tehnologică a materialelor, pot oferi răspunsuri pozitive ale organismului, cu conotaţii asupra capacităţii motrice.

Obiective. Îmbunătăţirea parametrilor capacităţii motrice condiţionale prin implementarea în cadrul orelor de educaţie fizică a activităţilor acvatice: aquagym şi aqua-pullpush-gym, la studenţii anului I de la neprofil.

Metode. Cercetarea s-a desfăşurat pe parcursul anului universitar 2012-2013 şi a cuprins 3 eşantioane: două experimentale (E1: aquagym şi E2: aqua-pullpush-gym), formate din câte 24 de subiecţii şi unul control (C), format din 48 de studente. Testele motrice aplicate au vizat: forţa musculaturii spatelui şi forţa musculaturii abdominale.

Rezultate. În urma desfăşurării cercetării şi a analizei statistico-matematice a valorilor individuale, se remarcă faptul că toate eşantioanele cercetării la cele două teste au înregistrat progrese evidente între cele două testări, dar progresele grupelor experimentale au fost superioare celei de control. Luând în considerare diferenţa valorilor mediei dintre testări, grupa E2 - aqua-pullpush-gym a înregistrat la evaluarea forţei musculaturii spatelui un progres semnificativ de 4,54 execuţii, iar a musculaturii abdominale de 4,34 execuţii, datorită solicitărilor suplimentare în manevrarea exclusivă a plăcilor pullpush. Grupa E1 - aquagym a înregistrat un progres de 3,16 execuţii la forţa spatelui şi de 2,50 execuţii la forţa musculaturii abdominale, inferior grupei E1, dar superior grupei control, a carei valori au fost de 1,63 execuţii respectiv 1,38.

Concluzii. Practicarea gimnasticii în apă sub diferitele ei forme, aquagym şi aqua-pullpush-gym, care utilizează inovaţile tehnologice în cadrul materialelor, contribuie la îmbunătăţirea componentelor capacităţii condiţionale.

Cuvinte cheie: gimnastica în apă, mediul acvatic, capacitatea motrică, forţa.

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Introduction

There is a direct interrelation between the physiological capacity mechanisms and the practice level of physical exercise, which is influenced by a series of factors, of which environment and its characteristics are the most important.

The introduction of technological innovations in materials and sports facilities induces multiple effects such as: various efforts to carry out motor tasks, increasing the attractiveness and active involvement of students in performing motor tasks, diversification of programs, etc., all in response to modern trends of efficiency increase in education.

Water activities can be rigorously defined as a package of "activities related to water environment, which can be united into programs with clear objectives, adapted to the age and characteristics of the persons who perform them" (Serrano & Rodriguez, 2009, cited by Moisés, 2010).

Bădău (2006) states that "human motor behaviour represents a complex system of movements, attitudes and postures, with the help of which the individual adapts to the different, ever-changing conditions of the environment".

According to Adami (2004), water activities are practiced to improve physical condition and "they use the water resistance and floatability in a creative manner so that the activity is carried out with low impact, combining entertainment with efficiency"; these are "appropriate for all ages and training levels, improving all physical condition components: endurance and muscular strength, body mass composition, aerobic capacity, flexibility and articular development, neuromuscular coordination".

Roseane et al. (2004) show that water activity contributes to physical condition improvement, with the mention that water exercises should be carried out regularly and systematically.

Water gymnastics is "focused on health improvement, organized in classes which include exercises with or without portable objects, with two distinct elements: performing them vertically and maintaining the head above the water. The objective of water gymnastics is to improve the motor and functional capacity, thus developing various components of physical abilities: strength, muscular endurance, respiratory capacity and segmental mobility. The methodology of water gymnastics is based on the water resistance, creating an overload on the trainee's locomotive system" (Teixeira & Barbosa, 2010).

According to studies, with the increase in the number of limbs involved in movement, an increase in the body's response to effort also occurs (Darby & Yaeckle, 2000; Barbosa et al., 2009).

We consider water gymnastics a system of exercises practiced analytically and globally within the water environment, which influences the locomotive system in a precise and selective manner, aiming towards a harmonious physical development, the development of motor, mental and physiological capacities, the improvement of health and implicitly, of the quality of life.

During water activities, support and traction forces are the most important (Prins, 2010).

Studies focused on segmental muscle strength and endurance by practicing forms of water gymnastics, carried out by Sanders, 2001; Colado & Moreno, 2001; Colado et al., 2002; Colado, 2002; Colado, 2003; Colado, 2004, found that systematic practice significantly influenced these motor skills.

Aquagym represents one of the modern trends of physical exercise practice through the combination of various simple and complex action systems, adapted to the positive influences of the water environment, and by using materials such as sticks, ankle sandbags (Bădău et al., 2012).

Aquagym represents an innovative method of motor education technology, being adaptable to particularities specific to age and training level, as well as to individual and group preferences, contributing to an optimal modification of behaviours and physical capacities.

Aquagym uses various aspects of gymnastics, swimming, stretching, dynamic games, all carried out in shallow pools; it brings comfort, stability and security in execution, with major results on muscular and joint recovery. In addition to these, it has a ludic and musical component, thus adding a recreational, entertaining note and ensuring the neuropsychic recovery of participants.

Aqua-pullpush-gym, a newly designed activity, involves a combination of various simple and complex action systems, adapted to the individual particularities and water environment, with complex impact on physical condition and health, combining simple movements with complex movements of body segments or the entire body, using pull-push paddles and fixopié accessories.

Aqua-pull-push gym represents an innovative activity of water gymnastics, consisting of complex movements of body segments, by using exclusively the pull-push paddle, with the view to improve health and physical condition as well as to increase muscle toning.

This method is intended for persons above 18 years of age, regardless of sex, weight or physical training. The basic movements consist of push and pull actions, lift, bring down, stretch and bend moves.

"The exercises with portable objects will amplify the effects of the regular physical exercises, allowing a more precise control over the segments movement and of the entire body" (Bădău & Bădău, 2011).

Di Masi (2000) added that by increasing the speed of execution of the movements, the water flow increases, thus preventing the advance in this area of reduced pressure. Rapidly changing the direction of movement requires overcoming water inertia and turbulence, because in the turbulence flow, resistance is twice the speed.

Objectives

The research focuses on the effects achieved by implementing programs with selected means of action, specific to aquagym - a classic water gymnastics activity, and aqua-pullpush-gym - an activity designed and developed by us. The programs were developed in accordance with a specific methodology adapted to the biomotor characteristics of the subjects, with the view to track the motor effects on students from non-sportive specialities.

Hypothesis

The hypothesis started from the assumption that aquagym and aqua-pullpush-gym practice will improve the selective motor capacity: the abdominal muscles and back muscles.

Material and methods

Research protocol

The study was approved by the Ethics Committee of the universities involved in research and the informed consent of the subjects was obtained. The materials adapted to water gymnastics programs have various shapes and dimensions and help achieve the objectives of the class by requiring additional efforts both in terms of load and handiness, having an ergonomic and modern design through their various shapes and colours.

The objects used in aquagym are built from materials less dense than the water, with a density below 1, which increases their floatability (Canderolo & Caromano, 2004).

The new aqua-pullpush-gym activity exclusively uses pull-push paddles, made by Decathlon, composed of SEBS and polypropylene, having a hydrodynamic flower shape, with five "petals" about 37 cm in diameter, with an ergonomic handle in the centre to hold, which is slightly rough to prevent slipping.

In order to execute exercises for the lower limbs, these also have an accessory called fixopié, which can be fixed to the soles and which looks like sandals, having two clips oriented in complementary directions in order to facilitate fixation with a twisting action.

Fig.1 – Fixopié and pullpush paddle (1).

The main differences between the two activities consist of the materials used, their design and usage percentage during the class.

Thus, aqua-pullpush-gym uses the pull-push paddles during the entire *fundamental part*, around 35 minutes, when these are held in hands in order to work on the upper body, fixed on the soles for the lower body, or both held and fixed.

Aquagym has a compound structure for the fundamental part: *the aerobic part* of 15-20 minutes when free exercises are carried out, and the *localized part* of 10-15 minutes with the purpose to train the strength and endurance of muscle segments; various materials can be used to increase their efficiency.

a) Period and place of the research

Two independent variables were used for the experimental plan of the research. They included the educational strategy for the improvement of somatic indices, of motor and functional capacity, by selecting the methods and action means specific to water activities: aquagym and aqua-pullpush-gym.

The research took place throughout the entire university year 2011-2012 (October 2011-May 2012) and consisted of a 50 minute class, held once a week.

The reasearch comprised two tests:

- initial test: 10-21 October 2011;
- implementing the suggested ludic recreational water activities in the experimental group: 24 October 2011 - 11 May 2012;
- final test: 14 May-26 May 2012.

The operational aquagym and aqua-pullpush-gym programs were divided into three levels: beginners, intermediate and advanced, depending on the difficulty degree, on the intensity and complexity of the action systems.

b) Subjects and groups

The research was carried out on 95 subjects assigned to three groups: two experimental groups and one control group.

The experimental groups included 24 first-year female students from the University of Medicine and Pharmacy in Targu Mures, aged between 19 and 23 years. The first group (E1) executed a specific program of aquagym activities, while the second experimental group (E2) executed a specific program of aqua-pullpush-gym, a newly elaborated activity.

The control group (C) consisted of 47 first-year female students from the Transylvania University of Brasov, aged 19-23, from non-sportive specialties; the subjects attended physical education classes held in the gym, where they practiced the following activities: applied exercises, freestyle exercises for general physical development, exercises with portable objects and dynamic games.

c) Tests applied

Two tests were applied:

- The first test for *abdominal muscle strength* - lying on the back with bent legs, ankles stabilized by a partner, arms folded, hands behind the head, executing lifts of the torso for 30 seconds; estimation was related to the subjects' age and number of executions, according to the following scale: excellent: > 43; good: 37-43; above average: 33-36; average: 29-32; below average: 25-28; low: 18-24; very low: < 18
- The second test targeted *back muscle strength* - lying face down, arms folded, hands behind the head, ankles stabilized by a partner, executing trunk extensions for 30 seconds. The number of correct executions carried out in the allocated time interval was recorded.

Content examples of the programs applied in the two experimental groups (Tables I, II)

d) Statistical processing

For statistical calculations, we used SPSS 20.0 for Windows; we calculated Pearson's correlation, as well as the mean and standard deviation, based on which the t test for independent samples was applied.

Results

Table I

Group E1 - *Aquagym – intermediate level.*

Link/ duration	Content	Batch
Aerobic part 25 min.	1. PI: Standing position. Runs: back and forth swings with arms outstretched, palm facing backwards and fingers close.	2x8
	2. PI: Standing, arms folded, hands on the trunk, palms down, arranged one above the other at a distance of 10-15 cm. Small circles are executed in the abdominal area, from left to right and vice versa.	2x8
	3. PI: Standing position, arm straight ahead, left arm backwards. Runs: arm balancing along the body.	2x8
	4. PI: Standing position, arms bent at the torso, palms facing inward. Runs: simultaneously zoom-in and out the arms to the body, back and forth.	2x8
	5. PI: Standing position, arms on the side, submerged below water surface. Taking the arm forward and dynamically lowering the left arm. Return to starting position, similar moves but on the opposite direction.	2x8
	6. PI: Standing position, arms forward, submerged below water surface, palms facing outward. Runs: carrying arms forward to backward, followed by return to initial position.	2x8
	7. PI: Standing anteroposteriorly with right leg forward, arms on the lateral right, submerged below water surface. Runs: carrying arms from right to left return to starting position. Similarly, on the opposite direction.	2x8
	8. Normal running, on the spot or with shift.	Active break
	9. Running with knees up or sideways on the spot or shift.	30 secs
	10. Running step, skipped shift.	2x30 secs
	11. PI: Standing, arms bent forward. Jump with legs landing on the side and return.	2x30 secs
	12. PI: Standing with arms folded forward. Jumps with knees up.	2x30 secs
	13. PI Standing. Jumps with knees up and sideways.	2x30 secs
Localized part 10-15 min.	*Exercises with sand bags attached to ankles*	
	1. Running versions: normal running on the spot; running with knees up or sideways, on the spot; running while swinging leg forward, on the spot; running with swinging leg backwards on the spot; running with added step; running crossed step; running step, skipped shift.	2x40 secs
	2. PI: Standing. Lifting legs alternatively through leap.	2x8
	3. PI. Standing, arms above as a crown. Lifting the right leg, bent on the side with the descent of the arm on the same side, behind the knee, followed by a return to the original position; the same movements on the opposite side.	2x8

Table II

Group E2 - *Aqua-pullpush-gym – intermediate level.*

Link/ duration	Content	Batch
Fundamental part	*Exercises with plates kept in hands*	
	1. PI: Standing, arms bent at 90 degrees, forearms ahead, plates submerged in water and oriented forward. A pushing motion is executed with alternative push of the arms forward, before returning to the starting position.	2x8
	2. PI: Standing, arms on the lateral, plates vertically immersed in water. Executing a simultaneous movement to carry arms forward.	2x8
	3. PI: Standing, arms bent at 90 degrees on chest level, with pullpush plates placed on the water surface. Executing an alternative pushing motion of the arms downwards.	2x8
	4. PI: Standing, right arm stretched forward, left arm backwards, plates on the water surface. Executing a rocking motion of the arms alongside the body.	2x8
	5. PI: Standing, arms forward, the plates resting on the water surface. Executing torso twisting while carrying arms sideways, opposite the twisting movement of the trunk.	2x8
		Active break
	Exercises with plates attached to soles	30 secs
	1. PI: Standing, hands on hips, plates attached to soles. T1 – lifting the right leg bent forward, T2, 4, 6, 8 - return to the original position T3 – lifting right leg straight laterally. T5 - lifting the right leg and extension of arms on the side T7 - lifting right leg bent backwards.	2x8
	2. PI: Standing widely anterior-posterior, right foot forward, and arms bent with hands on hips, plates attached to soles. Executing anterior-posterior track by stepping with the left leg forward and return to start position.	2x8
	3. PI: Standing, arms bent, forearms facing forward. Executing alternative leg crossing forwards.	2x8
	4. PI: Standing sideways, fixed plates, right arm bent grabbing the edge of the pool, left arm bent, hand on hip. T1 - lifting left foot forward, T2, 4, 6 - return to starting position, T3 – lifting foot on the side, T5 - lifting leg backwards, torso tilted forward. The same movements on the opposite side.	2x8
		Active break
	Exercises with plates held in hands and attached to soles	30 secs
	1. PI: Standing with plates attached to soles, arms bent forwards, the plates positioned horizontally below the water surface. Executing an alternative lifting movement of the leg on the side simultanesouly with pushing down the arms, forwards.	2x8
	2. PI: Standing with plates attached to soles, arms bent sideways, plates positioned vertically oriented outwards. Executing an alternative motion of lifting bent legs backwards, simultaneously pushing the arms on the sideways.	2x8
	3. PI: Standing with plates attached to soles, arms bent at 90 degrees, forearms forward, plates positioned below the water surface, facing down. Executing an alternative lifting of legs bent back simultaneously pushing down the arms.	2x8
	4. PI: Standing, plates attached to soles, hands sideways, plates positioned below the water surface, face down. Executing alternative lifts of legs bent forward at the same time lowering down the arms sideways.	2x8
	5. PI: Standing, plates attached to soles, hands sideways with plates positioned below the water surface, face down. Executing alternative lifts of legs bent forward at the same time lowering down the arms on the side, plates face to face.	2x8

a) Abdominal muscle strength

Table III

Abdominal muscle strength - summary of results.

Group	Motor activity	Average (X)		Difference	CV (%)	
		Ti	Tf	Tf-Ti	Ti	Tf
E1	Aquagym	20.83	23.33	2.50	2.77	2.53
E2	Aqua-pullpush-gym	20.08	24.42	4.34	2.35	2.30
C	DFG+EA+JD	20.81	22.19	1.38	1.97	1.91

DFG - exercises for general physical development;
EA - applied exercises; JD - dynamic games;

Table IV

Analysis of statistical results - Student t test.

Group	Test	T	p
E1 - C	Ti	0.04	.965
	Tf	2.12	.037
E2 - C	Ti	1.37	.175
	Tf	4.31	.000

p>.05*; p<.05**; p<.01***

b) Back muscle strength

Table V

Back muscle strength - summary of results.

Group	Motor activity	Average (X)		Tf-Ti	CV (%)	
		Ti	Tf		Ti	Tf
E1	Aquagym	28.92	32.08	3.16	3.47	3.09
E2	Aqua-pullpush-gym	27.88	32.42	4.54	2.64	2.24
C	DFG+EA+JD	28.94	30.57	1.63	3.37	3.22

DFG - exercises for general physical development;
EA - applied exercises; JD - dynamic games.

Table VI

Analysis of statistical results - Student t test.

Back muscle strength			
Group	Test	T	p
E1 – C	Ti	.023	.982
	Tf	1.89	.063
E2 – C	Ti	1.36	.177
	Tf	2.50	.007

Discussions

As a result of the research, regarding the testing of abdominal muscle strength, by calculating the arithmetic mean difference between the two tests, the control group registered a progress of only 1.38 executions, a value inferior to the one achieved by the experimental groups.

The experimental groups who carried out operational programs specific to ludic-recreational water activity showed greater differences compared to the control group: the Aquagym E1 experimental group recorded a mean difference of 2.50 executions and the Aqua-pullpush-gym E2 experimental group registered 4.34 executions, as it can be seen in Table III.

If we relate to the mark-value correlation grid, in the case of the trial targeting abdominal muscle strength in women, it can be seen that at the initial testing, all groups involved in the experimental research were at a *low* level. After performing the programs of the suggested activities, the control group and the Aquagym E1 experimental group remained at the same level of assessment, registering slightly improved results, while the Aqua-pullpush-gym E2 experimental group achieved more progress, reaching a *below the average* level on the grid, with a mean value of 24.42 executions.

By applying the Student t test and calculating the p correlation index, all values were significantly lower than 0.05 and p index values compared to the control group highlight the following: the mean performance at the initial testing was *significantly different* compared to the mean performance recorded at the final testing for the Aquagym E1 experimental sample and *highly significantly different* for the Aqua-pullpush-gym E2 experimental group.

The practical application of the new aqua-pullpush-gym activity required the design and development of action systems using pullpush plates with the view to selectively process all body segments, to develop the main motor skills and to train motor skills.

Following the research and the statistical-mathematical analysis of individual values, in the case of the back muscle strength testing, all research samples registered noticeable progress between the two tests, but the progress of the experimental groups was higher than that of the control group, according to Table V.

The Aquagym E1 experimental group obtained at the initial testing an arithmetic mean of 28.92 executions and 32.05 executions at the final testing, with a progress of 3.16 executions.

The Aqua-pullpush-gym E2 experimental group registered a difference of arithmetic means of 4.54 executions between the tests, which resulted from the mean value of 27.88 executions at the initial testing and the arithmetic mean of 32.42 executions at the final testing.

The arithmetic mean of the control group at the initial testing was 28.94 executions and at the final testing 30.57 executions, with a mean difference of 1.63, indicating a lower progress as compared to the two experimental groups.

The analysis performed using the Student t test for paired samples highlights a statistically *non-significant* difference between the control group and the Aquagym E1 experimental group: p <0.063 is higher than 0.05, which leads to the acceptance of the null hypothesis.

By comparative analysis between the control group and the Aqua-pullpush-gym E2 experimental group, the Student t test shows a statistically *significant* difference, p <0.007, much lower than 0.05, resulting in the rejection of the null hypothesis, thus supporting the alternative hypothesis of the research.

The use of equipment called pullpush paddles in aquagym activity, presenting superior technological features, allowed precise grading of muscle contractions, a suitable dosage and processing of the main muscle groups, all of which were in relation to the influence of water environment properties, training objectives, age particularities, training level and preferences of subjects.

Conclusions

1. In the case of the abdominal muscle strength trials, the progress of the experimental groups was significantly higher compared to the control group, due to the influence of the independent variables of the research.

2. The evaluation of back muscle strength highlights the fact that the two experimental groups who performed ludic-recreational water activities obtained a significantly higher progress compared to the control group who performed a classical program in the gym - terrestrial environment.

Conflicts of interests

There are no conflicts of interest.

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Consequences of lack of education regarding nutrition among young athletes

Lipsa educației nutriționale și consecințele acesteia în rândul tinerilor sportivi

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Abstract

Backround. Daily food intake has to maintain health and avoid the occurrence of injuries, leading to the best shape development of the athlete as a result of all stages of training.

Aims. Knowledge regarding nutrition was the first objective in a group of young athletes in the process of body development.

Methods. A transversal epidemiological study was performed in 2013 using a questionnaire. The group consisted of 100 students of a Sports High School from Târgu Mureș, Romania, members of various types of sports.

Results. Over three quarters of the respondents were male, with a mean age of 17.84 years. Only 17% of athletes planned their menu during a week, while 6% had correct knowledge on carbohydrates as the main energy source of the body. Over half of the respondents identified the correct answer on protein sources while 12% had the correct knowledge on lipids.

Conclusions. Although the school curriculum provides a theoretical initiation of the students, the results show that interventions in the area are unsatisfactory and the degree of support from coaches, as providers of appropriate information, is insufficient.

Key words: nutrition, athletes, coaches, education.

Rezumat

Premize. Ingestia alimentară zilnică trebuie să mențină starea de sănătate, să evite apariția accidentărilor, dezvoltând cea mai bună formă sportivă, ca urmare a tuturor etapelor de pregătire.

Obiective. Evaluarea cunoștințelor nutriționale ale unui grup de tineri sportivi, aflați în procesul de dezvoltare.

Metode. A fost realizat un studiu epidemiologic transversal, în 2013, pe baza unui chestionar. Lotul a fost alcătuit din 100 elevi ai Liceului cu Program Sportiv „Szasz Adalbert", Tîrgu Mureș, România, membri ai diferitelor ramuri sportive. Un procent de 76% din persoanele chestionate au reprezentat sexul masculin, cu vârstă medie a lotului de 17,84 ani.

Rezultate. Doar un procent de 17% din sportivi își planificau meniul pe parcursul unei săptămâni, în timp ce 6% au avut cunoștințe corecte privind carbohidrații ca principala sursă energetică a organismului. Un procent de 59% au identificat răspunsul complet referitor surselor proteice, iar cunoștințele corecte privind lipidele au fost evidențiate într-un procent de 12%.

Concluzii. Chiar dacă programa școlară a liceului luat în studiu prevede inițierea teoretică a elevilor, rezultatele indică faptul că nivelul intervențiilor în domeniu este unul scăzut, iar gradul de susținere din partea antrenorilor, care oferă informații corespunzătoare, insuficient.

Cuvinte cheie: nutriție, sportivi, antrenori, educație.

Introduction

The purpose of education regarding nutrition is to increase the value of nutritional practice, which aims to generate positive behavioural and dietary elements (Pérez & Aranceta, 2003). A child's education regarding nutrition, including the adequate training of the teaching staff involved, should be a priority in the education system, in order to ensure the optimum level of knowledge that children must acquire (Thibault & Marquis, 2006).

Ensuring the necessary amount of food is acknowledged as the main objective in preserving health and guaranteeing the growth of the body. Application of any energy/fluid restrictions would lead to disruption of the metabolic processes due to the lack of an energy substrate.

Once the main objective of providing the energy demand has been reached, secondary targets that depend on the peculiarities of physical activity are considered. These objectives often regard the process of positive or negative change of body mass. Decisions and practices that athletes

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take regarding body weight are often inadequate.

These restrictive food aspects characterise specific professional sports: gymnastics, sports of strength, endurance, and contact sports. Although energy deficit is not a frequent situation due to the specificity of these sports, it is often reported.

Gymnastics and strength sports have a compact, well-structured training system whose goal is to achieve the indicated physical level by covering all technical processes. Thus, the young athlete often appears unable to meet the necessary energy needs in order to achieve a change in body mass due to inadequately set restrictions (Jonnalagadda et al., 1998; Kerr et al., 2006; Burke et al., 2011).

Certain shortfalls can be found in endurance athletes in terms of meeting the energy demand as a result of total exercise time and established energy consumption (***, 2000).

Contact sports consider lowering body weight in order to achieve the weight that gives the athlete the opportunity to participate in competitions. These changes are most often carried out by dehydration over a short period of time (Franchini et al., 2012). As a result, athletes are often unable to restore in due time the pre-exercise fluid loss occurring 24-48 hours prior to the competition (Finn et al., 2004).

Given the changes that may be dictated by the nature of sport (sometimes with an adverse health impact), or the "imposed" practices to reach a high level of performance, the importance of nutrition and its role in training become of outmost importance.

Hypothesis

The initiation of this study took into account the practicability level of sports nutrition in Romania. Significant differences are most often seen in knowledge, application and desire of the field. Furthermore, we believe that nutritional actions are at a low level. Improving the nutrition system starts properly from such accounts, which can subsequently turn into positive, favorable specific activities.

Materials and methods

Research protocol

The study was conducted after obtaining the approval of the Ethics Committee and the subjects' informed consent to participate in the study. Basic information can be derived from a system of questionnaires among young athletes establishing connections between their levels of knowledge and practice imposed by the coach.

a) Period and place of the research

The study, including 100 subjects, was initiated on 1 October 2013, at a Sports High School in Târgu Mureş, Romania, and was completed on 25 October 2013.

b) Subjects and groups

100 athletes, members of various types of sports, enrolled in a Sports High School in Târgu Mureş, Romania, were analyzed. Of all athletes, 76% were male and 24% female, with a mean age of 17.87 years. The types of sports included athletics (12%), basketball (4%), boxing (1%), rowing (2%), football (60%), futsal (1%), gymnastics (1%), handball (12%), wrestling (4%), tennis (2%), and volleyball (2%).

c) Tests applied

Data were obtained through a questionnaire, developed and validated at the Department of Community Nutrition and Food Hygiene of the University of Medicine and Pharmacy in Târgu Mureş.

The first part of the questionnaire included data on students, the type of sport practised, and characteristics of daily effort. The second section involved the characteristics of the students' own practices/nutritional knowledge. The questions were designed to collect data on practices and food consumption attitudes, specific to intense effort. The knowledge of students regarding the following aspects was assessed: macronutrient intake, food sources, frequency of ingestion, food supplements used, prevalence of rehydration methods used, and details related to the preparation of the body and post-exercise recovery. Copies of the questionnaire (in Romanian) are available from the authors.

d) Statistical processing

Data processing was performed by descriptive statistics on a representative sample of students using the EpiInfo 6.0 internal test. The Chi-square test was used to interpret differences between athletes regarding the indices involved. The ANOVA test was employed to identify the connection between the body mass index and the specific number of hours of exercise per week.

Results

The results identified 85% of athletes with normal nutritional status, expressed by BMI values between 18.5-24.9. 12% of athletes had BMI values under 18.5, while 3% had a BMI value of 24.9 (overweight).

Given the weight of the athletes, in correlation with their specific activity, we noted that 48% of the athletes performed sports at national, 41% at regional, and 11% at international level.

The questionnaire surveyed the daily effort of the athletes. The level at which activity was carried out affected the number of hours spent in physical exercise during a week ($p = 0.0001$) (Fig. 1) and hence, the number of days of rest, i.e., without any training, in one month ($p = 0.006$). The number of hours spent in training per week is in a positive correlation with BMI, but without any statistical significance ($p = 0.05$).

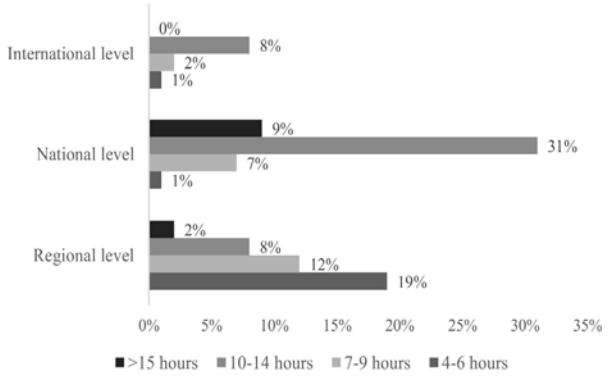

Fig. 1 – The number of hours spent in training per week.

Athletes who reported a number of 4-6 hours of exercise weekly (21%) had a BMI between 15.5 and 25.3.

Twenty-one percent of the athletes spent 7-9 hours per week in training; their BMI was between 16.1 and 26. Nearly half (47%) of the athletes reported 10 to 14 hours/ week spent in training, having BMI values of 18.3-24.2. The lowest rate was found among athletes who reported over 15 hours of exercise, with a BMI between 18.8 and 24.8 (Fig. 2).

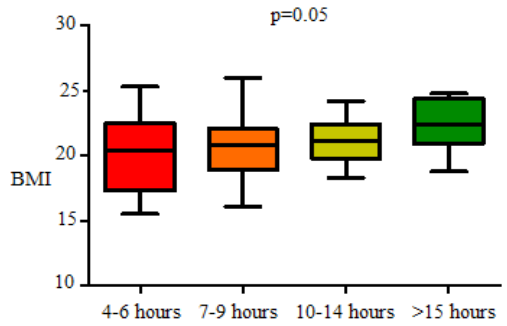

Fig. 2 – The relationships between BMI and the number of hours spent in training (NS).

In terms of the students' nutritional knowledge, an important aspect is provided by the way they perceive their food intake and nutrition knowledge on a scale from 1 (poor knowledge/practice) to 5 (very good knowledge/ practice). The surveyed athletes' nutritional knowledge was characterised by 3 (medium level of nutritional knowledge) in a relatively high percentage of 44%. One quarter rated their knowledge as very good (4 and 5). The percentages of nutrition practice were 32% (level 3) and 42% (levels 4 and 5).

All these data highlight the importance of nutrition among athletes in the study group. A notable difference was found between those who considered nutrition important and those who did not. In this case, 69% of athletes characterised the impact of nutrition on athletic performance as of high importance, and 8% stated that nutrition was not an important factor in physical activity performance.

The lack of intervention from coaches/trainers indicates a significant difference between the theoretical awareness of valid principles among athletes and the practice of each individual, ranking at a low level compared to the initial statement ($p = 0.021$).

The number of meals during the day ranged from 3 main meals (55%) to 2 main meals (19%). Nineteen percent of the athletes surveyed consumed 4 meals per day, while 6% consumed 5 meals per day.

The survey evidenced that 13% of athletes did not have breakfast. The distribution of snack consumption showed that, unlike the highest percentage recorded for the main meals, snacking did not account for a majority consuming secondary meals. Eighteen percent of the athletes reported consuming one secondary meal, while two snacks daily were reported by 30% of the athletes, three snacks by 29%, 4 snacks were consumed by 15% and 5 by 8% of the subjects.

We also took into account the use of food supplements, given the young average age (17.84 years), with an increased prevalence. Carbohydrate/protein supplements were used by 12% of the athletes, and vitamin and mineral supplements by 37% (Fig. 3).

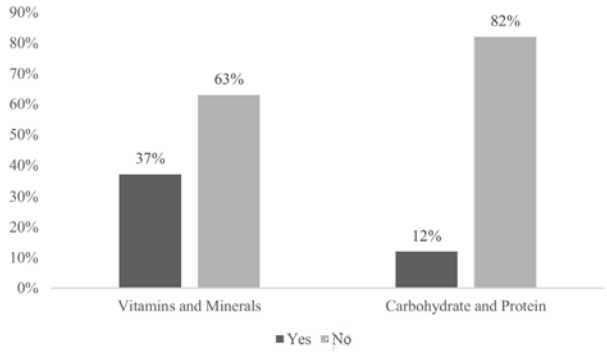

Fig. 3 – Consumption of food supplements.

The presence of nutritional strategies in the interviewed athletes was low; we identified a prevalence of 47% for the use of specific nutrition methods in order to meet energy requirements/post-exercise substrate recovery. Although 50% of athletes supported the importance of the proper use of food strategies, our survey revealed a low level of applicability. We noted significant correlations between dietary strategies for training/competition and the information from coaches ($p = 0.009$), the use of the carbohydrate consumption method ($p = 0.01$), the implementation of sports training rations ($p = 0.001$) (Fig. 4), and the use of pre-exercise hydration strategies ($p = 0.0001$) (Fig. 5). Menu planning in order to achieve the objectives in terms of energy needs was done by 17% of athletes.

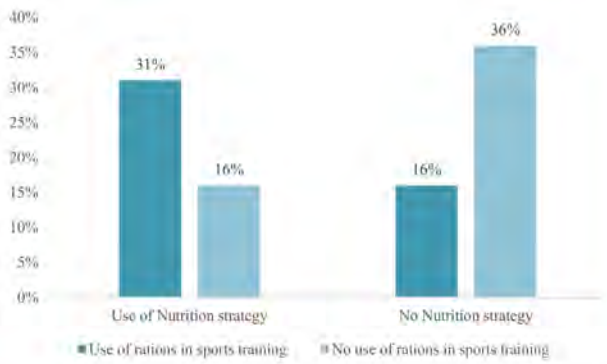

Fig. 4 – The use of food rations in direct relationship with the use of food strategies ($p = 0.001$).

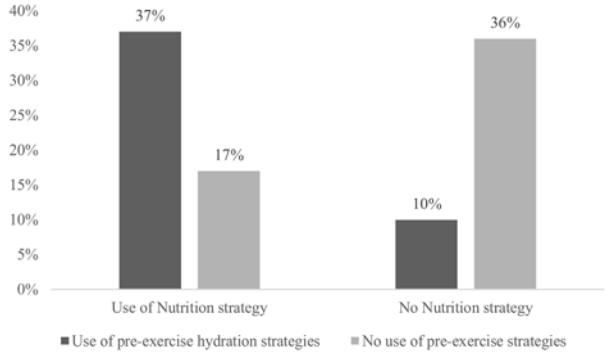

Fig. 5 – The main relationship between the use of hydration strategies and food intake strategies ($p = 0.0001$).

The use of hydration strategies shows a relation with the degree of physiological changes as a result of dehydration ($p = 0.07$, not statistically significant). Nearly one third of the athletes, namely 30%, had no knowledge of the side effects that could occur.

Of the 30% of athletes, 13% stated that dehydration can help in sports activities; conversely, 82% of athletes hydrated themselves in line with the training effort. Energy status was important for 82% of the athletes; however, the use of food strategies was low.

The increase in carbohydrate intake was not reported by 81% of athletes during the pre-exercise/post-exercise period. Rations during competition were unknown to 52% of athletes. Pre-exercise food intake was controlled by 48% of athletes.

Initiating post-exercise consumption (the shift of the body from catabolism to anabolism) was properly done (30 minutes post-exercise) by 19% of athletes. Sixty-two percent of the athletes reported that the first food intake occurred at least one hour after the cessation of the effort, the rest of the athletes (19%) consumed food at 2 hours post-exercise. Over half (54%) of the athletes surveyed did not change the total consumption of energy from food during transit.

By exposing the main energy sources, we characterised the knowledge related to foods and the macronutrient type they represented (Table I).

Table I

The share of complete answers on macronutrient sources from the athletes.

Macronutrients		
Carbohydrates	Proteins	Lipids
6%	59%	12%

As the main energy source of the body, carbohydrates were chosen from the existing options: cheese (5%), cereals (31%), vegetables (53%), and cheese and cereals (1%), cheese and vegetables (3%), cereals and vegetables (6%). Proteins were selected from the following: meat (59%), fruit (23%), pastries (4%), along with meat and fruit (14%). As important energy sources, lipids were chosen by a percentage of 64 from: olive oil, apples (3%), peanuts (20%), and olive oil and apples (1%), olive oil and peanuts (12%).

Knowledge of the sources of macronutrients was relatively low. Nineteen percent of the athletes agreed and 15% did not agree with the statement that a banana (100 g) contains 50 g carbohydrates, while 66% did not know how to respond. Almost half of the athletes surveyed (47%) believed that sugar had nutrients apart from carbohydrates. Twelve percent believed that bread and lettuce contained water, a statement significantly related to the use of hydration strategies ($p = 0.035$).

The theoretical role of proteins and carbohydrates in the body was also surveyed and the results completed the defining elements in the case of the main food sources. One percent of the athletes claimed that proteins played a catalytic and energy role, and, as a result, a muscle recovery role. Nearly half (49%) of the athletes believed that proteins had energy properties only, and 30% believed that proteins were important only for the recovery of the body (the rest of the data being equally distributed). Of all the athletes surveyed, 8% chose answers according to which carbohydrates play a role in body functioning, energy supply, and post-exercise recovery.

Only 60% of athletes read product labels of what they bought and consumed. However, although nutritional knowledge in students was low, awareness of the impact of food was high. Eighty-eight percent of the athletes surveyed stated that intake of sufficient amounts of vegetables/fruits may reduce muscle inflammation and stimulate efficient recovery of the body. In general considerations, 94% of the athletes stated that foods of plant origin, along with fruit, provided the necessary vitamins and minerals to the body to a great extent. Eighty-four percent of athletes expressed the opinion that a lack of micronutrients may affect the quality of muscle contraction. Soup was considered by 87% of individuals both a form of hydration and a satisfactory method to provide balanced micronutrients (consumed post-exercise daily), and also a form of providing energy substrate.

Although the athletes were aware of this information, 33% preferred eating the first meal of the day as cereals with milk (less than 50% were unrefined), and 33% preferred sandwiches containing meat products. The rest of the athletes consumed eggs, butter, bread, tea, dairy products, jam, and French toast. Less than 30% of athletes consumed vegetables and/or fruits for breakfast. Overall food consumption can be seen in Table II.

Table II

Overall food consumption.

Food type	Less than once a week	Once a week	Daily	More than one serving daily	Never
Milk	31%	11%	42%	9%	7%
Yogurt	30%	17%	15%	7%	31%
Soft Cheese	31%	15%	14%	3%	37%
Hard Cheese	33%	21%	21%	2%	23%
Feta Cheese	24%	24%	4%	2%	23%
Beef	25%	23%	4%	2%	46%
Pork	43%	21%	15%	7%	14%
Chicken meat	44%	17%	22%	12%	5%
Fish	28%	31%	6%	2%	33%
Cold cuts	15%	10%	55%	8%	12%
Eggs	45%	17%	19%	10%	9%
Fresh vegetables	27%	14%	45%	7%	7%
Canned vegetables	17%	20%	3%	7%	53%
Fresh fruits	17%	8%	65%	7%	3%
Dried fruits	10%	23%	13%	2%	52%
Fruit juices	24%	13%	36%	10%	17%
Sodas	25%	12%	30%	12%	21%
White bread	6%	0%	82%	11%	1%
Pasta	39%	25%	5%	8%	23%
Rice	39%	25%	7%	5%	24%
Walnuts	17%	22%	4%	0%	56%
Seeds	26%	22%	12%	3%	37%
Hazelnuts	18%	25%	8%	3%	46%
Groundnuts	9%	28%	9%	1%	53%
Sweets	17%	13%	43%	13%	14%
Butter	16%	18%	40%	6%	20%
Margarine	14%	18%	33%	6%	29%
Sunflower oil	29%	12%	23%	4%	32%
Olive oil	11%	14%	9%	1%	65%
Alcohol	11%	6%	0%	0%	83%

Discussion

The data were meant to establish a connection based on the knowledge of young athletes. Discussions between students and nutritionists can establish a level where nutrition practice should be such that athletes benefit

from adequate daily food practices. An optimal education system is followed by the involvement of young athletes in a series of actions carried out over a long period of time, with a high probability of inducing changes in eating habits.

In many cases of professional sports, coaches/athletes believe that low body weight leads to increased physical performance (Arroyo et al., 2008; Burke, 2004). This information can often be mistaken because (unwanted) weight loss influences the inactive mass of the body, but similarly, the active mass of the body affects the sporting activity.

The specific data that the nutritionist presents to the young athletes have to be clear, especially since athletes have a high degree of information retrieval based on the type of sport they practice (Abood et al., 2004).

Education of young athletes is a starting key element in professional sports. Both athletes (Zawila et al., 2003; Nancy et al., 2005; Yueching et al., 1999) and coaches/trainers have low levels of knowledge (Cotunga et al., 2005; Ozdoğan et al., 2011). Increasing the level of knowledge among young athletes must be undertaken both in the education system (Perez-Rodrigo & Aranceta, 2001) and in the family and the community to which the individual belongs (Ferrer et al., 2014; Pascoal et al., 2013). Data indicating the proper use of carbohydrates during exercise of different intensities and volumes (Jeukendrup, 2004), the use of proteins and their post-exercise action (Rennie et al. 2000), lipids and the different oxidation levels during exercise (Knechtle et al., 2004) must be carefully managed in order to optimize the athlete's performance. Consumption of supplements by young athletes should be closely monitored due to increased consumption trends in high performance sports (Meyer et al., 2007; Burns et al., 2004; McDowall, 2007).

For this study, the level of practicability of sport is described as medium/high. The number of hours spent exercising directly relates to the activity and weight of the individual. In terms of energy, these elements establish an intrinsic connection based on training sessions (Yoshioka et al., 2001; Petróczi et al., 2008). Once there is progress in the training of properly prepared athletes, energy changes are influenced by intensity, volume, and duration of exercise (Laia et al., 2009; Burke et al., 2006). Dietary elements are positively associated with the physical development of the individual (Purcell, 2013). Individual data vary depending on each athlete and the practical application of knowledge depends on individual perception. Thus, a number of eating habits are acquired which influence the development of the body (Galanti et al., 2015; Bar-Or, 2001). Therefore, 90% of the athletes considered dietary recommendations important for improving sporting achievement.

In sports, differentiating the perception towards food is accomplished by methods that characterise nutrition practice/knowledge and, implicitly, the athletes' view regarding the acquisition of more notions on the topic.

Differences are found between nutrition theory and practice used by the young athletes in our study in order to achieve the maximum level of competence appropriate to each period in sports training.

Conclusions

1. Awareness of the importance of applying adequate nutrition is high, but the level of theoretical knowledge and practical application is relatively low among young athletes.
2. Although the curriculum provides specific training, the results are not satisfactory.
3. The contribution of coaches/trainers in determining nutritional habits in students is low because of the incomplete system of practice based on scientific evidence in the field of athlete nutrition.
4. A first step towards changing these results can be achieved by implementing an accessible and effective education programme among teachers/trainers for the introduction of a proper hygienic-dietary plan that corresponds to high performance sports.
5. Among students, school education is the form that will positively affect both the knowledge and the degree of interest in the introduction of such a hygienic-dietary plan.

Conflicts of interest

There are no conflicts of interest regarding the results, the research method, and the conclusions drawn.

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Palestrica of the third millennium – Civilization and Sport
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The effectiveness of swimming in treating and preventing obesity
Utilizarea înotului în profilaxia şi tratamentul obezităţii

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Abstract

Background. Due to the influence it exerts on the body, swimming is considered one of the most important means of physical therapy, recommended to persons with overweight problems and obesity. Obesity is a serious global health problem with enormous economic impact. Obesity is a metabolic disease characterised by weight gain, as a result of the accumulation of body fat, food excess and a sedentary life.

Aims. The purpose of this research is to find the most effective and specific swimming methods to relieve excess weight. The research hypothesis: swimming activity conducted under special programs can prevent and reduce obesity.

Methods. The research was conducted from October 15, 2012 to April 15, 2013. The investigated somatic indices were: height, weight, abdominal circumference and body mass index (BMI).

Results. For all indicators in the study, significant differences between initial and final measurements were reported.

Conclusions. Research findings confirm the hypothesis that swimming can have a decisive role in maintaining health and also, in preventing and relieving obesity. Knowledge of nutrition problems in close interrelation with swimming practice will help prevent and combat overweight problems and obesity.

Key words: swimming, obesity, students.

Rezumat

Premize. Datorită influenţelor pe care le exercită asupra organismului, înotul este considerat unul dintre cele mai importante mijloace ale kinetoterapiei, recomandate persoanelor cu exces ponderal şi obezitate. Excesul ponderal reprezintă o gravă problemă de sănătate la nivel mondial, cu un enorm impact economic. Obezitatea este o boală de metabolism, caracterizată prin creşterea în greutate, în urma acumulării de ţesut adipos, prin exces de alimente şi viaţă sedentară.

Obiective. Scopul cercetării îl constituie găsirea celor mai eficiente metode şi mijloace specifice înotului, pentru ameliorarea excesului ponderal şi a obezităţii. Ipoteza cercetării: activitatea de înot desfăşurată în baza unor programe poate avea efecte benefice în prevenirea şi ameliorarea obezităţii.

Metode. Cercetarea s-a desfăşurat în perioada 15 octombrie 2012-15 aprilie 2013. Indicii antropometrici, care au fost investigaţi, au fost: înălţimea, greutatea, perimetrul abdominal şi indicele de masă corporală (IMC).

Rezultate. La toţi indicatorii luaţi în studiu s-au constatat diferenţe semnificative între măsurătorile iniţiale şi cele finale.

Concluzii. Concluziile cercetării confirma ipoteza; înotul poate avea un rol hotărâtor în menţinerea sănătăţii, în prevenirea şi ameliorarea obezităţii. Cunoaşterea problemelor legate de alimentaţie, în strânsă interdependenţă cu practicarea înotului, va contribui la evitarea şi contracararea excesului ponderal şi obezităţii.

Cuvinte cheie: înot, obezitate, studenţi.

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Introduction

Swimming is a pleasant physical activity, having individual and social utilities unmatched by any other sport (Marinescu, 2002).

It has a great beneficial influence on health and can be practiced anytime, starting from the first months of life until old age, due to the ease with which one can divide the effort into different stages.

Practiced in an academic environment, swimming today becomes a requirement with choices and large sanogenetic applications due to the students' specific work, where physical exercise occupies a small part of the students' time as opposed to the prevalence of mental and intellectual pursuits and stress (Stoica, 2009). Swimming also improves lung capacity and helps in reducing excess weight.

Through swimming, good results can be obtained in the prevention and treatment of obesity. Today, it is widely accepted that dieting or taking certain medicines cannot have long-lasting effects if they are not combined with physical exercise. Swimming gives very good results in this case, stimulating the burning of excess fat, preventing its deposition on the thighs, abdomen and hips; it also normalizes the function of endocrine glands (seriously affected by this illness). The superiority of swimming over other means of physical exercise in treating this illness resides in the fact that part of energy is also used in maintaining a stable body temperature.

Swimming helps develop and maintain the vital body processes and by using the entire muscular system, the body can develop harmoniously. The shoulders broaden, the well-developed thorax protects powerful lungs, the muscles, long and proportionate, enable good working capacity and can adapt to any kind of activity (Colwin, 1992).

The favourable effects exerted on the body are generally provided by the association with natural environmental factors – air, water, sun – improving health (Vasile, 2007). Due to these influences, swimming becomes one of the most important means of physical activity recommended to people with overweight problems and obesity.

Activity performed in water with a temperature of 17°C burns 2 calories per minute; moderate activity in water with a temperature of 17-21°C burns 9.5 calories per minute; when swimming fast, the number of calories increases to 12 per minute. The calories the body needs for the swimming motions and for cold water adaptation are generated through the acceleration of metabolism in general (Vasile, 2007).

Metabolism is required to make a bigger effort in burning calories, and metabolic energy production becomes more efficient through systematic swimming workouts. Heat loss in turn determines a substantial increase in tissue fat burning and generally accelerates metabolism (Stoica & Stoica; Stoica et al., 2012). The endocrine glands, especially the thyroid, are further stimulated in a beneficial way. This effect justifies swimming as a prescribed sport for those suffering from obesity, when metabolism becomes slow.

Physical activity in youth is an important public health issue, and regular participation of young people in physical activity can enhance their physical, psychological and social well-being. Parents are key factors in influencing the physical activity of their children. Building moderate-intensity physical activity into the daily routine may help parents model this desirable behaviour of their children (Biddle & Mutrie, 2001).

Due to the influence it exerts on the body, swimming is considered one of the most important means of physical therapy, recommended to people with overweight problems and obesity. Obesity is considered a serious problem worldwide and has a big negative economic impact. It is a metabolic disease characterised by weight gain, as a result of body fat accumulation through excess food and a sedentary lifestyle. These people must make an effort to lose weight, as individuals are exposed to all kinds of health problems such as high blood pressure, type 2 diabetes mellitus, coronary heart disease or stroke (Ganciu, 2012).

If the body tends to accumulate fat in the abdominal area, these deposits release fatty acids directly into the blood flow for immediate energy elimination in case of short-term activities (doctors cannot yet explain why this process is so harmful to health) (Mot, cited by Ganciu, 2012).

The waist circumference represents the second most important measurement after the BMI (Dumitru, 2007). It indicates where most of the fat is stored.

This accumulation of fat in the abdominal area is called an "apple shape", while the fat stored around the hips and thighs is called a "pear shape". If the waist circumference is larger than 102 cm in men and 88 cm in women, an increased risk for health is indicated, especially in the case of a BMI higher than 25 (Dumitru, 2007).

The BMI must be interpreted relative to age and sex (Reilly, 2006).

In the management of obesity, including morbid obesity, a 5-10% reduction of the initial weight brings a lot of benefits for comorbidities (Karlsen et al., 2013).

Changes in lifestyle (diet, behaviour, attitude, physical activity) are basic strategies in the intervention on obesity on a long-term basis (Wadden et al., 2013).

Widespread adoption of BMI-for-age will depend on continued efforts to train individuals in the appropriate use of national and international growth references (Anderson et al., 2006).

Direct but simple measures of body fatness and measures of body fat distribution may be helpful in such individuals to further stratify them according to their level of body fatness (Romero-Corral et al., 2008).

Objectives

The aim of this research is to find the most efficient swimming methods and programs to eliminate excess weight and obesity.

Physical activity practically represents the most accessible, agreeable and efficient "medicine" in fighting many health risk factors (Dumitru, 2007).

Hypothesis

It is assumed that different swimming methods and prolonged physical effort, of over 40 minutes 3 times a week, along with dietary measures, will lead to an improvement of body shape and weight.

Material and methods

Research protocol

a) Period and place of the research

The research was conducted from 15 October 2012 to 15 April 2013, at the "Lia Manoliu" Swimming Pool in Bucharest.

We mention that according to the Helsinki Declaration, the Amsterdam Protocol and Directive 86/609/EEC, the approval of the Ethical Commission of the Department of Physical Education and Sport of the University of Bucharest regarding research on human subjects was obtained, and all the subjects gave their consent to participate in this research.

b) Subjects and groups

The research was conducted over the course of an academic year and included 25 participants, students at the University of Bucharest aged between 18-25 years, who participated in 3 swimming lessons of 100 minutes each every week. The group also followed a low-calorie diet of 1200-1500 calories, for one year.

To determine the effectiveness of the activity in the experimental group, a control group of 25 students was formed, who preferred a moderate activity provided by their school schedule, thus taking part in only one weekly swimming lesson instead of three.

c) Tests applied

For this research, initial and final tests were conducted every 3 months.

These tests assessed the extent to which the independent variable influenced the difference between the data obtained from the 2 tests (Epuran, cited by Stoica & Stoica, 2012).

Biddle tested a model predicting intentions from perceived competence, achievement goals and ability beliefs in Hungarian youths. He found that entity beliefs predicted an ego goal orientation, whereas incremental beliefs predicted a task orientation. In addition, behavioural intentions were predicted by a task, but not an ego goal orientation (Wang & Biddle, 2014).

Sallis suggests that motivational variables centred on achievement orientation and perceptions of competence are worth to be studied. Indeed, the sport and exercise psychology literature over the past decade has shown that such constructs are popular (Biddle et al., 1998) with numerous studies of achievement goal orientations and perceptions of autonomy, self-determination or intrinsic motivational processes.

The investigated somatic indicators were: height, weight and abdominal circumference, and were obtained from both groups at the start and end of the experiment. On the basis of these results, the body mass index (BMI) was then calculated.

The workout schedule respects the principle of longevity in both duration and intensity (Dominteanu cited by Stoica, 2009).

The recovery program was mentioned in the records and included the following data: the length of immersion; the length of exercise; the motion axes; rhythmicity; the difficulty of these elements (accessibility); the times when the level of difficulty was increased; the general physical condition; age, sex, history; physical abilities; possible complications during physical activity etc.

The swimming sessions were divided into 3 weekly lessons:

- 2 x 1000 m with an active pause;
- 3 x 600 m with an active pause;
- 6 x 200 m with an active pause;
- 10 x 50 m with a 10 second pause;
- 2 x 4 x 50 m with a 10 second pause; a 2 second pause between every series
- 2 x 4 x 50 m with a 5 second pause; a 1 minute active pause between the series

A methodical process of steady effort was used to help lose excess weight and develop stamina (Maglischo, 1992).

We present below a training program for each of the 3 weekly lessons:

Monday
300 m – Warm-up
8 x 50 m Crawl – Start at 1:00''.
4 x 200 m Crawl – Pause at 1:00''
4 x 50 m Feet – Crawl
3 x 600 m with an active pause
100 m Relax
Total 3,600 m

Wednesday
300 m Warm-up
2 x 50 m Feet – Butterfly stroke
4 x 50 m Butterfly stroke - Start at 1:45''
2 x 50 m Back feet
4 x 50 m Backstroke – Start at 1:45''
2 x 50 m Feet - Bras
4 x 50 m Breaststroke – Start at 1:45''
2 x 50 m Feet - Crawl
4 x 50 m Crawl - Start at 1:20''
2 x 1000 m with an active pause
100 m Relax
Total: 3,600 m

Friday
300 m – Warm-up
4 x 50 m Sprints - Crawl
500 m - Crawl
4 x 50 m Sprints Feet - Crawl
500 m - Crawl
300 m Relax
Total 2,100 m

Physical activity in the case of people suffering from excess weight was conducted in 3 stages (Ganciu, 2009):

- 1st stage: intense, short-term physical exercise is used to burn excess fat, under conditions of controlled breathing associated with a low-calorie, low-fat diet
- the 2nd stage is aimed at correct muscle development through exercises steadily increasing in intensity and duration, thus ensuring the gradual reduction of fatty deposits
- 3rd stage: when adipose tissue has been reduced to acceptable levels and the muscles are built up, further physical exercise practice is recommended to maintain the results and prevent relapse.

We are now presenting a specific eating program with 5 meals a day, recommended to the participants in this program (Peter & D'Adamo, 1996):

- *Breakfast*: yoghurt (150 ml), fruit juice (250 ml), black bread (2 slices), cereals (150 g), honey (25 ml).
- *Snack*: 1 fruit.
- *Lunch*: vegetable soup (200 ml), salad (100 g), poultry/fish meat (100 g), black bread (2 slices), fruit salad (200 g).
- *Snack*: fruit juice (200 ml).
- *Dinner*: salad soured with lemon (150 g), baked vegetables (150 g), poultry/fish meat (100 g).

At least 2.5 l of water, green tea, fruit juice, herbal tea is indicated. Banned food: sweetened drinks, fat and salty cheese, fat meat, white bread, puddings, sweets and salt in big quantities.

d) Statistical processing

The statistical indicators used in this research were: the arithmetic mean, the differences between the final and the initial tests, the differences in percentage, the standard deviation and the "t" coefficient. The Student test was used to verify whether there were important differences between the initial and final tests. The computer programs used for statistical calculation were Microsoft Word, Microsoft Excel (Tudor, 2008).

Results

After statistical and mathematical processing of the results obtained from both groups, the following conclusions were drawn:

Table I

Waist circumference > 88 cm.

Groups	Initial testing	Final testing
Experimental Group	71.7 %	47.8 %
Control Group	70.8%	67.6%

Table II

Body Mass Index (BMI).

Groups	Normal Weight		Overweight		Obese	
Experimental Group	IT	17.6 %	IT	64.4 %	IT	17 %
	FT	35.2 %	FT	61.6 %	FT	3.2 %
Control Group	IT	19.5%	IT	68.2%	IT	12.3%
	FT	21.6%	FT.	67.2 %	FT	11.2 %

- In both cases, the final results were better than those recorded at the beginning of the experiment.
- In the experimental group, there was a significant difference in the BMI between the final and the initial testing: the value of $t = 2.31$, thus $p < 0.05$, as opposed to the control group, where the difference between the initial and the final testing was much smaller, as demonstrated by $t = 1.34$, thus $p > 0.05$.
- In the experimental group, there was a significant improvement in the two indices used, while in the control group, the small rise was not significant for any of the indices used for testing.

Discussions

This research includes female students who can swim and want to keep their weight under control, using swimming as a means for preventing obesity.

The idea underlying the formation of the 2 groups was that of group therapy: grouping them by similar weight provides psychological support, stimulates active participation and motivates the students to obtain the desired results.

In designing the diet, one must take into account the following:

- The diet must include products in caloric percentages from all food groups.
- Within the same group, isocaloric substitutions can be made by taking into account the preferences of the student or athlete.
- Every meal must include animal meat, vegetables and fruits.

It is necessary to calculate how much energy the diet will provide for the individual. The amount of carbohydrates the participants must intake is directly related to the degree of physical exercise, as carbohydrates are the perfect food for muscles. It must be noted that the working regime of the students is characterised by intellectual activity mainly conducted while sitting down.

Sedentary behaviour is often found in teens suffering from obesity, unlike in those with normal weight. Thus, minimising sedentary behaviour represents an important objective, especially in childhood, to prevent obesity. Reducing access to some of these sedentary activities can in fact generate other sedentary tendencies or heighten the excesses (Crockett, 2010).

The absence of physical exercise caused by psychological or social factors represents a problem in one's lifestyle. Obese children and teens, especially girls, do not seem to understand that they are less active than their counterparts from movies (Gorely, cited by Ayvaz & Cimen, 2011).

Two researchers, Wang & Biddle (2014), have demonstrated that sedentariness can be reduced by applying certain methods aimed at the desire of children and teens to adopt physical activities in their lives.

The interventions based on diet changes combined with physical activity proved to be more successful in the reduction of weight and BMI compared to the interventions based on only one of these components (Stephens et al., 2014).

Ross et al. (2004) reported that a loss of 6 kg by physical exercise resulted in a 6.5 cm reduction of the waist circumference and a 30% decrease of intra-abdominal fat.

The progress made after intense swimming practice refers to the improvement of morphological indices (weight, abdominal circumference), as follows:

In the experimental group: at the first testing, 71.7% of the subjects had over 88 cm in the abdominal area, but the percentage decreased to only 47.8% at the final testing (Dumitru 2007).

Previous studies proved that changes in the waist circumference were correlated with modifications of intra-abdominal fat. Slentz et al. (2005) demonstrated that a weight loss of 2 kg was associated with a 7% reduction of body fat.

- The BMI changed accordingly: at the time of the initial testing, 17.6% of the participants had an adequate weight, 64.4% were overweight and 17% were obese, as opposed to the final testing, where 35.2% had an adequate weight with a BMI < 25, 61.6% had a BMI between 25-30

(overweight), and only 3.2% had a BMI higher than 30 (obese).

In the control group who attended the basic lessons provided by the school program, only a minor improvement could be seen; at the initial testing, 70.8% of the students had a waist circumference larger than 88 cm, and the percentage decreased to 67.6% at the time of the final testing.

- The BMI values did not increase or decrease significantly: initially, 19.5% of the students had a normal weight, 68.2% were overweight and 12.3% were obese. In the final testing, 21.6% had a normal weight, 67.2 % were overweight and only 11.2% were obese.

Conclusions

1. This research concluded that almost 24% of the participants changed from an increased risk of obesity to normal values after the swimming lessons combined with a low-calorie diet, as calculated based on abdominal fat.

2. Approximately 14% of the participants changed from the obese to the overweight category.

3. Swimming determined visible changes in the body shape. The main physical effects were a decrease of the body mass index and of abdominal circumference.

4. In the beginning, 17% of the subjects were obese, 17.6% were normal weight and 64.4% were overweight. At the end of the experiment, only 3.2% of the students remained in the obese category, 35.2% were normal weight and 61.6% were overweight.

5. Somatic parameters demonstrate a drop in weight and an improvement of the abdominal circumference, which indicate the efficiency of the program applied and of swimming as a means of preventing and treating obesity.

6. Dietary measures are linked to a rise in the quality of food while decreasing the number of calories (generous amounts of fibre-rich food are recommended, such as whole grains, vegetables, fruits, and avoiding fats, sugar, processed foods and snacks loaded with calories and too few nutrients).

7. Swimming lessons based on a schedule can be very beneficial in preventing and treating obesity.

8. Educating willpower in doing physical activity systematically over the course of life is extremely important for improving the quality of life.

9. The findings of this research confirm the hypothesis that swimming can play a decisive role in maintaining health, as well as in treating and avoiding obesity. Knowledge of nutrition issues carefully paired with swimming will help in reducing excess weight and obesity.

Recommendations

The recommendations for people who follow a schedule for losing weight are the following:

- at least 30 minutes of daily moderate physical activity, which involves consuming about 250-300 kcal (1050-1260 kJ) per session;

- to effectively reduce weight, moderate physical activity for about 45-60 minutes daily is necessary.

Specific schedules should encourage regular physical exercise and counter a typical decline of physical development in growing children (Hughes, cited by Soos, 2014).

Conflicts of interests

There are no conflicts of interest.

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CASE STUDIES
STUDII DE CAZ

Recovery of patients after ablative and non-ablative laser treatments - a case report

Recuperarea pacienţilor în urma tratamentelor ablative şi non-ablative laser - studiu de caz

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Abstract

Background. In the aging process, some patients have multiple signs of aging (wrinkles, skin texture changes, pigmented lesions, vascular lesions, skin laxity) and therefore to treat these changes, combined minimally invasive aesthetic procedures (intense pulsed light - IPL, mesotherapy) and laser therapies are required, which can be performed in the same treatment session or in multiple sessions. In addition to these therapies, sessions of biostimulation are performed to increase the natural healing process.

Aims. The objective of this study was to highlight the significantly higher degree of patient recovery by associating facial treatments and myogymnastic exercises.

Methods. This paper presents the favorable evolution of a patient who received combined treatments: laser resurfacing, myogymnastic exercises and laser biostimulation. During the recovery period, the patient followed a strict hygiene and facial care regime combined with myogymnastic exercises.

Results. The results highlight the benefits of combining laser treatments with facial myogymnastics and biostimulation in one session, demonstrating a shorter healing time, less discomfort and a much more rapid social integration.

Conclusions. Patients with multiple changes in the aging process who seek treatment in aesthetic medicine clinics have higher levels of satisfaction if they receive combined treatments.

Key words: laser resurfacing, facial myogymnastics, biostimulation, healing.

Rezumat

Premize. În decursul ontogenezei, unii pacienți prezintă multiple semne de îmbătrânire (riduri, modificarea texturii pielii, leziuni pigmentare, leziuni vasculare, laxitate tegumentară), iar pentru a putea trata aceste modificări este necesară utilizarea tratamentelor estetice combinate minim invazive (lumina intens pulsată - IPL, mezoterapie) cu tratamente laser, care pot fi efectuate în aceeași ședință de tratament sau în ședințe multiple. Adițional la aceste terapii se efectuează și ședințe de biostimulare, pentru a grăbi procesul de vindecare.

Obiective. Obiectivul acestui studiu a fost să evidențieze gradul mult mai ridicat de recuperare al pacienților, prin alăturarea tratamentelor faciale și a exercițiilor de miogimnastică.

Metode. Lucrarea de față prezintă evoluția favorabilă a unei paciente, care a beneficiat de tratamente combinate: rejuvenare laser, exerciții de miogimnastică și biostimulare laser. Pacienta a urmat pe durata perioadei de recuperare un regim strict de igienă și de îngrijire a feței, combinat cu exerciții de miogimnastică.

Rezultate. Rezultatele evidențiază beneficiile combinării tratamentelor laser, în aceeași ședință, cu miogimastica facială și biostimularea, rezultatele obținute demonstrând o perioadă de vindecare mai redusă, cu un grad redus de disconfort și reintegrarea socială mult mai rapidă.

Concluzii. Pacienții cu multiple modificări în procesul de îmbătrânire, care se adresează clinicilor de medicină estetică, au nivele de satisfacție mai mari dacă sunt aplicate tratamentele combinate.

Cuvinte cheie: laser resurfacing, miogimnastică facială, biostimulare, vindecare.

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Introduction

Laser applications in modern medicine are used in various specialties such as dental medicine, neurosurgery, oromaxillofacial surgery, dermatology, ophthalmology, otorhinolaryngology and sports medicine. Lasers are also used in engineering, computers and communications.

The number of patients who seek help from aesthetic surgeons is increasing (Cicchi et al., 2014). Evolution and revolution in aesthetic surgery allows to perform corrections by classical surgical techniques and minimally invasive techniques using laser technology (Preissig et al., 2012).

Patients who seek treatment in aesthetic medicine clinics for multiple changes that occur during the aging process (wrinkles, facial texture changes, pigmented lesions, vascular lesions, skin laxity, etc.) require the combination of minimally invasive therapies such as IPL or mesotherapy with more complex treatments, i.e., laser therapy, procedures that can be combined in the same treatment session or in multiple sessions (Raulin & Karsai, 2011).

Many studies have shown an improvement in wrinkles, facial texture and skin laxity in the case of multiple treatment procedures. Although multiple clinical effects have been described after the application of these therapies, there are few data regarding the patients' degree of satisfaction (Ramsdell, 2012).

The biological target of lasers used for facial rejuvenation is tissue water. After reaching the target, lasers produce an inflammatory reaction that results in skin collagen synthesis stimulation and remodeling (Usatine et al., 2012), an important process because skin aging occurs due to a reduction of collagen synthesis. Ablative laser resurfacing involves the vaporization of the superficial epidermal layer and its replacement with new collagen and a new epidermis once the healing process is completed (Van Aardt, 2012). Ablation is performed at 2940 nm wavelengths (Railan & Kilmar, 2012). Unlike ablative laser, non-ablative laser does not remove the superficial epidermal layer, but acts on deeper skin layers by intensifying collagen synthesis. Because the superficial layer is not removed, there is no controlled skin burn, which means that patients will need no recovery time and will not have to interrupt their daily activities (Kazemi et al., 2014).

Hypothesis

The study aims to highlight post-treatment recovery possibilities, which are aesthetically and functionally much more advanced using myogymnastic exercises combined with aesthetic facial treatments.

The increasing demand for these therapies underlay this study, which aims to demonstrate the advantages of the combination of the two treatments for the improvement of facial aesthetics.

Material and methods

In what follows, we present the case of a 30-year old female patient, a financial inspector, who came to the aesthetic medicine office for multiple signs of facial skin aging due to voluntary or involuntary grimaces and hyperpigmented lesions. The patient's profession was not associated with solar or ultraviolet radiation exposure.

After an extensive examination, it could be established that the patient had a Fitzpatrick phototype 1 (white complexion with freckles that do not tan during sun exposure, but always get burned), with many hyperpigmented macules in the zygomatic region, on the forehead, and both dynamic and static expression wrinkles, which were classified as Fitzpatrick type 2 (fine to moderately deep wrinkles and a moderate number of linear wrinkles). The hyperpigmented areas were irregular, with an inhomogeneous appearance, being interspersed with non-hyperpigmented skin areas. According to the Glogau classification, considering age as an indicator, the patient did not fit into group 2 with moderate changes, because the age limit for this group is 35-40 years; the skin changes were specific to this group (early to moderate photoaging: early brown spots visible, keratosis palpable but not visible, parallel smile lines begin to appear, wears some foundation). The described aspects are shown in Fig 1.

The patient was not exposed to solar radiation, did not use contraceptive medication and was not under treatment with antibiotics, converting inhibitors, hormone therapy or any type of photosensitizing medication. She denied the presence of disorders associated with melasma (hyperpigmented lesions) such as polycystic ovary syndrome, hyperthyroidism, and of diseases involving skin photosensitivity. Also, she had no allergies.

At the time of examination, the patient was not pregnant or breastfeeding.

The lesions developed during childhood, and the patient was not able to associate their occurrence with any particular events or treatments.

After 2 chemical peeling treatments with 20% glycolic acid, the patient found no improvement of her skin appearance. Subsequently to these treatments, the patient used skin photoprotection.

Fig. 1 – Initial appearance.

The treatment proposed to the patient was a combined one, i.e., ablative laser for dynamic and static wrinkles, and non-ablative laser for hyperpigmented lesions in one session, associated with facial gymnastics for a more rapid post-treatment recovery and for the restoration of functional muscle balance.

Table I
Weekly facial gymnastics program.

Description of the exercise	Monday (repeats)	Tuesday (repeats)	Wednesday (repeats)	Thursday (repeats)	Friday (repeats)	Saturday (repeats)
Raising the eyebrows	15	14	13	10	10	10
Frowning	20	30	30	10	20	10
Closing-opening the eyes	30	30	30	30	30	30
Wrinkling the nose	10	10	10	10	10	10
Pursing the lips	20	20	20	10	10	5
Smiling and laughing	40	40	40	40	30	30
Inflating the cheeks	10	10	10	10	10	10

After IPL treatment (non-ablative treatment, Palomar platform), which consisted of light pulses with pre-established diameters targeting tissue melanin, Micro Laser Peel 25 microns – Fractional Laser 200 microns (ablative laser Er Yag, 2940 nm, Sciton Joule platform), also termed weekend resurfacing in the literature, was performed, as well as low-power laser treatment for biostimulation in order to accelerate healing. The patient was asked to respect the following indications:

– in the open wound phase (2-4 days), the skin was rinsed with thermal water, avoiding contact with other types of water, and was gently dried with sterile compresses;

– during this period, sun exposure or use of sun protection factor creams as well as application of other emollient creams than those recommended (petroleum jelly as a skin emollient combined with anesthetic cream to reduce postoperative discomfort) were forbidden.

– facial gymnastics was performed according to the program indicated in Table I. Thus, after cleaning the skin and applying petroleum jelly, the following myogymnastic exercises were performed: raising the eyebrows (surprise), frowning (moving the eyebrows towards one another), closing-opening the eyes, wrinkling the nose, pursing the lips (attempting to whistle), smiling and laughing (showing the teeth), inflating the cheeks – moving air from one cheek to another. We mention that exercises were performed two times a day, in the morning and in the afternoon.

Results

The patient was followed up and assessed at one day after treatment (Fig. 2), at 2 days (Fig. 3) and at 4 days (Fig. 4). The evolution was favorable, without complications. We mention that the patient strictly followed the medical indications and performed the facial myogymnastic exercises with maximum seriousness.

Fig. 2 – Appearance at 1 day.

Fig. 3 – Appearance at 2 days.

Fig. 4 – Appearance at 4 days.

These exercises allowed facial muscles to obtain a higher oxygen intake, improved blood circulation, reduced pain and accelerated healing and skin cicatrization. Along with low-power lasers, facial gymnastics has an effect of biostimulation of these processes.

Through these combined treatments, the healing process was accelerated, the results allowing the application of cosmetic makeup and sun protection factor creams only a week after facial resurfacing.

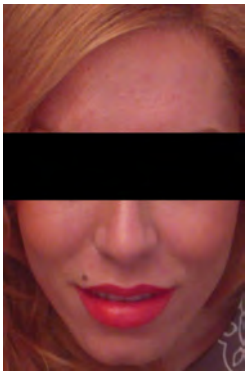

Fig. 5 – Results obtained by the patientafter the recovery period and care including wound cleaning and myogymnastic exercises.

Discussions

Multiple facial treatments fit into the natural evolution trend of medicine and healthcare over the past years, and are continuously improved by revolutionary last-generation technologies, in order to ensure spectacular results in a short time (Small, 2012a).

Lasers and intense pulsed light (IPL) are the latest and most advanced aesthetic methods for achieving consistent, minimal risk facial rejuvenation. The two techniques should be considered as alternative weapons in the fight against aging rather than a replacement of previously available

techniques (Halon et al., 2015). With the introduction of laser therapy, the degree of satisfaction and addressability has continuously increased (Makrantonaki & Zouboulis, 2007) and non-ablative lasers have been rated as having modest or even very good results (Small, 2012b).

For a correct diagnosis of skin aging, for the evaluation of the type of wrinkles and their depth, the patient undergoes complete examination, both statically and during facial expressions (frowning, laughing, smiling, surprise and anger expressions) (Trelles et al., 2009).

So far, devices for skin rejuvenation associated with the use of all non-ablative rejuvenation treatments have led to excellent changes in skin histology and good collagen remodeling (Gulsoy et al., 2006). However, the effects of laser therapies have not always resulted in epidermal restoration, and patient satisfaction in these cases has been lower. In addition, prolonged treatment schemes associated with non-ablative methods may reduce patient compliance with therapy (Trelles et al., 2001).

Patients with multiple skin changes due to premature aging prefer ablative laser treatment followed by facial myogymnastic exercises, the degree of satisfaction being higher than in the case of non-ablative lasers.

Patient satisfaction increases inversely proportionally to the number of treatment sessions used. The use of therapeutic combinations such as non-ablative and ablative laser technologies with various wavelengths intended for all skin layers in one session has been limited, despite the good results obtained and a high degree of satisfaction, by the long post-therapy recovery time.

The best results in facial rejuvenation have been obtained by the application of laser treatment associated with facial gymnastics and facial massage.

Conclusions

1. Following the treatments performed, the patient had a very high degree of satisfaction.

2. It was found that aesthetic appearance was significantly improved through the reduction of hyperpigmentation and premature aging signs.

3. Myogymnastic exercises contributed to the shortening of the recovery period and to more rapid healing.

Conflicts of interests

No conflict of interests.

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REVIEWS
ARTICOLE DE SINTEZĂ

Adipokines, systemic inflammation and exercise
Adipokinele, inflamația sistemică și exercițiul fizic

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Abstract
Adipokines are metabolically active molecules involved in the development of insulin resistance, which is closely correlated with obesity, diabetes mellitus and metabolic syndrome. All these diseases are associated with an increased cardiovascular risk. Adipokines are produced by white adipose tissue and may have local or systemic pro- or anti-inflammatory activities. Inflammation in adipose tissue is considered an important factor that induces peripheral insulin resistance. Exercise may reduce both inflammation and body weight and consequently, insulin resistance and the risk of metabolic diseases and atherosclerosis. We present a short review of the literature underlining the roles of adipokines in inflammation and insulin resistance and the favorable effect of exercise that may reduce inflammation and ameliorate insulin resistance by inducing a favorable anti-inflammatory adipokine profile.
Key words: adipokines, inflammation, insulin resistance, exercise.

Rezumat
Adipokinele sunt molecule active metabolic implicate în dezvoltarea insulinorezistenței, la rândul ei strâns corelată cu obezitatea, diabetul zaharat și sindromul metabolic. Toate aceste afecțiuni sunt asociate cu un risc cardiovascular crescut. Adipokinele sunt produse de țesutul adipos alb și pot avea efecte pro- sau antiinflamatoare la nivel local sau sistemic. Inflamația din țesutul adipos este considerată un factor important în dezvoltarea rezistenței periferice la insulină. Exercițiul fizic poate reduce atât inflamația, cât și greutatea corporală și în consecință, rezistența la insulină și riscul afecțiunilor metabolice și al aterosclerozei. Prezentăm o scurtă sinteză a literaturii, subliniind rolul adipokinelor în inflamație și insulinorezistență și efectul favorabil al exercițiului fizic, care poate reduce inflamația și rezistența la insulină, prin inducerea unui profil antiinflamator favorabil al adipokinelor.
Cuvinte cheie: adipokine, inflamație, rezistența la insulină, exercițiul fizic.

Introduction

Low-grade chronic systemic inflammation is a state defined by a 2 to 3-fold increase in the systemic concentrations of tumor necrosis factor alpha (TNF-α), interleukins (IL-1, IL-6), interleukin 1 receptor activator (IL-1ra), soluble TNF-α receptors and C-reactive protein (CRP). The trigger of this inflammatory reaction is not known (Coppak, 2001; Petersen & Pedersen, 2005), but systemic inflammation has been associated with aging and with many pathological conditions such as diabetes mellitus, obesity, insulin resistance or atherosclerosis (Barziley et al., 2001; Duncan et al., 2003; Han et al., 2002; Ross, 1999). Markers of systemic inflammation have been correlated with an elevated risk of acute cardiovascular events and cardiac death. Plasma Il-6 and TNF-α concentrations have been shown to predict the risk of myocardial infarction (Ridker et al., 2000a; Ridker et al., 2000b). Elevated CRP levels are highly predictive of cardiovascular events (Khera et al., 2005).

Obesity has become an important health problem all over the world. It is usually associated with other metabolic diseases including type 2 diabetes mellitus, arterial hypertension, non-alcoholic fatty liver disease or polycystic ovary syndrome (Finkelstein et al., 2012). Adipose tissue is not only a passive energy storage organ for triglycerides, but also an active endocrine organ that secretes important functional molecules called adipokines. Subcutaneous and visceral adipose tissues produce adipokines involved in systemic inflammation and insulin resistance in obesity (Kwon & Pessin, 2013). The perturbation of insulin mediated mechanisms determines hyperglycemia and type 2 diabetes mellitus. Insulin resistance is also linked to hypertension and hyperlipidemia (Cornier et al., 2008).

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Diabetes, hypertension and hyperlipemia are important cardiovascular risk factors which may be influenced by non-pharmacological and pharmacological therapies.

It has been shown that aerobic exercise increases insulin sensitivity (Heath et al., 1983), induces positive effects on endothelial function (Higashi et al., 1999), and accelerates fat oxidation (Romijn et al., 1993). The beneficial effects of exercise in metabolic diseases have also been linked to its influence on adipokine activities.

Adipokines are active molecules (cytokines) secreted by the white adipose tissue. They have many important roles, regulating local metabolic processes (autocrine and paracrine functions) and systemic processes due to their endocrine functions (Gnacińska et al., 2009). Adipokines play an important role in the maintenance of the energetic balance, in lipid and glucose metabolism, in immune reactions and angiogenesis (Gnacińska et al., 2009). These metabolically active molecules are produced by adipocytes (the main source of adiponectin and leptin), macrophages (the main source of TNF-α) and stromal and vascular cells (Gnacińska et al., 2009).

The involvement of adipokines in systemic inflammatory reactions plays an important role in their relationship with cardiovascular diseases that are frequently associated with insulin resistance, obesity and diabetes. Adipokines have pro- or anti-inflammatory activities. Most of them are pro-inflammatory molecules, being increased in obese persons.

We present a short review of the literature underlining the correlations between systemic inflammation and adipokines and the possible roles of exercise in reducing inflammation, insulin resistance and subsequently, cardiovascular risk.

Adipokines and inflammation

There are many recent data regarding the involvement of adipokines in both local and systemic inflammation in obesity and insulin resistance states. Many recent data support their role as pro-inflammatory (leptin, interleukin-6, tumor necrosis factor-α, retinol binding protein 4, resistin, chemokines and their receptors, angiopoietin-like protein and chemerin) or anti-inflammatory mediators (adiponectin, secreted frizzled-related protein 5, visceral adipose tissue-derived serine protease inhibitor, omentin-1 and apelin).

Among *pro-inflammatory adipokines*, the most studied are *leptin, IL-6* and *TNFa*.

Leptin

The main source of leptin is white adipose tissue; it is encoded by an obesity gene located on human chromosome 7q31.3 (Considine & Caro, 1997). Leptin regulates weight by decreasing appetite and food intake through a hypothalamic regulation in the central nervous system (Zhang et al., 1994). The lack of leptin due to a mutation in the obesity gene in mice induces hyperphagia, obesity and insulin resistance. Exogenous administration of leptin in these situations reduces obesity and insulin resistance (Lönnqvist et al., 1999). Interestingly, circulating leptin levels are increased in obese subjects who are not anorexic, suggesting a lack of sensitivity to leptin action. Chronic inflammation induced by obesity is an important factor that mediates leptin resistance (Kleiridders et al., 2009).

Leptin has pro-inflammatory actions. It activates monocytes and macrophages to produce pro-inflammatory IL-6, TNF-α and IL-12 (Gainsford et al., 1996) and it enhances the production of pro-inflammatory Th1 cytokines (Grunfeld et al., 1996). Leptin also suppresses the synthesis of anti-inflammatory Th2 cytokines such as IL-4 (Lord et al., 1996).

Hyperleptinemia in obese patients has been correlated with the development of type 2 diabetes mellitus. Insulin influences glucose concentration and stimulates leptin production. Increased leptin levels induce, as a result of a negative feed-back, a decrease of insulin secretion (Havel, 2004; Gnacińska et al., 2009).

Interleukin-6

IL-6 is produced in adipocytes in correlation with the degree of obesity, but its role in obesity and insulin resistance is still unclear. IL-6 is also produced in T cells and macrophages and is considered an inflammatory cytokine as it stimulates the production of acute phase reactants, including CRP (Gauldie et al., 1987), in various situations that stimulate inflammatory response. Increased CRP concentrations are associated with metabolic syndrome and insulin resistance (Pepys & Hirschfield, 2003).

In peripheral tissues, IL-6 decreases the production of insulin receptors (Pittas et al., 2004). In contrast, in IL-6 deficient mice that develop obesity and hepatic inflammation, central administration of IL-6 reverses insulin resistance (Wallenius et al., 2002). Because central administration was associated with energy expenditure and a reduction in body weight, it was concluded that the effects of IL-6 may depend on its site of action (Kwon & Pessin, 2013).

IL-6 is also an anti-inflammatory cytokine through its inhibitory effects on TNF-α and IL-1, and activation of IL-1ra and IL-10, being involved in controlling local and systemic inflammation. Its relationship with exercise is complex because it is secreted by myocytes in response to exercise (Pedersen & Febbraio, 2008). IL-6 secreted in response to muscle contraction (as a myokine) has a strong anti-inflammatory action (Pedersen & Febbraio, 2008).

Tumor necrosis factor alpha

TNF-α is an anti-inflammatory cytokine produced primarily by macrophages and also by other cells including adipocytes. Its concentrations are elevated in obesity and it contributes to insulin resistance (Kwon & Pessin, 2013). Experimental studies showed that genetic deletion of TNF-α or its receptors in *ob/ob* and diet-induced obese mice reduced insulin resistance in muscle and adipose tissue (Uysal et al., 1997). A recent review pointed out that TNF-α plays a direct role in insulin resistance and metabolic syndrome (Plomagaard et al., 2008) and it also increases the release of free fatty acids from adipose tissue, which contributes indirectly to insulin resistance (Plomagaard et al., 2008). Increased circulating levels are correlated with cardiovascular risk and development of atherosclerosis (McKellar et al., 2009).

Several adipokines such as adiponectin, secreted frizzled-related protein 5, visceral adipose tissue-derived serine protease inhibitor, ometin-1 and apelin have *anti-inflammatory* properties (Kwon & Pessin, 2013). Of these, the most important and extensively studied is adiponectin.

Adiponectin

Adiponectin is mainly produced in adipocytes and has significant anti-inflammatory actions. It has an antiatherogenic effect by decreasing the expression of adhesion molecules, reducing proliferation of vascular smooth muscle cells and the transformation of macrophages to foam cells (Shimada et al., 2004). In contrast to pro-inflammatory adipokines, adiponectin inversely correlated with the body mass index, visceral adiposity and markers of insulin resistance (Mazaki-Tovi et al., 2005). Adiponectin has some important metabolic effects, reducing hepatic glucose production and improving glucose uptake and fatty acid oxidation in skeletal muscles (Yamauchi et al., 2002). Total adiponectin consists of three oligomers (low molecular weight, medium molecular weight and high molecular weight) (Oh et al., 2007). The most active form involved in glucose metabolism seems to be high molecular weight adiponectin, which also has the strongest association with cardiovascular disease (Rizza et al., 2010).

Exercise and adipokines

Exercise may reduce systemic inflammation and insulin resistance. However, the effect of exercise on adipokine levels depends on the type and duration of exercise; hence, it is difficult to compare and standardize the results reported by various studies.

Effects of exercise on circulating leptin

Leptin was determined before and after acute or chronic exercise. *Sakurai* et al. reported in a recent review that the results of previous studies indicated that short periods of exercise (≤12 weeks) did not influence leptin concentrations (Sakurai et al., 2013). Physical training for more than 3 months reduced leptin levels only if exercise was accompanied by a reduction in body weight (Sakurai et al., 2013; Kraemer et al., 2002). Favorable effects of exercise were attributed to alterations in energy balance, improvements in insulin sensitivity and alterations in lipid metabolism (Kraemer et al., 2002). Exercise seemed to be more efficient in diabetic patients who presented a delayed response after short-term resistance and reduced leptin levels with long-term exercise (Sakurai et al., 2013; Kraemer et al., 2002).

Effects of exercise on IL-6 and TNF-a

In obesity and/or hyperinsulinemic states, there is an increased adipocyte production of inflammatory molecules including IL-6 and TNF-α. During exercise, the response of these two adipokines is different. Il-6 is the first cytokine that increases in circulation with exercise, while TNF-α, a classical pro-inflammatory cytokine, is reduced (Ostrowski et al., 1999). The production of Il-6 is accompanied by the augmentation of anti-inflammatory cytokines causing an anti-inflammatory environment associated with physical exercise, as reviewed by (Brandt & Pedersen, 2010). The explanation for these apparently contradictory effects of IL-6 is based on possible different signaling pathways for IL-6 in macrophages and myocytes. It has been hypothesized that IL-6 signaling in macrophages induces a pro-inflammatory response, while activated IL-6 in muscles (as a myokine) has anti-inflammatory properties (Brandt & Pedersen, 2010). Exercise may also induce weight loss, with a decrease in the volume and number of adipocytes and macrophages located in adipose tissue that produce pro-inflammatory cytokines. Weight loss reduces the number of circulating mononuclear cells, another source of inflammatory mediators (Brandt & Pedersen, 2010).

Effects of exercise on adiponectin levels

As an anti-inflammatory and cardiometabolic protective adipokine, adiponectin has been intensively studied in relation to exercise. The results must be interpreted in correlation with the type and duration of physical effort. There may also be differences regarding the form of adiponectin tested (total adiponectin or its oligomers).

Aerobic exercise increases insulin sensitivity, enhances vascular endothelial function, and accelerates fat oxidation as reviewed by Numao (Numao, 2012). Because adiponectin has similar effects to those determined by exercise (Shimada et al., 2004; Mazaki-Tovi et al., 2005; Yamauchi et al., 2002), clinical and experimental studies have investigated the hypothesis that exercise-induced changes in adiponectin may explain the beneficial consequences of physical exercise.

Acute aerobic exercise does not influence circulating levels of total adiponectin in healthy, lean subjects as reviewed by Golbidi and Haher (Golbidi & Laher, 2014). However, in inactive, abdominally obese men, both acute and short-term exercise (one week) increased plasma adiponectin levels (Saunders et al., 2012). An increase in interstitial adiponectin levels and a decrease in adiponectin mRNA in subcutaneous abdominal adipose tissue have been reported after acute aerobic exercise in both lean and obese subjects (Højbjerre et al., 2007).

Oligomers were determined after acute exercise in middle aged abdominally obese men and the results indicated that high intensity exercise decreased total adiponectin by reducing low and medium molecular adiponectin levels, while HMW adiponectin remained unchanged (Numao et al., 2011).

Chronic aerobic exercise seems to influence adiponectin levels only indirectly by reducing weight. Physical exercise accompanied by a substantial weight loss determined an increase in circulating total adiponectin (Numao, 2012). However, high intensity aerobic exercise in patients with type 2 diabetes increased total adiponectin levels despite weight remaining unchanged (Balducci et al., 2010).

In a recent study, 12 weeks of combined aerobic and resistance exercise training induced an increase in adiponectin and ghrelin levels, associated with a reduction of leptin levels and inflammatory CD14+CD16+ monocytes, without any modification of body weight, in older healthy subjects (Markofski et al., 2014). This study suggests that high intensity exercise reduces inflammation and has a favorable effect on adipokine profile independent of body weight.

Conclusions

1. Physical exercise may reduce systemic inflammation and insulin resistance by modifying the balance between pro- and anti-inflammatory cytokines.
2. The effects of exercise depend on the duration and on the intensity of exercise.
3. Leptin levels are influenced only by intense exercise

that reduces body weight, diabetic patients being more responsive.

4. Exercise reduces TNF-α and insulin resistance related to this adipokine.

5. Muscle-derived IL-6 (which acts as a myokine) is increased by exercise and exerts anti-inflammatory effects, whereas the chronic elevation of IL-6 as an adipokine proves pro-inflammatory actions.

6. Acute exercise, if mild or moderate, has no significant effects on circulating adiponectin levels, but it may increase interstitial adiponectin in adipose tissue. However, acute or chronic high-intensity exercise may increase circulating adiponectin, particularly in overweight persons. The effect of exercise on adiponectin oligomers is still unclear.

7. Further studies are necessary to establish the duration and intensity of exercise that may influence adipokine levels, as well as to determine clinical therapeutic benefits.

Conflict of interest

The authors confirm that this article content has no conflict of interest.

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Cutaneous pathology in athletes
Boli dermatologice la sportivi

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Abstract

The most common medical sufferings of athletes are found in the skin. Cutaneous pathologies can be classified into: infectious, allergic/inflammatory, traumatic, environment-related and tumoral. Skin infections are the most common skin diseases in athletes: fungal, viral or bacterial. The most frequent cutaneous pathology seen in athletes is tinea pedis, also called "athlete's foot"; the plant and interdigital skin are the most exposed to this disease. It is estimated that at least 70% of the population have had an episode of tinea pedis during the course of life; the proportion in athletes is even higher due to additional risk factors: warm shoes, sweating, wet environmental conditions such as locker rooms and showers. It occurs more frequently in men and is slightly observed before puberty. Recognizing signs and symptoms of skin diseases in athletes and referral to the specialist is extremely important. Furthermore, knowledge of possible skin disorders that can occur in athletes compels technical staff to take measures for primary and secondary prevention.

Key words: sports medicine, skin diseases, infections, trauma, prevention.

Rezumat

Cele mai frecvente suferinţe medicale ale sportivilor se întâlnesc la nivelul pielii. Patologiile cutanate pot fi clasificate în: infecţioase, inflamatorii-alergice, traumatice, afecţiuni legate de condiţiile de mediu şi tumorale. Infecţiile cutanate sunt cele mai frecvente suferinţe dermatologice la sportivi: fungice, virale sau bacteriene. Cea mai frecventă patologie cutanată întâlnită la sportivi este tinea pedis, supranumită „piciorul de atlet", planta şi pielea interdigitală fiind cele mai expuse acestei patologii. Se estimează că cel puţin 70% din populaţie are un episod de tinea pedis în cursul vieţii, la sportivi procentul fiind chiar mai mare, datorită unor factori de risc suplimentari: încălţămintea nearisită şi temperatura crescută locală, hipersudoraţia, medii comune umede cum ar fi vestiarele şi duşurile. Apare mai frecvent la bărbaţi şi este puţin observată înainte de pubertate. Recunoaşterea simptomelor şi semnelor bolilor cutanate ale sportivilor şi trimiterea către specialist este extrem de importantă. Mai mult, cunoaşterea posibilelor interesări cutanate ce pot apărea la sportivi, obligă staff-ul tehnic să ia măsuri de prevenţie primară şi secundară.

Cuvinte cheie: medicină sportivă, boli cutanate, infecţii, prevenţie.

Introduction

Each day millions of people practice sports, and during these activities the most risk exposed area is the skin. Lesions can appear in professional athletes, as well as in those who practice leisure sports. These dermatoses are divided, based on etiology, into infectious pathologies, inflammatory reactions, traumas, environmental diseases and neoplasms. Some entities occur in epidemics and can affect an entire community (herpes gladiatorum, tinea corporis gladiatorum, impetigo, furunculosis), some are life threatening on individual level (cutaneous inflammatory states or intense workouts, which can both cause anaphylaxis), while other can cause traumatic lesions (nail dystrophy, corns and blisters). Athletes that spend most of the time outdoors, usually during free UV exposure peak hours, present a higher risk for melanoma, other skin cancer types or acute sunburn. Using the correct gear, sunscreen creams, and proper hygiene of the athlete and play surfaces are extremely important. It is essential that the supervision teams recognize, treat and prevent these entities, so that individual and team activities are not disrupted.

Epidemiology

A recent analysis shows that between 1922 and 2005, 56% of infections in athletes were cutaneous. Direct contact with other participants during practice and competitions renders vulnerable this professional category. The most frequently affected areas are the neck and the head (Steven

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M et al., 2010). The risk for someone to get a cutaneous infection through direct contact while competing against an infected athlete is 33% (Lincoln et al., 2011).

In teenagers, the highest incidence is that of bacterial infection (30%), followed by herpetic (20%) and fungal lesions (20%). In young adults, the prevalence was reported as follows: herpes virus infection 47%, impetigo 37%, fungal infections 7%, cellulite 6%, methicillin-resistant Staphylococcus aureus (MRSA) 3%.

From a fungal etiology point of view, the most frequent ailment is tinea pedis, with prevalence levels of 25%-70% during life. This is especially common in people wearing closed shoes, while those walking barefoot have 15 times less chances of being affected. Men are infected 2-4 times more frequently than women.

An alarming 7% increase of MRSA nasal colonization has occurred in recent years, both in children and adults. Strict measures of prevention, diagnosis and treatment of such infections are highly necessary (Zinder et al., 2010).

Infectious pathologies

The most frequent dermatosis in athletes is cutaneous infection. Due to intrinsic and extrinsic factors, athletes are at high risk to be exposed to this pathology. Once established, this can cause permanent lesions, withdrawal from competitions or temporary disqualifications. Prevention, early diagnosis and suitable treatment could minimize the adverse effects of cutaneous infections, both for the athlete and for the team.

Classification of cutaneous infections (Drăgan I, 2002):

a) Bacterial
b) Viral
c) Fungal
d) Atypical mycobacteria
e) Parasitic

The infection spreading mechanism

The high prevalence of this pathology type is due to various factors:

- The loading of the stratum corneum due to sweating and wet clothes allows the easy passage of microorganisms through the epidermis.
- Most athletes experience abrasions and cuts that allow the passage of microorganisms through the epidermis.
- Direct contact between athletes favors the spreading within the entire community.
- The presence of bacteria, viruses, fungi, atypical mycobacteria and parasites on play surfaces, showers and locker rooms.

a) Bacterial infections

- *Impetigo contagiosum*

The determining factor of this disease is group A streptococcus. It is transmitted through contact with the sea water or through direct contact. The National Collegiate Athletic Association (NCAA) data show that between 1991-2003, 14% of all cutaneous infections in young wrestlers were represented by impetigo (Adams, 2006). Also, athletes who developed cutaneous staphylococcal infections were 4 times more likely to have been exposed to sea water than those who did not. The most affected are therefore the swimmers, surfers or divers, rowers and contact sports athletes (wrestlers).

Clinically, symptoms usually appear 1-3 days from infection. The lesions are often accompanied by itching, but are usually not painful. Initially, small red spots appear which turn into scabs, especially around the nose and mouth. The liquid underneath the scabs contains bacteria that might infect other people, if they come in direct contact with the lesion. After a few days, the scabs fall off and the lesion heals without scars, while other lesions can appear. Differential diagnosis must be made with acne vulgaris, atopic dermatitis or folliculitis. Usually local antibiotic treatment is enough, but in severe cases per os treatment is advised (Adams, 2006).

The National Collegiate Athletic Association (NCAA) ruled that, in order to be able to take part in competitions, infected athletes must undergo antibiotic treatment within at least 72 hours and not present new lesions within 48 hours prior to the competition. After fulfilling the two conditions, athletes are compelled to bandage the existing lesions in such manner that the bandages cover the lesion and do not shift (Adams, 2006).

- *Cutaneous MRSA infections*

Infections caused by methicillin-resistant Staphylococcus aureus (MRSA) are increasingly frequent in athletes. There are numerous sports where this pathology is very common: basketball, athletics, rugby, football, volleyball, weightlifting and wrestling. While in some sports the way of transmission seems to be direct contact with the skin (basketball, football, rugby, wrestling), in others the gear plays a decisive role (athletics, volleyball and weightlifting). Actually, it is a combination of these factors that causes real S. aureus epidemics.

At a 2003 football competition, 9% of the participants developed furunculosis and missed out on 17 competition days (Adams, 2006). After a thorough investigation into the epidemic, the investigators identified several risk factors in the development of furunculosis among athletes: cutaneous lesions following friction against the turf, towel sharing, not showering before and after the competition, game surfaces and locker rooms not being cleaned on a regular basis. The increased resistance of MRSA in sports communities was also proved by isolating the Panton-Valentine cytokine and type IV staphylococcal cassette chromosome mec (SCC mec), both of which increase MRSA virulence (Kazakova et al., 2005).

Furunculosis clinically manifests though erythematous nodules on the exposed skin surface. Diagnosis is relatively easy to make, but they can easily be mistaken for acne or insect bites (in early stages) or epidermoid cysts (mature lesions). Bacterial culture of the suspected lesions is still required in order to establish the MRSA infection diagnosis and to determine antibiotic susceptibility to the isolated bacteria. The treatment of cutaneous MRSA infection consists of abscess drainage (either spontaneous or after incision) and systemic antimicrobial therapy (Cohen, 2005).

b) Viral infections

Athletes with viral infections are exposed to pain, missing practice hours and disqualifications. In some cases the virus spreads through direct contact with the skin, in others it is transmitted through contaminated gear. Even without contact, recurrent infections can develop through

exposure to various elements (no contact).

Prolonged exposure to UV radiation increases the risk of reactivation of a previous herpes simplex virus (HSV) infection (20% incidence increase during summer months). Thus, all athletes who practice outdoor sports and do not protect their lips run the risk of developing labial herpes. Athletes practicing winter sports at high altitudes are at even higher risk. This occurs because the snow reflects a high quantity of UV, multiplying the exposure level; also, because of the high altitude, a smaller amount of radiation is filtered. 12% of skiers with known HSV history developed lesions one week after skiing (Adams, 2006).

Clinically, infected athletes will feel burning and tingling sensations in the infection area. These precede the onset of cutaneous manifestations by a few days. At first, erythematous patches appear, followed by grouped vesicles with erythematous halo. The most frequent locations are on the head, neck and extremities. They might be accompanied by sore throat, high fever, myalgia, arthralgia and lymphadenopathy.

In the case of transmission through direct contact, wrestlers and rugby players are the most exposed. These develop a particular type of herpes, called Herpes gladiatorum. NCAA states that 39% of the infections that occurred in American college wrestlers between 1991 and 2003 were caused by HSV. The general prevalence among athletes is 20%. A characteristic is the location of lesions far from mucous tissues. The most frequent areas are the head and neck, the thorax, the hands and the hips. The differential diagnosis is done with acne vulgaris, tinea corporis, molluscum contagiosum and impetigo contagiosum (Lincoln, 2011).

Molluscum contagiosum, caused by a virus of the Poxviridae family, has been frequently reported, both in contact sports (rugby, wrestling) and in other categories (gymnastics). According to the NCAA, between 1991-2003, 0.3% of all cutaneous infections in young wrestlers were caused by molluscum (Adams, 2006). Papules are generally asymptomatic, well defined, discolored or having the skin color. They occasionally become itchy and may develop a surrounding rash. In terms of count, they can reach several hundreds, but usually they are around 20 in number, located on the hands, arms and face.

Warts are transmitted through direct skin contact or through gear. The lesions are far less contagious than those caused by molluscum. Wrestlers and football players are prone to infection as they come in direct contact with the opponents' skin. The other categories are at risk through gear, game surface, swimming pools, locker rooms and showers (swimmers, weightlifters, gymnasts). There is a 1.81 higher chance for swimmers to get warts than those who do not practice water sports. The result is not statistically significant, but it does show proneness towards this pathology (Penso-Assathiany et al., 1999).

Warts appear as well-defined papules, ranging in size from a few millimeters to a few centimeters. The most frequent locations are around the nails or at plantar level. Those which appear on the soles can easily be mistaken for corns and calluses.

c) Fungal infections

Globally, fungal infections occur in 15% of the population, 1 in 4 adults being affected (Bell-Syer, 2012). Usually, fungi grow in warm, humid and dark environments. Due to intense activity, heating of gear clad skin and sweating, the skin of the athletes is an ideal environment for the development of mycoses.

It is a proven fact that athletes develop tinea pedis more frequently than individuals who do not practice sports. There are no differences between genders and the most affected are the swimmers, runners, and football or basketball players. It would seem that transmission occurs through joint use of showers and locker rooms. It is caused by Trichophyton rubrum, Epidermophyton floccosum, Trichophyton mentagrophytes interdigitale. It is estimated that at least 70% of the population have had a tinea pedis episode during their life. In athletes, the percentage is even higher due to additional risk factors: unventilated shoes and high local temperature, excessive sweating, humid common areas, such as showers and locker rooms (Zinder, 2010).

Clinically, three types are described:

- Intertriginous tinea pedis, which appears as a white macerated patch, with discreet erythema and interdigital cracks. The lesions are itchy and sometimes painful, and in warm seasons they can spread to the soles or the dorsal side of the foot.
- Dyshidrotic tinea pedis, characterized by erythemato-vesicular lesions, arranged in plaques and patches with eccentric evolution and polycyclic edges. Sometimes they may take an inflammatory aspect, with significant edema and painful bullous lesions. The lesions are usually symmetrical, on both legs, located in interdigital spaces, the anterolateral edge of the sole and the plantar notch.
- Dry, scaly tinea pedis is a chronic form of mycosis, characterized by discreet erythematous patches covered with hyperkeratotic scales and cracks. It is characteristically located on the heel and plantar vault.

In order to avoid the onset of mycosis, several prevention rules were established:

- using anti-humidity socks
- showering right after practice
- avoiding to walk barefoot in the locker room or to the showers
- thorough cleaning of the floors
- daily use of anti-fungal creams.

Onychomycosis (Tinea unguium) has been more frequently noticed in runners and swimmers, but any athlete is at risk. A study carried out on 100,000 subjects showed that tinea was 1.5 times more frequent in athletes aged under 18 years than in subjects of the same age group who did not practice sport. In adults, there were no statistically significant differences (Caputo, 2001).

The most frequent location of onychomycosis is distal. The exam of both hands and feet is very important, as almost always the two locations are associated. Clinically, the nail appears yellow, friable, thickened, and the green color may indicate superinfection with Pseudomonas aeruginosa. It may sometimes be accompanied by pain, but generally it is aesthetically unpleasant. For differential diagnosis, one must take into account the nail transformations due to the mechanical actions of the gear.

Tinea corporis gladiatorum causes real epidemics

among wrestlers during competitions. According to data from the National Collegiate Athletic Association Injury Surveillance System (NCAAISS), tinea corporis gladiatorum accounted for 23% of all skin infections in wrestlers between 1991 and 2003 (Adams, 2006). The causing agent is Trichophyton rubrum in wrestlers and Trichophyton tonsurans in all the other categories. Clinically it is characterized by round and well-defined erythematous-squamous plaques, with vesicular halo. It is associated with lymphangitis and painful local adenitis. The most frequent locations are the head, neck and arms (Adams, 2006).

d) Infections with atypical mycobacteria

A swimmer's skin is prone to atypical mycobacteria infections through 2 mechanisms: due to immersion in water, an oversaturation of the stratum corneum is achieved, which allows the easy passage of microorganisms through the epidermis; secondly, the possible abrasions caused by the contact with the pool walls or spring boards give way to bacteria, which can penetrate the skin.

The most frequently involved agent is Mycobacterium marinum. This causes swimming pool granuloma and occurs in real epidemics. This organism usually lives in sweet or salted water. The most affected by it are swimmers, lifeguards, sailors, divers, surfers, polo players. It starts as a small red lesion which, in time, increases in size and ulcerates. It is treated with difficulty, with suitable antibiotics, and it sometimes requires surgery for excision (Adams, 2006).

e) Parasitic infections

Of all skin infections, those caused by parasites are the least frequent among athletes. Despite the low incidence, these infections can seriously affect the athletes' capacity to attain performance or even compete. Pediculosis corporis (body lice), pediculosis capitis (head lice), pediculosis pubis (genital lice) and scabies are the most common parasitic infections in athletes. Anyone who practices contact sports is considered to be at risk, but the highest incidence is among wrestlers. The National Collegiate Athletic Association Injury Surveillance System (NCAAISS) concludes that 0.1% of all skin infections in wrestlers between 1991 and 2003 were caused by pediculosis and 0.5% by scabies. After exposure, a lapse of time passes, from a few days to a few weeks. Then, athletes complain about itching in the affected area. The parasites can be directly observed or there can be reactive dermatitis. The differential diagnosis is done with atopic dermatitis, contact dermatitis or allergic drug rashes (Adams, 2006).

The prevention of cutaneous infections

In order to decrease the high incidence of cutaneous infections in athletes, the National Athletic Trainers' Association (NATA) issued a prevention guide in 2010. Their recommendation for the team coordinating the athlete is to follow the seven principles (1):

1) Governmental organizations must supply the suitable financial and human resources in order to implement a global policy for infectious disease control.

2) Keeping clean the facilities is essential in limiting the spreading of infectious diseases (locker rooms, bathrooms, play surfaces).

3) Proper hand hygiene and taking showers after each sports activity are among the most important factors in reducing the spreading of infectious diseases.

4) Athletes and trainers must be educated and encouraged to follow the general hygiene good practices.

5) Athletes must be discouraged from sharing towels, gear, water bottles, shavers and trimmers.

6) All clothes and gear must be washed and/or disinfected on a daily basis.

7) Athletes should inspect their skin on a daily basis and report any suspicious lesions in order to get treatment.

Tumors

Athletes are also prone to cutaneous tumor formation, both malignant and benign. Unlike infections, tumors do not lead to acute pathologies that could result in temporary withdrawal from competitions. Even so, athletes have a high risk of skin cancer due to repeated and extensive exposure to the sun.

a) Benign tumors

The most frequent benign tumors in athletes are cutaneous nodules. These occur mainly in football players and rowers, due to chronic friction on the skin. They are caused by using inadequate gear (especially footwear) and appear as formations on the dorsal side of the foot.

b) Malignant tumors

The incidence of skin cancers is on the rise globally, the exposure to UV light being the main risk factor. This determines skin damage and, together with genetic, immunological factors or skin color, plays and important part in the development of skin cancer.

Studies on athletes have shown that certain sports are associated with high skin cancer risk, but research is limited and could not exactly establish mortality and morbidity.

Athletes who practice outdoor sports are prone to UV exposure. Altitude as well as high light reflections on snow and ice surfaces must also be taken into consideration (Adams, 2006).

Some athletes are exposed to high quantities of UV and present an increased risk of sunburn because of the training conditions. Summer sports are most of the time practiced during high UV exposure (midday for instance) and the gear does not provide protection. Intense physical activity causes sweat, which contributes to skin damage by increasing photosensitivity and thus, the risk of sunburn.

Epidemiological studies have shown that recreational activities such as sunbathing and water skiing are associated with a high risk of basal cell carcinoma, while skiing is associated with a high risk of squamous cell carcinoma (Harrison, 2009).

Cutaneous melanoma risk factors, such as solar lentigines and melanocytic nevus count, were more frequently encountered in athletes practicing outdoor endurance sports (for instance marathon runners) (Adams, 2006).

Moreover, besides sun exposure, the immunosuppression caused by intense physical activity can increase skin cancer risk in athletes.

Unfortunately, athletes are not educated regarding the risks of exposure to sunlight. Protection means, such as avoiding sun exposure during practice and competitions, choosing adequate clothing and using waterproof

sunscreen lotions must be intensely promoted within the sports community (Moehrle, 2008).

Inflammatory reactions

Acute inflammatory pathology in athletes includes contact dermatitis of allergic causes, as well as through irritation and hives. The severity of the lesions varies from focal damage with slightly itchy rashes to generalized afflictions (anaphylactic shock).

Athletes are confronted daily with numerous risks during their activity. An athlete's skin is exposed to trauma, heat, humidity and numerous allergens or chemical substances. These factors combined with each individual's genetic predisposition may cause allergic contact dermatitis and irritant contact dermatitis. Just like in other cases of contact dermatitis, these subacute eruptions in athletes may cause, in time, chronic dermatitis (Kockentiet, 2007).

Allergic contact dermatitis may occur following direct damage to the skin due to the gear. It may also appear as a reaction to any clothing or accessory, but the most frequent etiology is due to footwear. Any athlete can be affected, but the most frequent cases were recorded in runners and team sports players. The reaction develops due to some rubber components or coloring agents and it appears as itchy plantar eruption (plaques or vesicles), with onset after wearing a new pair of shoes (Ventura, 2001).

Another etiology of allergic dermatitis is the use of ointments (anesthetic, decontracturant) applied on the skin. The most frequent cases were recorded among cyclists and football players. A frequently used antibiotic applied on the skin is Neosporin. Up to 10% of the population is allergic to it and thus, any athlete using this cream risks getting plaques or well-defined itchy erythematous vesicles after topical use.

Athletes practicing nautical sports risk developing contact dermatitis as a reaction to water disinfectants (bromine or chlorine). Besides a macular erythematous rash, hair loss or discoloration was also observed (Adams, 2006).

Not all athletes develop contact dermatitis, but only those with an immune system sensitive to the allergen react. Irritant contact dermatitis, unlike allergic dermatitis, may appear in any athlete if the concentration of the irritant agent or exposure to it is high enough. The athlete's immune system is irrelevant for irritant contact dermatitis. Moreover, this type of dermatitis develops rapidly after exposure. The lesions may appear due to the gear, the play surface or even the athlete. The diagnosis of this pathology is generally based on the clinical aspect, the prolonged exposure to the irritant factor (Table I). The immediate exclusion of the causing factor is absolutely necessary. Recognizing irritant contact dermatitis is very important for physicians, in order to be able to protect other team members from developing similar reactions (Denig, 1998).

Athletes may develop various rashes or hives as a result of genetic predisposition and influence of internal or external stimuli. Body temperature increase or the play environment may cause the eruptions to appear. Also, the sun and water can cause the same effects. Therefore, a proper diagnosis of the allergic reaction is necessary, as well as identifying the causing factor and preventing any future exacerbations. Clinically, hives are usually associated with itching. Special concern must be given to athletes practicing water sports, because in these cases intense itching may appear even in the absence of obvious cutaneous lesions (Adams, 2006).

The most frequent type of eruption in athletes is cholinergic urticaria. Most athletes develop the lesions after practice, the severity being correlated with the duration and intensity of the physical activity. It would seem that runners are those who most frequently develop it, but it can be caused by any body temperature increasing activity. In terms of pathophysiology, it seems that mast cells play an important role in triggering the disease. It has been shown that the serum level of histamine (the primary mediator) is higher during exercise, being accompanied by an increase in eosinophil and neutrophil chemotactic factor, as well as that of tryptase, leading to a possible occurrence of urticarial lesions. Also, there is a decrease in the level of alpha-1 antitrypsin, as it happens in other forms of urticaria.

Urticaria due to cold is the most frequent in athletes. Swimmers and athletes who practice winter sports are the most susceptible. It is usually idiopathic, but other secondary causes must be excluded (cold hemolysis, cryoglobulins or connective tissue disorders). The temperature at which injuries occur is specific to each individual; injuries disappear after heating the skin, not the environment (Adams, 2006).

The most significant emergency of all dermatological diseases in athletes is angioedema. Athletes prone to anaphylaxis should be cautious, but not all athletes develop this pathology. It appears in several categories (cyclists, skiers, basketball, handball, tennis players), but it seems that runners develop symptoms even after moderate or light activities. The average age of onset is 25 years and women are predominantly affected. Itching occurs in 90% of cases and urticaria is present in 86% of athletes. Angioedema occurs in 70% to 80% of cases and is usually located on the face, hands and arms. Symptoms may start within 5 minutes of exercise, as well as after exercise (Adams, 2006).

Table I

Factors involved in the onset of contact dermatitis.

Category	Sports	Name	Irritant factor
Play surface	Mountain climbing	Lesions on the hands	Natural elements (rocks, water, wind)
	Indoor football	Lesions caused by concrete	Calcium oxide
	Swimming	Swimming pool dermatitis	Halogenated compounds in water
Gear	Basketball	Finger lesions	Grit in the cracks of the ball
	Hockey	Hockey dermatitis	Fiber glass
The athlete	Swimming	Shoulder lesions	Freshly cut beard or hair

(Adams, 2006)

Diagnosis is based on the presence of angioedema and itching, with or without respiratory failure. Patients may experience hypotension, laryngeal edema, altered consciousness, and differential diagnosis is mainly done with cholinergic urticaria.

Table II
Differentiating exercise-induced angioedema/ anaphylaxis from cholinergic urticaria.

Disease	Complaint	Findings on physical examination
Cholinergic urticaria	Shortness of breath Skin rash	Expiratory lung wheeze Small discrete red papules Appropriate blood pressure Appropriate heart rate
Exercise-induced angioedema/ anaphylaxis	Shortness of breath Skin rash Lightheadedness Heart racing	Inspiratory laryngeal stridor Large angioedema areas Hypotension Tachycardia

(Adams, 2006)

Inflammatory skin disorders can hinder athletes from participating in competitions and cause secondary infections. Doctors treating athletes with post-practice hives should monitor their patients closely and make the difference between cholinergic urticaria and anaphylaxis induced by exercise (Adams, 2004).

Traumas

Athletes are frequently affected by trauma. These include not only the skin, but also the hair or nails. Friction is the force that causes the most common injuries in athletes. Some conditions are common to all athletes (scratches, abrasions, blisters, calluses and corns), others are specific to certain sports (weightlifters' hand bandages).

The most common are abrasions and scratches, which are present in most sports. However, the most affected are marathon runners, divers, skiers and cyclists (63%). Open wounds usually occur in contact sports. Rugby players present 2.75 wounds per 1000 hours of playing (Adams, 2006).

Physical exercise has been correlated with hyperkeratotic lesions such as corns and calluses. These occur due to friction and excessive or prolonged pressure by increasing skin thickness at the spot of maximum mechanical irritation. In time, the lesion increases and causes in turn increasing pressure in that area. Usually these lesions are found on the hands and feet, being related to the interaction with the playing surface or gear. Pain only occurs when the skin is extremely thick and it cracks (Grouios, 2004).

The nail and the region around the nail also suffer from the force and pressure during exercise. The result is a color change and thinning, dystrophy being often confused with onychomycosis or nail melanoma. In order to exclude infectious pathology, bacterial cultures are necessary. For the exclusion of neoplastic pathology, a careful clinical and dermatoscopic examination of the region is required. In malignant melanoma, an extension of the brown longitudinal coloration of the nail appears at cuticle level - the Hutchinson sign (Adams 2002).

Nipple irritation occurs due to constant rubbing against the clothing. It is more common in men and occurs in those who wear shirts made of thick fibers (cotton) and women not wearing a bra while running. The prevalence is 6.7% during marathons and is usually described under low temperature and moisture conditions (Adams, 2006).

There are situations where traumatic conditions cause certain effects on hair as well. While the means by which skin adapts to friction is hyperkeratosis, hair is more fragile than that and it falls off. Thus, various sporting activities can cause alopecia (e.g. bandanas worn by marathon runners).

Friction, heat and unventilated clothing can cause mechanical acne. Clinically, erythematous papules and pustules appear on the shoulders and posterior chest or on the areas covered by gear (hockey or American football players) (Adams 2002).

In general, strong pressure causes the most important skin damage. "Talon noir" is a well-defined asymptomatic lesion, with irregular shape. It looks like a black macula or petechia, approximately 1 cm in size, observed in the posterior region of the heel. Rarely, it can be located on soles or toes. It is more frequent in basketball, soccer, tennis players or weightlifters. There are no differences between genders and it usually appears between the ages of 12 and 24. It occurs due to high forces, sudden stops or jumping, by the rupture of blood vessels in the superficial dermis.

Environment-related diseases

Athletes are directly exposed to a variation of environmental factors. Water, both salt water and pool water, is an important factor in the appearance of skin pathology. Exposure to cleaning products based on copper can lead to green hair, while chlorine based products lead to hair discoloration and thinning. Contact with salt water and various marine animals can cause allergic contact dermatitis. In order to avoid that, special protective gear and showering after exposure are recommended (Basler, 2000).

Since the emergence of anabolic and androgenic steroids, they have been used by athletes to improve performance. Prolonged use may cause dangerous complications in the body. These supplements increase the risk of heart disease (hypertension, atherosclerosis, and stroke), liver disease (hepatitis, cancers) or mental illness (manias, neuroses, depression, irritability, sleep problems). Men experience gynaecomastia and testicular atrophy, and women develop amenorrhea, clitoral hypertrophy, hirsutism and irregular menses. Cases of HIV infection through the use of unsterilized needles have been reported. It is estimated that 50% of professional athletes have used steroids at least once in a lifetime. Most commonly, they are used by weightlifters and can cause acne (53%), hirsutism (47%), alopecia (20%) and skin and hair fattening (27%). Cutaneous manifestations of anabolic steroid use are extremely important in order to raise awareness among athletes about the numerous and harmful effects they are exposed to.

Extreme temperatures are another cause of skin damage. In the case of outdoor sports, the most common injuries are frostbites. They occur not only due to low

temperatures, but also due to strong wind. At the highest risk are skiers (20% of injuries are due to cold), but also cyclists or athletes. High temperatures cause acute and chronic complications. In time, various neoplasms may arise, while in case of short-term exposure, skin burns may occur (marathon runners, golfers, football players, etc.). The use of sunscreen creams and special gear is recommended (Adams, 2006).

Conclusions

1. Cutaneous pathology in athletes is a vast field, which should receive maximum consideration.

2. Monitoring of an athlete with cutaneous pathology must be performed by a complex team consisting of dermatologists, sports medicine and internal medicine physicians, orthopedic surgeons, coaches and public health officials.

3. In order to avoid repercussions on the athlete's career and health, it is very important to recognize and treat any lesions at very early stages.

Conflicts of interest

Nothing to declare.

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Benefits of rehabilitation programs for the asthmatic patient
Beneficiile programului de reabilitare în astm

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Abstract

Asthma is among the most important problems of medicine and is one of the most frequent chronic respiratory diseases. It is characterized by recurrent attacks of shortness of breath and wheezing, which vary from person to person. After a few years of treatment with medication, the patients with asthma have dysfunctions and disabilities. There is a real need of additional, non-drug remedies that can affect the basic clinical manifestations of the disease to improve the efficiency of treatment of such patients and reduce the drug load. The main goal of the rehabilitation treatment of asthma (allergic and non-allergic asthma, but also late onset asthma and asthma with fixed airflow limitation) is to restore the homeostatic self-regulation of the body and consists of many methods such as education, postural drainage, respiratory gymnastics, physical training, climatotherapy, speleotherapy, halotherapy, balneotherapy, and even spa treatment.

Key words: asthma, treatment, rehabilitation.

Rezumat

Astmul reprezintă una dintre cele mai frecvente afecţiuni cronice ale sistemului respirator şi una din provocările lumii medicale curente. Se caracterizează prin atacuri recurente de dispnee, wheezing, variabile de la persoană la persoană. După ani de tratament medicamentos, pacientul astmatic prezintă o disfuncţie/dizabilitate variabilă. Sunt necesare remedii nonfarmacologice (programe de reabilitare), care să controleze manifestările clinice şi să reducă disfuncţia/dizabilitatea pacientului, cu limitarea necesarului de medicamente. Scopul principal al programului de reabilitare la oricare pacient astmatic este de a reface starea de homeostazie a individului, cu capacitatea de self-control şi constă în mai multe metode (program educaţional, drenaj postural, gimnastică respiratorie, antrenament fizic, climatoterapie, balneoterapie, speleoterapie şi terapie inhalatorie, tratament de tip spa).

Cuvinte cheie: astm, tratament, reabilitare.

Introduction

Asthma is among the most important problems of medicine and is one of the most frequent chronic diseases of the respiratory organs. The health and socio-economic relevance of the problem is determined by further growth of the morbidity rate, difficulty in control over the process, increasing mortality, the high material damage to society (***, 2007).

Global Strategy for Asthma Management and Prevention, elaborated by Global Initiative for Asthma (GINA) and updated in 2015, defines asthma as a ”heterogeneous disease with chronic airway inflammation, history of wheeze, shortness of breath, chest tightness and cough that vary over time in intensity and variable expiratory airflow limitation”. These variations are triggered by allergens, irritant exposures, exercises, weather changes, viral respiratory infections (1).

Asthma symptoms can be resolved spontaneously or by medication, and they can also be absent for a long time (weeks or months). Another problem is the recurrent attacks of shortness of breath and wheezing, which vary in severity and frequency from person to person. These conditions are due to the inflammation of the air passages in the lungs and affect the sensitivity of the nerve endings in the airways, so they become easily irritated. During an attack, the lining of the passages swells, causing the airways to narrow and reduce the flow of air in and out of the lungs. The airways become narrow and swell and produce extra mucus. This can make breathing difficult and trigger coughing, wheezing and shortness of breath (***, 2007); (Clark & Rees, 1998).

Asthma affects all age groups but often starts in childhood. For some people, asthma is a minor nuisance. For others, it can be a major problem that interferes with daily activities and may lead to a life-threatening asthma attack. Asthma is a major burden on the individual patient

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and society. People with asthma have been reported to have lower levels of physical fitness, increased levels of psychological distress and reduced health-related quality of life (HRQoL), as well as school and work impairment (Holland et al., 2013).

Epidemiology

Asthma affects an estimated 300 million individuals worldwide. Annually, the World Health Organization has estimated that 15 million disability-adjusted life-years are lost and 250000 asthma deaths are reported worldwide (Eder et al., 2006).

The prevalence rate of asthma in industrialized countries ranges between 2-10%, but it depends on the state of the environment and anthropogenic activity. Trends suggest an increase in both the prevalence and morbidity of asthma, especially in children younger than 6 years. Factors that have been implicated include urbanization, air pollution, passive smoking, and change in exposure to environmental allergens (Clark & Rees, 1998; Eder et al., 2006).

Asthma predominantly occurs in boys in childhood, with a male-to-female ratio of 2:1 until puberty, when the male-to-female ratio becomes 1:1. Asthma prevalence is increased in very young and very old persons because of airway responsiveness and lower levels of lung function.

Two thirds of all asthma cases are diagnosed before the patient is aged 18 years. Approximately half of all children diagnosed with asthma have a decrease or disappearance of symptoms by early adulthood (Clark & Rees, 1998).

Etiology

Many asthma phenotypes have been described. The most common are:

- Allergic asthma with onset in childhood; patients have a positive family history and present positive skin tests to common allergens, allergic diseases such as eczema, allergic rhinitis, food or drug allergy. The precipitating factors can be easily detected in these patients (Cohn et al., 2004; Holgate & Polosa, 2006). Eosinophilic airway inflammation has good response to inhaled corticosteroid (ICS) treatment (1). In allergic asthma, the precipitating factors include: infection, house dust mites, pollens, animals, exercise, smoking, dust and pollution, drugs, foods, occupation, psychological factors, pregnancy and menstruation, gastro-oesophageal reflux, thyroid disease (Clark & Rees, 1998; Cohn et al., 2004).

- Non-allergic asthma diagnosed in adulthood, airway inflammation with eosinophils and neutrophils; this phenotype responds less well to ICS treatment (1); it presents persistent symptoms, it has no obvious precipitating factors, except infection, and the patients have negative skin tests (Clark & Rees, 1998; Holgate & Polosa, 2006).

- Late-onset asthma, with onset in adult life, particularly in women, without allergy. These patients require high doses of ICS or they are relatively refractory to corticosteroid treatment (1).

- Asthma with fixed airflow limitation: some patients with long-standing asthma develop fixed airflow limitation, due to the airway wall remodelling process.

- Asthma with obesity (1).

Pathology

The three main factors producing airflow obstruction in asthma are: the retention of bronchial secretions, thickening of the bronchial wall and bronchoconstriction (Clark & Rees, 1998); (***, 2007). Mucus in asthma is abnormally sticky and also has an inhibitory action on the cilia in the airways, both factors predisposing to mucus retention and plugging. The bronchial wall is also abnormal. Inflammatory cells, particularly eosinophils, invade the wall, which becomes oedematous. Between exacerbations these changes are reversible, but in the longer term bronchial mucous glands may enlarge, and bronchial smooth muscles and collagen beneath the basement membrane may become thick (Cohn et al., 2004; (***, 2007); Ohta et al., 2014). There may be an increase in the collagen laid down beneath the basement membrane, inducing sub-basement membrane fibrosis. This causes a remodelling of the airways with irreversible obstruction. The main physiological finding in asthma is airflow obstruction. The immunohistopathological features of asthma include inflammatory cell infiltration: neutrophils, eosinophils, lymphocytes, mast cell activation, epithelial cell injury (Clark & Rees, 1998; Holgate & Polosa, 2006, Ohta et al., 2014).

Treatment

The GINA report established the long term goals of asthma management to be the achievement of good symptom control and minimisation of future risk of exacerbations, fixed airflow limitation and side effects of treatment; also, the patients' own goals regarding their asthma and its treatment should be identified (1). For all the affected patients, the ultimate goal is to prevent functional and psychological morbidity to provide a healthy (or near healthy) lifestyle.

Pharmacological treatment of asthma covers *controller medication* (used for regular maintenance treatment to reduce airway inflammation and control symptoms in order to reduce future risks) and *reliever medication* (used during exacerbations). *Add-on therapies* can be considered when patients have persistent symptoms and exacerbations despite correct controller treatment (correct doses and correct administration of medication).

A stepwise approach of asthma in order to control symptoms and minimise future risks assumes the use of control agents such as *inhaled corticosteroids* (budesonide, beclomethasone dipropionate, fluticasone propionate, ciclesonide, mometasone propionate) in all control steps of asthma but in increasing doses, or/plus *leukotriene receptor antagonists* (montelukast, zafirlukast) or/ plus low doses of theophylline for step 2, *long-acting beta agonist bronchodilators* (LABA: formoterol, salbutamol, indacaterol) for steps 3, 4, 5, *ultra-long-acting anticholinergic bronchodilators* (tiotropium) in steps 4 and 5, and more recent strategies such as the use of anti-immunoglobulin E (IgE) antibodies (omalizumab) in step 5 of asthma treatment (***, 2007); (Incorvaia & Ridolo, 2015); (1). Relief medications include short-acting bronchodilators (SABA: salbutamol, ipratropium bromide), systemic corticosteroids (prednisone, methylprednisolone),

and low doses of inhaled corticosteroids/formoterol (Clark & Rees, 1998; Holgate & Polosa, 2006; Bateman et al., 2008); (1).

Despite the wide introduction in practice of documents regulating the principles of treatment and prevention of asthma, more than 80% of persons have a poor or bad disease control, clinical symptoms and a need for β 2-agonists. In addition, there is often a failure in patients that use hormonal drugs (***, 2007); (Lommatzsch & Virchow, 2014). GINA updated the strategies for asthma managment based on the individualization of treatment depending on patient characteristics, modifiable risk factors, patient preferences and practical issues (1).

Treatment of asthma exacerbations with medication is effective in cases of emergency. However, this treatment does not eliminate the cause of the disease: after a temporary physical alleviation, the next acute exacerbation of asthma is still inevitable, becoming more and more severe (Clark & Rees, 1998); (***, 2007); Bateman et al., 2008).

Moreover, each year of treatment of asthma with medication makes recovery difficult, as the use of drugs increases damage to the epithelium of the airways at cellular level, weakens the immune system as a whole and reduces the parenchyma of the lung tissue, that is the area of the lungs which is capable of gas exchange (Holgate & Polosa, 2006); (***, 2007).

After a few years of treatment with medications, patients with asthma have various dysfunctions and disabilities. As such, their quality of life and life expectancy is on average much lower than in healthy people. Comprehensive care involves not only using drugs, but also non-pharmacological treatment (Burianova et al., 2008). There is a real need of additional, in particular non-drug remedies that can affect the basic clinical manifestations of the disease to improve the efficiency of treatment of such patients and reduce the drug load (***, 2007); (Clark & Rees, 1998; Holgate & Polosa, 2006; Bateman et al., 2008). GINA recommends, in addition to pharmacological treatments, a few strategies in the management of asthma; physical activity and breathing exercises are two of these strategies (1).

Rehabilitation program

The holistic approach - In an attempt to develop alternative therapies for asthma, a complex holistic systemic therapy was proposed. This was aimed at the systemic restoration of the immune system, blood microcirculation and treatment of stress. It began with a complex systemic diagnosis of patients with asthma that included: determining the condition of the body homeostatic self-regulation, identifying the type of asthma, identifying the causes of immunologic abnormalities. The ultimate goal was to restore the homeostatic self-regulation of the body without involvement of medications. The algorithm for the treatment of asthma was developed on an individual basis, depending on the type of asthma and accompanying disorders (if any) of other body organs and systems (Solovyev, 2011).

Pulmonary rehabilitation programs are aimed at recovering and improving the respiratory function through a mechanical action on the more distal bronchial and pharmacological branches. Each pulmonary rehabilitation program is supposed to be a very important part of a comprehensive treatment and can help to improve breathing and decrease the incidence of musculoskeletal system dysfunctions (Slader et al., 2006). In 2013, Carson et al. published an analysis of 21 studies including 772 patients with asthma, who were randomised to undertake physical training or not. Physical training had to be undertaken for at least 20 minutes, two times a week, over a minimum period of four weeks. The authors' conclusions were that physical training can improve cardiopulmonary function and may have positive effects on the health-related quality of life in patients with asthma, benefits unrelated to the effects on lung function. There was no evidence of adverse effects caused by physical training on asthma symptoms. The same review shows that physical training is well tolerated by these patients. The intervention programmes that produced these benefits included aerobic conditioning using a treadmill, other aerobic exercises and swimming (Carson et al., 2013). Another strategy used in improving asthma symptoms was the association between physical activity and the education program and breathing exercises (Carson et al., 2013).

GINA mentions that there is little evidence to recommend one form of physical activity over another, but breathing exercises are useful supplements to asthma pharmacotherapy (evidence B) (1). Also, regular physical activity is recommended because of its general health benefits (evidence A) and the improvement of cardiopulmonary fitness, without a specific benefit on lung function or asthma symptoms, except for swimming in young people with asthma (evidence B). Information on the patient is important in order to provide advice about the prevention and management of exercise-induced bronchoconstriction (evidence A) (1). Therefore, the approach to the treatment of asthma was holistic and was chosen for each patient individually in accordance with the chosen strategic asthma treatment plan.

The components of holistic systemic therapy of asthma comprised the regulated and officially approved pulmonary rehabilitation methods and techniques, which included:

- education;
- chest physiotherapy;
- respiratory gymnastics;
- physical training;
- balneotherapy;
- climatotherapy;
- speleotherapy;
- sylvinite speleotherapy and chest cryomassage;
- halotherapy;
- spa therapy;
- others (acupuncture, with or without use of resonance on biologically active points, homeopathy).

Education means the individual recommendations on the way of life, diet, and nutrition (Milan et al., 2013). Each education lesson should include the pathophysiology of asthma, the importance of breathing exercises and physical training, all possibilities of treatment. The physical therapist offers materials about asthma and materials describing exercises.

Chest physiotherapy focused on breathing exercises and *respiratory gymnastics* (control breathing, thoracic

expansion exercises, forced expiratory technique, autogenic drainage, pursed lip breathing, diaphragmatic breathing, effective cough training and elimination of upper chest breathing) (Burianova et al., 2008). Buteyko is a specific form of breathing therapy (actually breathing restraint) that has been used in the management of asthma. Professor Konstantin Pavlovich Buteyko (Russia) developed it about 50 years ago. His theory was that many "civilisation-induced diseases" are caused by deep breathing. Buteyko therapy was developed as a way to reduce the depth of respiration. Many studies have shown that the Buteyko technique used in patients with asthma decreased the use of medication and improved their clinical status (Hassan et al., 2012; Cowie et al., 2008). A systematic review and meta-analysis showed improvements in HRQoL from trials of the Buteyko breathing technique or physiotherapist-led breathing retraining. In asthma, breathing retraining typically aims to eliminate over-breathing by developing a slow, shallow, controlled breathing pattern (Holland et al., 2012; Prem et al., 2013). Postural drainage consists of making the patient assume a certain position in order to facilitate the outflow of secretions from the different areas of the lungs. The drainage is accompanied by shaking vibrators, with compression of the chest wall and on exhalation by the percussion of the chest wall by means of the hand composed in the shape of cup, in order to obtain the detachment of the bronchial secretions from the walls, especially in chronic asthma (Slader et al., 2006). Moreover, expanding the excursions of the diaphragm allows to improve the mobility of the thoracic cage, gaining elasticity through relaxation and lengthening of the respiratory muscles intervening in breathing and thereby promoting drainage of bronchial secretions (Slader et al., 2006; Freitas et al., 2013).

Respiratory gymnastics represents a sequence of operations performed to improve the breathing mode of the lungs, which allows the exchange between oxygen and carbon dioxide in the blood. Just breathing properly provides a fair contribution of blood oxygen. Breathing exercises give many benefits such as the increase of the quantity of air blown into the lungs and the complete re-expansion of the same. It allows to recover gradually the tone of respiratory muscles and it facilitates the removal of phlegm from the bronchial tubes. Simple rhythmic breathing exercises may help agitated patients to stop hyperventilating and to use their inhaled therapy more effectively (Slader et al., 2006).

Physical training - Exercise training remains a cornerstone of pulmonary rehabilitation in patients with asthma, because physical training programs improve physical fitness, neuromuscular coordination and self confidence, without deleterious effects on asthma control (Chandratilleke et al., 2012). Although there were insufficient data to pool results due to diverse reporting tools, there was some evidence to suggest that physical training may have positive effects on the health-related quality of life (Pereira, 2014). Importantly, more recent randomised controlled trials have also shown positive effects of exercise training on asthma symptoms and quality of life in adults with moderate-to-severe persistent asthma (Mendes et al., 2010; Turner et al., 2011). The choice of the type of exercise training depends on the physiological requirements and goals of the individual patient, as well as on the available equipment at the rehabilitation centre where it is performed. Current evidence suggests that ground walking exercise training, Nordic walking exercise training, resistance training, water-based exercise training, tai chi, and nonlinear periodized exercise are all feasible and effective in patients with asthma. These exercise training modalities can be considered as part of a comprehensive, interdisciplinary rehabilitation program (Andrianopoulos et al., 2014). Physical training showed significant improvement in maximum oxygen uptake, though no effects were observed in other measures of pulmonary function. More research is needed to understand the mechanisms by which physical activity impacts asthma management (Pereira, 2014). The multidisciplinary inpatient rehabilitation program proved a significant short and long-term improvement in asthma control, physical fitness and HRQoL in adult asthmatic patients (Lingner et al., 2015). Exercise can be an important trigger of symptoms in some individuals, even when their asthma is otherwise well controlled. Exercise-induced bronchospasm typically occurs 5-10 min after exercise, with symptoms including breathlessness, wheeze, chest tightness or cough. For individuals with exercise-induced bronchospasm, GINA guidelines recommend pre-treatment with a rapid-acting inhaled b2-agonist prior to exercise. A gradual warm-up may also minimise exercise-induced bronchospasm. Cardiopulmonary exercise testing may be useful to detect exercise-induced bronchoconstriction prior to commencing an exercise program (Holland et al., 2012). The British Thoracic Society (BTS)/Scottish Intercollegiate Guidelines Network (SIGN) asthma guideline draws attention to exercise-induced asthma and precautions to prevent this should be followed if appropriate (Bolton et al., 2013).

Balneotherapy uses mineral waters that have special properties in an attempt to treat patients with asthma. Each water source has its own unique mineral properties which is suited to treat this disorder. These waters contain varying amounts of minerals that have proven health benefits (Rassulova et al., 2007; McNamara et al., 2013). In balneotherapy, mineral waters can be used internally or externally. Balneotherapy uses subterranean products, such as hot spring water, gases, muds, and climatic factors, as therapeutic elements. Therapy is conducted by combinations of hot spring water bathing, various thermotherapies and hydrotherapies, exercises, drinking waters, as a complex treatment. Hot spring water bathing as a "bath cure" is the most fundamental modality of balneotherapy, with repeated hyperthermic whole-body immersion at a water temperature that is quite hot. In this therapy, the direct effects of the physical factors of bathing, such as hydrostatic pressure, buoyancy, and water temperature, and the pharmacological properties of the hot spring water constituents exert important actions on the body. The complex therapeutic stimulation is repeatedly applied during a long-term period of 2-4 weeks. These therapeutic factors work to alter physiological functions comprehensively and non-specifically (Rassulova et al., 2007). The process of alteration is considered to

be mediated by the autonomic nervous, endocrine, and immune systems, resulting in normalisation of pathological functions and enhancement of the functional capacities and self-healing potential of the organism. Most physiological functions exhibit a circaseptan (about 7 days) rhythm during the course of adaptation to the therapeutic environment. The beneficial usefulness of balneotherapy has been well demonstrated in patients with asthma. In most cases, clinical symptoms were improved. Moreover, basic studies showed immune and antioxidative defence systems were ameliorated or enhanced (Andrianopoulos et al., 2014). The significance of modern balneotherapy has been increasingly emphasized, especially for the purposes of preventive medicine and health promotion (Cowie et al., 2008).

Climatotherapy - Alpine climatotherapy improves the general status; patients with asthma manifest an amelioration of ventilation and decreased responsiveness of the bronchial tree by the end of alpine climatotherapy. Favourable alterations in the immune parameters together with appreciable stimulation of steroidogenesis in the adrenals are discovered. Alpine climatotherapy produces a favourable effect on the main mechanisms of disease development and can be used on a wider basis for the treatment of patients suffering from asthma. Maritime climate also improves the clinical status of patients with asthma (Schuh & Nowak, 2011; Massimo et al., 2014).

Speleotherapy in salt mines and caves - Speleotherapy and halotherapy are used in the treatment of asthma with different degrees of control. Long-time exposure to salt therapy helps to strengthen the respiratory mucosa against allergens and maintains proper hygiene over the whole respiratory system. Home salt therapy is also available for long term exposure in chronic respiratory diseases. Through aerosol salt therapy and salty baths, the anti-inflammatory and healing effects of salt therapy are highlighted. Rock-salt aerosol therapy is considered one of the most effective methods of treatment of asthma (Beamon et al., 2006; Rassulova et al., 2007; Munteanu et al., 2011; Lazarescu et al., 2014a; Levchenko et al., 2014).

Sylvinite speleotherapy and chest cryomassage - This combined method has shown its utility in the rehabilitation of patients with asthma. It consists of the application of microclimate sylvinite speleotherapy, the main active factor of which is sylvinite - a rock formed by the mutual germination of halite (sodium chloride) and Silvina (potassium chloride), total average content in salt layers 97-98%, a small percentage consisting of magnesium salts (Aĭrapetova et al., 2011; Irapetova et al., 2011). The distinctive feature of this method of treatment is the possibility of integrated and consistent impact on the patient's organism of a sylvinite speleotherapy microclimate, providing multivariate effects due to stable temperature and humidity conditions, high air ionization, temporary isolation of the patient from aggressive external environment, elimination of allergens, and impact of cryomassage, based on the abstraction of heat from the body tissues with the aim of achieving a muscle relaxant, anti-oedematous and, as a consequence, increased anti-inflammatory, analgesic potency. The patient, on the background of basic and symptomatic medication, spends the first half of the day under the impact of climate sylvinite speleotherapy, for 60-90 minutes daily; in the second half of the day, the patient consistently undergoes the chest cryomassage method: bags with the volume of 300 to 500 ml, which are cooled in the freezer at a temperature of -21 degrees to -23 degrees. The technical results of this proposed method are anti-inflammatory, broncholytic, immune-correction effects that slow the progression of the disease and improve the results of treatment, leading to an improvement of the quality of life of patients with longer remission of the disease, reducing the frequency of relapses and decreasing drug load on the organism, as well as the possibility of application of the method in patients with concomitant diseases. The goal of the cryo treatment is the achievement of a muscle relaxant, analgesic effect, and the strengthening of the anti-inflammatory action. The effect of cold on the organism is similar to the action of glucocorticoids, which is accompanied by a decrease of the content and activity of fat and biogenic amines, reducing capillary permeability. The method of treatment was applied with good results to patients with exogenous allergic asthma as well as patients suffering from endogenous non-allergic asthma (it reduced coughing and shortness of breath, the need for inhaled bronchial spasmolytics, it improved mucus discharge and normalised respiratory function, with an immunomodulatory effect). The improvement of the clinical status was paralleled by changes in the psycho-emotional status of the patients. The combined method of sylvinite speleotherapy and cryomassage improves the well-being of patients, their activity and mood. It also increases tolerance to physical activity according to the 6-minute walking test (Aĭrapetova et al., 2011; Irapetova et al., 2011).

Halotherapy is a mode of treatment in a controlled air environment which simulates a natural salt cave microclimate. The main curative factor is dry sodium chloride aerosol with particles 2 to 5 mkm in size. Particle density (0.5-9 mg/m3) varies with the type of the disease. Other factors are the comfortable temperature-humidity regime, the hypobacterial and allergen-free air environment saturated with aeroions. It is used in the treatment of various types of respiratory diseases, but it mainly improves the clinical state of most of the patients with asthma. The positive dynamics of flow-volume loop parameters and the decrease in bronchial resistance measured by body plethysmography are observed. The specificity of this method is the low concentration and gradual administration of dry sodium chloride aerosol (Chervinskaya, 2003; Rassulova et al., 2007). In our country, this mode of treatment was applied to patients with chronic allergic asthma and infectious-inflammatory pathologies. The data acquired also proved the halo-therapeutic effect causing a reduction of body sensitiveness in patients with asthma (Lazarescu et al., 2014 b).

Spa treatment is commonly used for people who have chronic respiratory diseases, with acute remitting process, and mostly if the disease is in remission. The main factors are resort balneotherapy, climatotherapy, mud and physiotherapy. Spa treatment is especially useful when administered in a health facility (Tanizaki, 2007; Ochiuz & Popovici, 2014). One of the spa treatment methods that

has shown its utility in the treatment of asthma patients (especially for patients with allergic asthma) uses the effects of *radon and thermal therapy*. The sanatorium in which treatment is performed must be in a forest-steppe climate, dominated by coniferous trees, combined with healing radon springs. Radon increases the blood levels of the absolute and relative numbers of T-lymphocytes, reducing the number of eosinophils, which increases immune-competent body defense. Radon baths and inhalation are also useful in case of inflammation of the respiratory tract. Radon and thermal therapy are performed once a week. All subjects enter a hot bathroom with a high concentration of radon, and nasal inhalation of vapours from a hot spring is performed for 40 min once a day under conditions of high humidity. Radon and thermal therapy improves the pulmonary function of asthmatics by increasing the reduced activities of antioxidant enzymes. Spa therapy methods are effective in asthma by improving the ventilator function, subjective and objective symptoms, and the suppressed function of adrenocortical glands. Spa treatment also decreases airway inflammation, especially in patients who present a large number of inflammatory cells such as lymphocytes, neutrophils and eosinophils. Spa treatment has also shown its utility in uncontrolled asthma patients (Sokolova et al., 2007; Kamimura, 2014). Complex spa therapy (swimming training in a hot spring pool, fango therapy and inhalation of iodine salt solution) also has a beneficial effect on psychological factors in patients with asthma (Sokolova et al., 2007). During the spa and resort-based treatment of asthma therapy, hypoxic interval training and enteral oxygen therapy are performed. This combined application of hypoxytherapy and oxygen therapy can also be used. During spa treatment, an improvement of oxygen supply to various organs at all stages of mass transfer and an enhancement of oxygen consumption by the tissues occur. These effects promote the normalisation of the respiratory system function, improve the characteristics of the exhaled air condensate and the state of pro-oxidant and anti-oxidant systems. This confirms the high efficacy of the combined therapeutic modality for the treatment of patients with asthma (Sokolova et al., 2007).

Conclusions

1. The pharmacological management of asthma does not eliminate the cause of the disease; after a temporary physical alleviation, the next acute exacerbation of asthma is inevitable, becoming more and more severe with each episode. In a few years of treatment with medications, patients with asthma become disabled to different degrees.

2. There is a real need for additional non-drug remedies that can influence the basic clinical manifestations of the disease, to improve the efficiency of treatment. The main goals of the rehabilitation treatment are to restore the homeostatic self-regulation of the body without the involvement of too many medications, to improve the clinical as well as the psycho-emotional status of patients, and to promote self-management.

3. Guided self-management for asthma that requires important aspects (education, joint goal setting, a personalized written action plan, self-monitoring of key symptoms, and regular review of asthma control, treatment and skills by a healthcare professional) is highly effective and considered a cornerstone of modern asthma care.

4. All clinicians and healthcare professionals involved in complex asthma care should make sure that any self-management training provided meets the guideline requirements for people with this complex respiratory disorder.

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A study on hand and finger gymnastics, published in 1880, in Jassy

Un studiu despre gimastica mâinii și a degetelor, publicat în 1880, la Iași

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Abstract

In the Romanian medical literature of the 19th century, only a few studies concerning the positive effects of gymnastics on human health were published, as compared to the medical literature from various countries in Western Europe. One of the first studies published in Romania was edited in 1880, in Jassy. It is entitled "Gymnastics of the hand and fingers for strengthening muscles, making them flexible". It was written by Professor A.J. Rosenfeld, from the Royal Institute of Stenography from Dresden.

In our paper, we will point out the most important aspects about Rosenfeld's study.

This study was the Romanian translation of an original study, written in German by A.J. Rosenfeld. The editor of the Romanian version was Th. Balassan. On the first page of this booklet it states that this study is very useful for musicians (players), people who work in every kind of manufacture, military officers, writers, telephone-operators, etc. This study contains 34 figures and is divided into 16 chapters: the anatomy of the hand and fingers, gymnastics influence on the muscles and joints of the hand and fingers, status of neglected hands and fingers, the need of performers to have strong fingers for playing instrumental music, status of finger joints having minimal resistance, physical exercises for fingers and especially for the thumb, physical exercises for the wrist, etc.

The Romanian translation of this detailed study shows that at the end of the 19th century, Romanian physicians and perhaps nurses too were interested to improve the health of their patients, with specific reference to the strengthening and recovery of their hands and fingers.

Key words: gymnastics of hand and fingers, recovery, medical literature, A.J. Rosenfeld.

Rezumat

În literatura medicală românească din secolul al 19-lea au fost publicate doar puține studii despre efectele pozitive ale gimnasticii asupra sănătății umane, comparativ cu literatura medicală din diverse ţări din Europa Occidentală. Unul dintre primele studii publicate în România a fost editat în 1880, la Iaşi. El este intitulat „Gimnastica mâinii şi a degetelor pentru întărirea muşchilor, făcându-i flexibili". Acesta a fost scris de Prof. A.J. Rosenfeld de la Institutul Regal de Stenografie din Dresda.

În lucrarea noastră vom pune în evidenţă cele mai importante aspecte ale studiului lui Rosenfeld.

Acest studiu este traducerea făcută în româneşte a unui studiu scris în limba germană de A.J. Rosenfeld. Editorul versiunii româneşti a fost Th. Balassan. Pe prima pagină a acestei broşuri este menţionat faptul că lucrarea este foarte utilă pentru muzicieni (interpreţi), persoane care lucrează în toate tipurile de manufacturi, militari, scriitori, telefonişti etc. Studiul cuprinde 34 de figuri şi este împărţit în 16 capitole: anatomia mâinii şi a degetelor, influenţa gimnasticii asupra muşchilor şi articulaţiilor mâinii şi a degetelor, starea mâinii şi a degetelor neîngrijite, articulaţiile degetelor care au o rezistenţă scăzută, necesitatea interpreţilor de a avea degete puternice pentru a interpreta muzica instrumentală, exerciţii fizice pentru degete, mai ales pentru police, exerciţii fizice pentru articulaţia carpo-metacarpiană etc.

Traducerea în româneşte a acestui detaliat studiu arată că la sfârşitul secolului al 19-lea o parte a medicilor români, probabil şi a asistenţior medicali, erau interesaţi de dezvoltarea sănătăţii pacienţilor lor, cu referire specifică la fortifierea şi recuperarea mâinii şi a degetelor.

Cuvinte cheie: gimnastica mâinii şi a degetelor, recuperare, literatura medicală, A.J. Rosenfeld.

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Hand and finger gymnastics has the same importance as the gymnastics of other parts of the human body. But this fact was neglected for many centuries.

During the 19th century, significant progress was made in gymnastics in different European, mostly Western European countries, as well as in the United States. The contributions made to this field by Friedrich Ludwig Jahn (1778-1852) in Germany and Pehr Henrik Ling (1766-1839) in Sweden (1) are well known.

However, the publications concerning the role of gymnastics in preventing illnesses or in recovering health were not very numerous. In this context, there were few original publications, while most of the published material was a synthesis of previous work. Compared to the medical literature from various Western European countries, the Romanian medical literature of the 19th century comprised only a few studies on the positive effects of gymnastics - and especially of hand and finger gymnastics - on human health.

Our paper is focused on a book about hand and finger gymnastics, published in 1880, in Jassy. Its title is "Gymnastics of the hand and fingers for strengthening muscles, making them flexible". The author was Prof. A. J. Rosenfeld from the Royal Institute of Stenography from Dresden.

This book was written in German and has 17 chapters. We present the Romanian version, which was edited by Th. Balassan. There is very little information about Balassan. He was one of the owners of the "Curierul de Iași" ("Jassy Courier") publication. He was also an editor and the owner of a printing house in Jassy. In 1874, he offered a job of editor to Mihai Eminescu, but Eminescu in his turn offered this job to Ioan Slavici (2). It is difficult to know why the name of Balassan is present in the National Retrospective, but with no other biographical data (3).

Unfortunately, we have no information about Rosenfeld or this Institute where he was a professor.

Regarding stenography, it is useful to put it in the context of the mid-19th century. At that time, the increasing needs of communication for business required the mechanization of the writing process. Stenographers and telegraphers had the possibility to take down the information at rates of up to 130 words per minute. This was a significant progress for that period. For comparison, a writer with a pen could write a maximum of 30 words per minute (in 1853) (4).

In order to provide a landmark for Romanian books on gymnastics, it is useful to mention the publication in 1881 of the book entitled "The History, Anatomy and Hygiene of Gymnastics, Following the Most Significant Authors, with the Principal Figures and Explanations about Baths and the Swimming School" elaborated by Gheorghe Moceanu (1835-1909) (Bârsu, 2014).

In the preface, Rosenfeld mentions the beneficiaries of hand and finger gymnastics. Depending on profession, they are musicians (composers and performers), writers, printers and lithographers, painters and designers, xylographers (wood engravers), metal engravers, ivory workers, watchmakers, jewelers, weavers and cloth manufacturers, telegraph girls, children who write and calculate. Persons with various post-surgical or post-traumatic sequelae in fingers as a result of frostbite or trauma are also included.

The book contains 32 pages and 35 figures in the text with exercises for the hand and fingers. Finally, it has a plate attached which includes 35 other images relating to human body gymnastics. In Figure 1, the title page of this book is presented.

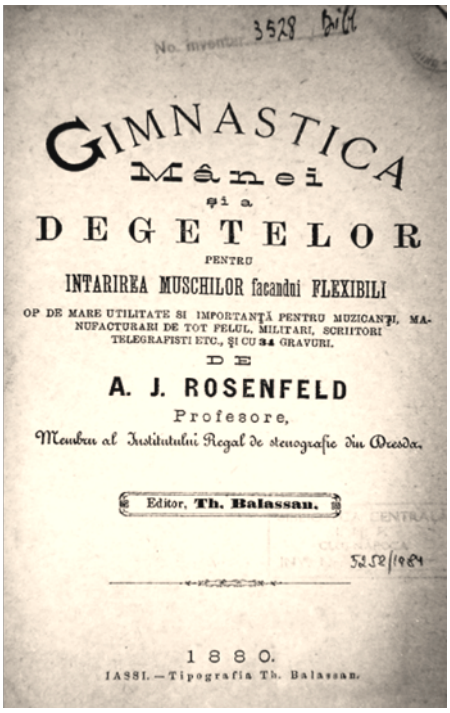


Fig. 1 – Title page of Rosenfeld's book.

Chapter I is entitled "Anatomy of the hand, about joints, nerves etc." and gives a description of the hands, fingers, as well as some data on the physiology of their movements. First of all, a scheme of the skeleton of the hand and fingers is presented (Fig. 2), but without mentioning the name of each bone. Then, a scheme of the muscles of the wrist is provided (Fig. 3), but without mentioning the name of each muscle. The original form of this study probably included the anatomical terms.

Fig. 2 – The skeleton of the hand and fingers.

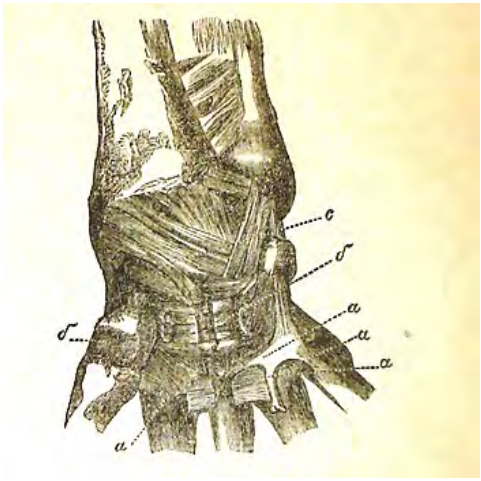


Fig. 3 – The muscles of the wrist.

Chapter II is entitled "The hand and finger structure". It contains descriptions of the hand bones with joints, muscles and tendons. It should be noted that all the anatomical elements of the hand and fingers were displayed in the 4 images included in the book, without being described in text or figure legends. This method shows that the author did not insist on the anatomy of the hand and fingers, because he wrote this book for the general public (not for physicians).

Chapter III is entitled "Influence on the muscles and joints of the hand and fingers by gymnastics". It is interesting that the author also mentioned the risk of muscle tension.

An interesting chapter is Chapter IV, which bears the title "Neglect of the hand and fingers until now". Rosenfeld describes some aspects about the neglected and untrained hand and fingers. He included six "pro domo" quotes regarding the need of hand gymnastics, associated with the gymnastics of the whole body. The quoted authors are European physicians: Dr. Dietz, P. H. Link, Professor Schmidt, Dr. M. Bally and Dr. Ferguson.

Chapter V is entitled "Finger joints are less exercised and the weakest". Rosenfeld provided arguments for the fact that the knuckles of patients having all occupations, except for pianists and violinists, are less used, thus being weaker compared to other joints of the human body. However, this argument is not entirely correct, because these joints are very much used also by cellists, double bassists and organ players.

"The main difficulty is not reading musical notes, but finger weakness" is the following chapter of this book. The author argued, contrary to the general opinion, that for musicians the main difficulty is neither learning, nor reading musical notes, but "the insufficient function of fingers and wrists". Therefore, he recommended to start with gymnastics to strengthen the finger muscles, hand joints and even hand bones, and then to learn the musical notes.

The next chapter's title exceeds the subject of a publication regarding gymnastics. The title is "About music, an art which requires the greatest development of the muscles of the fingers". The author refers to interpretative music. He argues that gymnastic exercises for the performers' hands would have been introduced 150 years before, i.e., in the mid-18th century. Thus, in Rosenfeld's opinion, these hand exercises should have been introduced during the time of Johann Sebastian Bach (1685-1750), Georg Friedrich Handel (1685-1756), etc. However, this argument is not entirely correct, keeping in mind that different instruments were modernized during the 19th century, such as the piano, horn, harp, etc. So, there was a certain change in the groups of muscles used for playing these instruments. Rosenfeld recommended that all the exercises described in this brochure should be carried out, because limitation to some gymnastic exercises would not be sufficient for a proper functionality of the hand and fingers.

Chapter VIII – "Artists and music teachers" – refers to the importance for artists to practice hand gymnastics, emphasizing that this should be known primarily by music teachers, and recommended to their pupils as well as to all those interested.

Chapter IX – "Free gymnastic exercises for fingers" – deals with the very simple movements that must be performed during different types of gymnastics. Rosenfeld included a figure in which he presented different simple exercises for the fingers (Fig. 4).

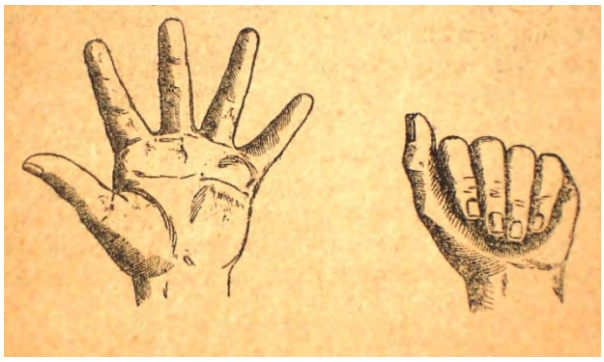
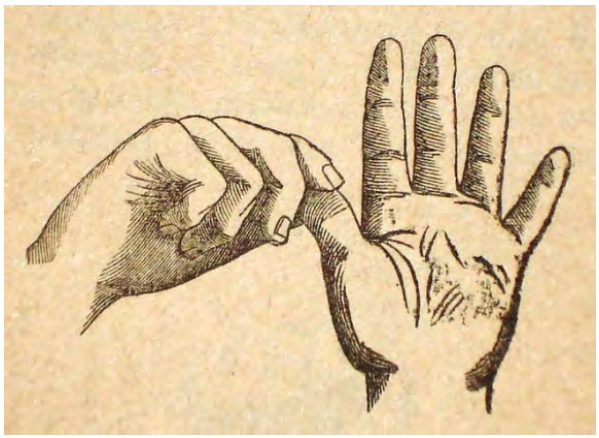
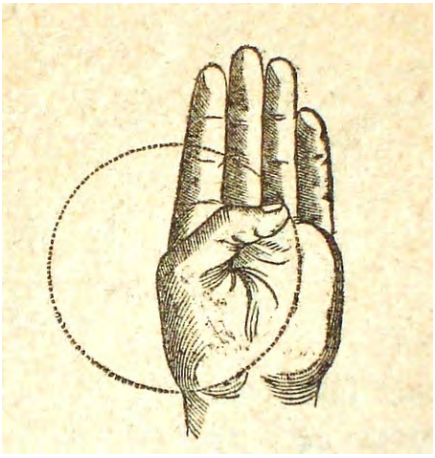


Fig. 4 – Different simple exercises for the fingers.

We will not describe the following two chapters, "Free gymnastic exercises for the thumb" and "Free gymnastic exercises for the wrist", but we enclose three figures (5 a, b and 6) in which different simple exercises for the thumb and an exercise for the wrist are mentioned.



a



b

Fig. 5 a, b – Different simple exercises for the thumb.

Fig. 6 – Exercise for the wrist.

Chapters XII and XIII present "finger exercises with tools". The "tools" are 4 cylinders 2 inches long, ½-1 inch in diameter. Rosenfeld included different figures to show finger exercises with tools. We mention only one example (Fig. 7).

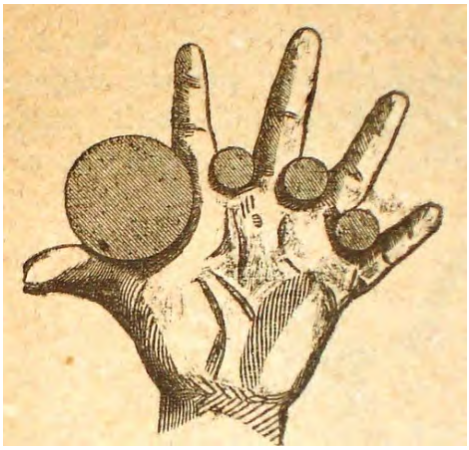


Fig. 7 – Finger exercises with tools.

The following chapter is entitled "Board tensioners for stretching the muscles of the thumb and other fingers". A board tensioner is 22 inches long, 4-5 inches wide, ¾ inch thick, and has small canals 4-5 ½ inches deep. The author gave examples of exercises for the thumb and fingers, using board tensioners (Fig. 8).

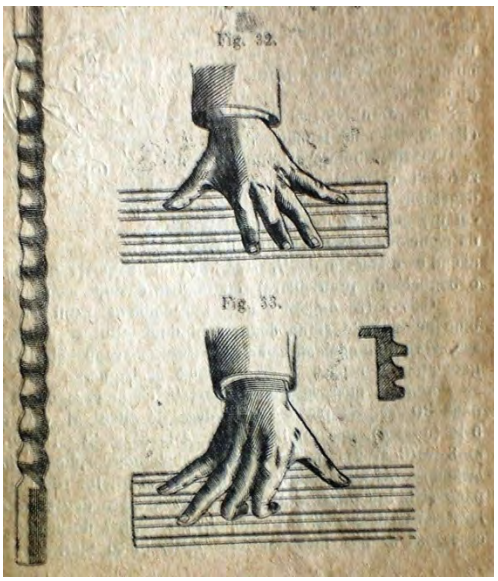


Fig. 8 – Exercises using board tensioners.

Chapter XV – "Exercises with tools for the wrist of the right hand" – describes some gymnastic exercises for instrument players, such as violinists, violists, cellists, etc. The purpose of these exercises is to increase the agility of the wrist and, secondarily, the agility of the elbow joint.

A very interesting chapter is the following one, entitled "Staccato Tone". The aim of the gymnastic exercises is to strengthen the joints of the fingers, wrist, elbow and shoulder. These exercises were recommended first of all for pianists. It is useful to mention the significance of staccato: it is a form of musical articulation, signifying a note of shortened duration, separated from the note that may follow by silence (5).

The last chapter bears the title "Conclusions, options". The author noted that "It must not be forgotten that a too energetic fire [n. n. – an effort] has a negative effect on the muscles and the nerves, making them fragile; while some [gymnastic] movements done with quietness make them stronger".

Another significant indication given by Rosenfeld is the following: "The condition for practicing all gymnastic exercises is to practice them in front of a mirror, with energy (power) and according to indications, but never with excess".

Rosenfeld quoted Eduard Ferdinand Angerstein, who pointed out that "during the hours when children at school practice on instruments, [the effect] of a five minute break in which they do finger exercises revitalizes once again the hand, even if it had been already tired". It is interesting to note that Angerstein was the author of the book "Home gymnastics for the well and sick" (1889) (6).

At the end of the book, Rosenfeld attached a large drawing, comprising 35 gymnastic exercises for the whole human body. There is only one reference to these figures, in Chapter IV, written by Professor Schmidt. Unfortunately, Rosenfeld did not specify the identity of this professor. Schmidt insisted on the usefulness of practicing general gymnastic exercises for the health of the whole body. Some images are exercises with the ball, others with small weightlifting movements of bending, rotation of the body,

etc. In Figs. 9 a, b, c we give examples of different physical exercises recommended by Rosenfeld, in order to complete hand and finger gymnastics.

a

b

c

Fig. 9 a, b, c – Different physical exercises recommended by Rosenfeld, in order to complete hand and finger gymnastics.

Conclusions

1. The Romanian translation of this detailed study shows that at the end of the 19th century, Romanian physicians and perhaps nurses too were interested to improve the health of their patients, with specific reference to their hands and fingers, to promote their health or to recover them.

2. This Romanian translation was done in a clear way, having few medical terms, e.g., anatomical terminology. This facilitated the use of this study by the general public, not only by physicians.

3. For an easier understanding of the physical exercises recommended by Rosenfeld in this study, he included 70 images, mostly for the hand and fingers, but also for the body.

Conflict of interest

The authors confirm that this article content has no conflict of interest.

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Palestrica Mileniului III – Civilizaţie şi Sport
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RECENT PUBLICATIONS
ACTUALITĂŢI EDITORIALE

Book reviews
Recenzii cărţi

Physical Education for Students with Autism Spectrum Disorders. A Comprehensive Approach
(Educaţia fizică pentru elevii cu tulburări din spectrul autismului. O abordare comprehensivă)
Editor: Michelle Grenier
Editura: Human Kinetics, 2015
152 pagini; Preţ: 16,25 €

Deşi în România nu există o statistică oficială privind prevalenţa acestui tip de perturbare neuropsihică a copilăriei, este evident că populaţia noastră nu poate rămâne indemnă la trendul creşterii alarmante a "tulburărilor din spectrul autismului (TSA)"*; trend probat fără putinţă de tăgadă peste tot în lume şi, desigur, şi în Europa. Amintim în acest sens cifrele efectiv îngrijorătoare, lansate de Societatea Naţională pentru Autism din Marea Britanie: 1 caz la 2500 persoane, în anii '80, 1 la 166 în 2001, 1 la 110, actualmente. Şi, parcă pentru a ne înspăimânta de-a binelea, prima frază a textului prin care editura Human Kinetics îşi prezintă cartea de care ne vom ocupa în cele ce urmează, conţine o previziune şi mai sumbră, înfricoşătoare chiar: „Estimările curente apreciază că 1 din 88 de copii vor fi diagnosticaţi cu o formă de autism".

Dacă trendul semnalat este deja un truism, tot un adevăr de ordinul evidenţei a devenit şi faptul că unul dintre cele mai eficiente tratamente ce pot fi aplicate celor cu autism, este exerciţiul fizic. Astfel, potrivit specialiştilor de la Autism Research Institute, San Diego, USA, studiile arată că efortul viguros sau epuizant, face să scadă comportamentele stereotipe, hiperactivitatea, agresivitatea, auto-agresiunea şi distructivitatea. Efort viguros însemnând 20 de minute, sau mai mult, de activitate fizică aerobă, de 3 - 4 ori pe săptămână, efortul uşor, blând, având efecte minore în plan comportamental. În plus, mulţi copii cu TSA se îngraşă, dacă sunt lăsaţi să se complacă în sedentarism, iar excesul de greutate, ştim foarte bine, aduce cu el numeroase alte probleme de sănătate, pe termen mediu şi lung.

Pornind de la asemenea date şi realităţi, şi având certitudinea că acest teritoriu al TSA va reprezenta un domeniu de exprimare profesională din ce în ce mai mult frecventat de absolvenţii facultăţilor de educaţie fizică şi sport (EFS) din ţara noastră, am găsit de cuviinţă că ar fi foarte potrivit să semnalăm cititorilor revistei PALESTRICA, specialiştilor români în EFS, apariţia foarte recentă a lucrării editate de Michelle Grenier, profesor coordonator al programului de EFS adaptată, din cadrul Universităţii New Hampshire (Durham, USA). Dr. Grenier fiind o specialistă cu vastă experienţă şi reală notorietate internaţională, în cercetarea, practica şi predarea a tot ce ţine de incluziunea celor cu TSA, prin activitatea fizică adecvată şi sistematică.

Pedagogii adevăraţi ştiu dintotdeauna că a concepe o curiculă şi/sau o planificare, care să fie valabile pentru toţi elevii dintr-o clasă, nu este deloc uşor; un asemenea demers presupune foarte bogate cunoştinţe de specialitate, multă experienţă şi, desigur, creativitate "cât cuprinde". Ne putem imagina însă că o încercare de această natură este cu mult mai dificilă, în cazul elevilor cu TSA; cu atât mai mult cu cât, în această privinţă şi cunoştinţele, dar şi experienţa – mai ales în România – nu au cum să fie prea bogate. Sunt doar câteva motive pentru care o carte ca cea de care vorbim, este extrem de binevenită şi utilă; altfel spus se constituie exact în ajutorul de care profesorul avea nevoie. Ea se dovedeşte a fi lucrarea care îi prezintă strategii şi soluţii, prin care el are posibilitatea să-şi conceapă şi să îşi adapteze "oferta", ţinând cu adevărat cont de calităţile, capacităţile, disponibilităţile şi interesele populaţiei ţintă; adică propunându-le celor cu TSA "lecţii" care să le stimuleze colaborarea, într-un context (ambient) favorabil şi folosindu-se de tehnologiile asistive cele mai adecvate. Spunem asta, deoarece cartea conţine informaţie din belşug despre, dar şi exemple de utilizare a unor instrumente şi metode, cum ar fi scenariile, modelarea video, povestirile sociale şi o bogată varietate de alte activităţi, din care profesorul nu are decât să selecteze tot ce simte, bănuieşte, ştie deja (sau vrea să încerce) că îi poate ajuta efectiv pe elevii cărora li se adresează, să-şi dezvolte şi să exerseze abilităţile sociale şi motorii. Abilităţi şi comportamente la care altfel, fără un program bine întocmit, nu ar avea cum să acceadă.

Numărul de pagini destul de redus, arată că editorul şi cei 6 colaboratori ai săi au reţinut în lucrare numai ce este esenţial şi strict necesar profesorului de educaţie fizică, nelansându-se în dezvoltări teoretice şi medico-psihologice complicate, care nu ar fi făcut altceva decât să încarce şi să complice inutil acest instrument şi îndrumar, dedicat unor practicieni prin definiţie. Avem drept urmare doar 8 capitole, distribuite în două părţi: 6 capitole în prima: "Elaborarea procesului de instrucţie al elevilor cu TSA", iar restul constituind substanţa celei de-a doua, intitulată "Jocuri şi activităţi individuale şi pentru grupuri mici".

Titlurile celor 8 capitole sunt, în ordine: 1. Înţelegându-i pe (empatizând cu) elevii cu TSA, 2. TSA din perspectiva familiei copilului, 3. Conceperea curiculei în virtutea aşa-numitului "spectru al incluziunii" (prin spectru al incluziunii înţelegând, reamintim: „o abordare centrată pe activităţi care au drept obiectiv incluziunea persoanelor cu dizabilităţi, în activităţile fizice şi sportive"; vezi http://www.playbytherules.net.au/assets/media/interactive/Inclusion_Spectrum.pdf), 4. Strategii proactive de incluziune, 5. Reducerea stresului pentru optimizarea învăţării, 6. Evaluarea şi procesul de educaţie individualizată (Individualized Education Program – IEP; detalii aici: https://en.wikipedia.org/wiki/Individualized_Education_Program), 7. Jocuri şi activităţi individuale, 8. Activităţi şi jocuri în grup.

Conform unuibun obicei, semnalat şi cu alte ocazii, editura Human Kinetics dă posibilitatea celor interesaţi de a afla mai multe despre carte şi stilul ei, să lectureze liber o serie de texte din conţinutul său. Link-urile de acces la acestea sunt: http://www.humankinetics.com/excerpts/excerpts/learn-3-of-the-5-activity-categories-that-comprise-the-inclusion-spectrum, http://www.humankinetics.com/excerpts/excerpts/general-recommendations-and-strategies-to-better-communicate, respectiv, http://www.humankinetics.com/excerpts/excerpts/learn-to-play-a-game-of-tag-with-verbal-cues.

Deşi ar mai fi şi alte lucruri de spus, considerăm că în cele de mai sus le-am oferit potenţialilor cumpărători destule argumente pentru a trece la fapte. În mod normal, aceşti potenţiali cumpărători pot proveni din următoarele categorii de specialişti: profesorii de EFS, practicienii educaţiei fizice adaptate şi terapeuţii prin activităţi recreative. Dar, ideal ar fi ca lor să li se adauge şi părinţi, deoarece, motivaţi atât de puternic cum numai ei pot fi, aceştia au mari şanse să se dovedească deosebit de eficienţi în, şi prin administrarea zilnică a acelor deloc puţine mijloace terapeutice accesibile şi nespecialiştilor; pe care le pot găsi/identifica, selecta şi aplica relativ uşor, parcurgând cu atenţie paginile cărţii.

**Preluăm şi noi termenul folosit de „Asociaţia Autism Romania" - şi, după cum se vede, utilizat în limbajul internaţional de specialitate -, pe de o parte deoarece el are o notă mai puţin peiorativă decât cel de autism/autist, iar pe de altă parte pentru că, într-adevăr, pe lângă autismul propriu-zis (clasic), sfera autismului cuprinde şi alte tulburări: sindromul Rett, tulburarea dezintegrativă a copilăriei, sindromul Asperger, tulburările globale de dezvoltare-nespecificate altfel (vezi site-ul: http://www.autismromania.ro/site/SprijinSfaturiIdei/ceEsteAutismul/)*

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EVENTS
EVENIMENTE

The right to health of the child and the marketing of unhealthy food

Dreptul la sănătate al copilului și introducerea pe piață a produselor alimentare nesănătoase

At the University of Oslo, an international seminar on "The right to health of the child and the marketing of unhealthy food. What role for the Committee on the Rights of the Child in monitoring and promoting state protection?" was organized in August. The organizer of this event was the research group named LEVE - Research and action group on Food, Corporations and Human Rights (FoHRC). This group was established based on a collaboration between the Faculties of Medicine, Law, Social Sciences and the Center for Development and Environment of the University of Oslo. The seminar took place on 27 August 2015, at the Norwegian Center for Human Rights, University of Oslo. The participants were mostly from Norway, from the Faculties of Medicine and Law, Master students, researchers in public health, nutrition or human rights, a representative of the World Health Organization, but also from other countries such as Ireland, Denmark, Tanzania, Romania.

In the opening of the symposium, the activity of the organizer - LEVE Research and action group on Food, Corporations and Human Rights (FoHRC) was presented in brief.

The topics presented included the following aspects:

- Food quality and human rights to a healthy diet
- The issue of obesity in children. Prof. Nanna Lien, from the Department of Nutrition, Faculty of Medicine, University of Oslo, delivered a presentation on "Focus on the world-wide escalation of childhood obesity – what's the problem?"
- The right to food and food quality in terms of human rights. Prof. Kirsten Sandberg, from the Department of Public and International Law, Faculty of Law, University of Oslo, delivered a presentation entitled "The role of the Committee on the Rights of the Child in monitoring and promoting states parties' obligations under the Convention on the Rights of the Child, with particular reference to its General Comment No. 16 on the impact of the business sector on children's rights".

At the end of the presentations, there was a debate session about all the topics presented during the seminar, highlighting the necessity to educate people to apply healthy principles in choosing food and adopting a healthy lifestyle for their own children. It is very important for children to learn from the youngest ages about healthy eating habits and healthy lifestyles, including physical activity. Another important issue was the children's rights to have healthy food, in accordance with their quantitative and qualitative needs. Therefore, health promotion policies should be based on laws adopted by each country, requiring producers to target their production on foods preserving as many nutritional qualities as possible, without being affected by the use of chemical food additives. The negative impact of the media in promoting unhealthy foods, as well as its very important role in educating people and particularly children for promoting a healthy lifestyle, were highlighted.

The participation in this seminar was supported by the project „Promoting healthy diets for children", financed by the Fund for Bilateral Relations of Programme RO01 - *Technical Assistance and Bilateral Fund at National Level*, as part of EEA and Norway 2009-2014 grants. This fund finances individual or partnership, collaborative projects/ actions, exchange programmes, transfer of knowledge and best practices between the beneficiary, including Romania, and the entities of the donor countries: Iceland, Liechtenstein and Norway.

* * *

În cadrul Universității din Oslo s-a organizat, în luna august, un seminar internațional cu titlul „Dreptul la sănătate al copilului și introducerea pe piață a produselor alimentare nesănătoase. Ce rol are Comitetul pentru Drepturile Copilului în monitorizarea și promovarea protecției de stat?" Organizatorul acestui eveniment a fost grupul de cercetare LEVE - Alimente, Corporații și Drepturile Omului (FoHRC), grup care a fost înființat pe baza unei colaborări de tip inter-facultăți la care au

aderat Facultătile de Medicină, Facultăţile de Drept, de Ştiinţe Sociale şi Centrul pentru Dezvoltare şi Mediu din cadrul Universităţii din Oslo. Seminarul s-a desfăşurat în data de 27 august 2015, la Universitatea din Oslo, în sediul „Centrului Norvegian pentru Drepturile Omului". Participanţii la seminar au fost majoritatea din Norvegia, din cadrul Facultăţilor de Medicină, Facultăţilor de Drept, masteranzi, cercetători din domeniul Sănătaţii publice, Nutriţiei, Drepturilor Omului, un reprezentant al Organizaţiei Mondiale a Sănătăţii, dar şi participanţi din alte ţări: Irlanda, Danemarca, Tanzania, România.

În deschiderea simpozionului s-a prezentat pe scurt activitatea organizatorului - LEVE Grup de cercetare şi acţiune în domeniul Alimente, Corporaţii şi Drepturile Omului (FoHRC).

Temele prezentate s-au bazat pe următoarele aspecte:

- Calitatea produsele alimentare și drepturile omului la o alimentaţie sănătoasă şi Problematica obezităţii în rândul copiilor. Prof. Nanna Lien, Departamentul de Nutriţie, Facultatea de Medicină, Universitatea din Oslo a prezentat tema: "Focus pe escaladarea la nivel mondial a obezităţii la copii - care este problema?".

- Dreptul la hrană şi calitatea hranei din perspectiva drepturilor omului. Prof. Kirsten Sandberg, Departmentul de Drept Public şi Internaţional, Facultatea de Drept, Universitatea din Oslo a prezentat lucrarea cu titlul „Rolul Comitetului pentru Drepturile Copilului în monitorizarea și obligațiile de promovare a statelor ca părți, în temeiul Convenției cu privire la Drepturile Copilului, în special cu referire la Comentariul General nr. 16 cu privire la impactul sectorului de afaceri în respectarea drepturile copilului"

La finalul expunerilor a existat o sesiune de discuţii pe baza materialelor prezentate în cadrul seminarului, subliniindu-se din ce în ce mai mult nevoia de educaţie a populaţiei astfel încât să poată la rândul ei să aplice în practică principii sănătoase în alegerea hranei şi adoptarea unui stil de viaţă sănătos pentru proprii lor copii. Aceştia trebuie să deprindă de la cea mai mică vârstă obiceiuri alimentare sănătoase şi un stil de viaţă din care să nu lipsească activitatea fizică. Un alt aspect important care s-a discutat a fost cel legat de faptul că şi copiii au dreptul la asigurarea unei hrane sănătoase care să corespundă cantitativ şi calitativ nevoilor lor. Ca urmare politicile de promovare a sănătăţii populaţiei trebuie să ceară producătorilor, prin intermediul unor legi adoptate de fiecare ţară în parte, să îşi orienteze producţia spre produse alimentare care să păstreze cât mai multe din calităţile nutritive, iar acestea să nu fie diminuate prin utilizarea de aditivi alimentari de natură chimică. De asemenea, s-a subliniat impactul negativ al mass mediei, în promovarea unor alimente nesănătoase în cadrul unor spoturi publicitare, dar şi rolul său foarte important în educaţia populaţiei şi, în special, a copiilor în promovarea unui stilul de viaţă sănătos.

Participarea la seminar a fost posibilă datorită proiectului "Promovarea unei alimentăţii sănătoase în rândul copiilor", finanţat de Fondul pentru Relaţii Bilaterale la nivelul Programului RO01 - *Asistență tehnică și Fondul Bilateral la Nivel Național*, în cadrul granturilor EEA şi Norvegia 2009-2014. În cadrul acestui fond se finanțează proiecte/acțiuni, individuale sau în parteneriat, de colaborare, schimb de experiență, transfer de cunoștințe și bune practici între beneficiar, inclusiv România, și entități din Statele Donatoare: Islanda, Principatul Liechtenstein şi regatul Norvegiei.

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Diamond Anniversary of the veteran athletes of ”U” Cluj club (21)
Aniversarea de diamant a atleţilor veterani de la „U” Cluj (21)

This year’s event gathered veteran athletes of several generations. It is known that the 1955 generation was the richest in champions of the ”U” Club, 11 in total. The 60th anniversary meeting was particularly festive. The former athletes of the past years, currently at a venerable age, reunited to set an example for the young. Among them: Aurel Palade Ursu, Alexandra Taifas-Sicoe, Dora Copândean, Emma Konrad-Jenei, Grigore Cojocaru, Mircea Pop, Ilarie Măgdaş, Mircea Alexei, Dumitru Oltean. In addition to the above mentioned, former athletes of the younger generations were present, such as Eva Zörgö, Karoly Ráduly, Tuka Ladislau, Vasile Sărucan, Agepsina Rusu, Draga Comşa, Maria Marta, Iulia Popa, Vali Bogdan, Ioana Ciupei-Dobrău and many others.

The greeting speech from the part of the ”Babeş Bolyai” University was given by the Prorector, Prof. Dr. Călin Rus, and the Pro-Dean of FEFS, Prof. Dr. Leon Gomboş. Of particular assistance in the organization of the event was the ”U” Club through its President, Ovidiu Vasu. An artistic program in the honor of the participants was performed by the mezzo-soprano Lavinia Bocu.

* * *

Sub acest generic s-au adunat anul acesta atleţii veterani din mai multe generaţii. Este cunoscut faptul că cea mai bună recoltă de campioni a Clubului U, 11 la număr, a fost cea a generaţiei din anul 1955. Acum, la împlinirea a 60 de ani, întâlnirea a avut un fast deosebit. Aceiaşi foşti atleţi din anii trecuţi, astăzi cu vârste venerabile, s-au întâlnit din nou, pentru a da un exemplu celor mai tineri. Printre aceştia: Aurel Palade Ursu, Alexandra Taifas-Sicoe, Dora Copândean, Emma Konrad-Jenei, Grigore Cojocaru, Mircea Pop, Ilarie Măgdaş, Mircea Alexei, Dumitru Oltean. Pe lângă cei amintiţi, au fost prezenţi şi foşti atleţi din generaţiile mai tinere, precum Eva Zörgö, Karoly Ráduly, Tuka Ladislau, Vasile Sărucan, Agepsina Rusu, Draga Comşa, Maria Marta, Iulia Popa, Vali Bogdan, Ioana Ciupei-Dobrău şi mulţi alţii.

Cuvântul de salut din partea Universităţii „Babeş Bolyai” a fost adresat de Prorectorul Prof. Dr. Călin Rus şi Prodecanul FEFS, Prof. Dr. Leon Gomboş. Un sprijin deosebit în organizarea evenimentului a fost acordat de Clubul „U”, respectiv de preşedintele său, Ovidiu Vasu. Programul artistic dedicat participanţilor a fost susţinut de mezzosoprana Lavinia Bocu.

Traian Bocu
traian_bocu@yahoo.com

Traditional picture at 10 am. First to the left - Mircea Pop, first to the right - Aurel Palade Ursu, in the middle - Alexandra Sicoe.

The promoter of the event, veteran Aurel Palade Ursu.

„Veteran" Eva Zörgö-Raduly, together with her colleagues Draga Comşa, Cruciţa Călugăr, Agepsina Rusu, Mioara Bodea.

Two generations: Dora Copândean-Dumitrescu and Maria Marta.

Friendly discussions and browsing of newspapers and of the Palestrica of the Third Millennium journal, before the artistic program offered to the veterans. In the foreground, from the left: Agepsina Rusu, Eva Zörgö-Raduly, Traian Sudrigean, Mircea Pop.

Moment during the official opening by the Prorector of UBB, Prof. Dr. Călin Rus. To the left - Prof. Dr. Mircea Alexei, to the right - Prof. Dr. Leon Gomboş.

Poster of the event, work of Prof. Dr. Cristian Cheşuţ.

Artistic moment offered by the mezzo-soprano Lavinia Bocu..

FOR THE ATTENTION OF CONTRIBUTORS

The subject of the Journal

The journal has a multidisciplinary nature oriented toward biomedical, health, exercise, social sciences fields, applicable in activities of physical training and sport, so that the dealt subjects and the authors belong to several disciplines in these fields. The main rubrics are: "Original studies" and "Reviews".

Regarding "Reviews" the main subjects that are presented are: oxidative stress in physical effort; mental training; psychoneuroendocrinology of sport effort; physical culture in the practice of the family doctor; extreme sports and risks; emotional determinatives of performance; the recovery of patients with spinal column disorders; stress syndromes and psychosomatics; olympic education, legal aspects of sport; physical effort in the elderly; psychomotricity disorders; high altitude sportive training; fitness; biomechanics of movements; EUROFIT tests and other evaluation methods of physical effort; adverse reactions of physical effort; sport endocrinology; depression in sportsmen/women; classical and genetic drug usage; Olympic Games etc.

Among articles devoted to original studies and researches we are particularly interested in the following: the methodology in physical education and sport; influence of some ions on effort capacity; psychological profiles of students regarding physical education; methodology in sport gymnastics; the selection of performance sportsmen.

Other articles approach particular subjects regarding different sports: swimming, rhythmic and artistic gymnastics, handball, volleyball, basketball, athletics, ski, football, field and table tennis, wrestling, sumo.

The authors of the two rubrics are doctors, professors and educators, from universities and preuniversity education, trainers, scientific researchers etc.

Other rubrics of the journal are: the editorial, editorial news, reviews of the latest books in the field and others that are presented rarely (inventions and innovations, universitaria, preuniversitaria, forum, memories, competition calendar, portraits, scientific events).

We highlight the rubric "The memory of the photographic eye", where photos, some very rare, of sportsmen in the past and present are presented.

Articles signed by authors from the Republic of Moldova regarding the organization of sport education, variability of the cardiac rhythm, the stages of effort adaptability and articles by some authors from France, Portugal, Canada must also be mentioned.

The main objective of the journal is highlighting the results of research activities as well as the permanent and actual dissemination of information for specialists in the field. The journal assumes an important role regarding the achievement of necessary scores of the teaching staff in the university and preuniversity education as well as of doctors in the medical network (by recognizing the journal by the Romanian College of Physicians), regarding didactic and professional promotion.

Another merit of the journal is the obligatory publication of the table of contents and an English summary for all articles. Frequently articles are published in extenso in a language with international circulation (English, French).

The journal is published quarterly and the works are accepted for publication in the Romanian and English language. The journal is sent by e-mail or on a floppy disk (or CD-ROM) and printed, by mail at the address of the editorial staff. The works of contributors that are resident abroad and of Romanian authors must be mailed to the Editorial staff at the following address:

„Palestrica of the third millennium – Civilization and sport"
Chief Editor: Prof. dr. Traian Bocu
Contact address: palestrica@gmail.com or traian_bocu@yahoo.com
Mail address: Clinicilor street no. 1 postal code 400006, Cluj-Napoca, România
Telephone:0264-598575
Website: www.pm3.ro

Objectives

Our intention is that the journal continues to be a route to highlight the research results of its contributors, especially by stimulating their participation in project competitions. Articles that are published in this journal are considered as part of the process of promotion in one's university career (accreditation that is obtained after consultation with the National Council for Attestation of Universitary Titles and Diplomas).

We also intend to encourage the publication of studies and research, that include original relevant elements especially from young people. All articles must bring a minimum of personal contribution (theoretical or practical), that will be highlighted in the article.

In the future we propose to accomplish criteria that would allow the promotion of the journal to superior levels according international recognition.

THE STRUCTURE AND SUBMISSION OF ARTICLES

The manuscript must be prepared according to the stipulations of the International Committee of Medical Journal Editors (http://www.icmjee.org).

The number of words for the electronic format:

– 4000 words for original articles;

– 2000 words for case studies;
– 5000-6000 words for review articles.

Format of the page: edited in WORD format, A4. Printed pages of the article will be numbered successively from 1 to the final page.

Font: Times New Roman, size 11 pt.; it should be edited on a full page, with diacritical marks, double spaced, respecting equal margins of 2 cm.

Illustrations:

The images (graphics, photos etc.) should be numbered consecutively in the text, with arabic numbers. They should be edited with EXCEL or SPSS programs, and sent as distinct files: „figure 1.tif", „figure 2. jpg", and at the editors demanding in original also. Every graphic should have a legend, written **under** the image.

The tables should be numbered consecutively in the text, with roman numbers, and sent as distinct files, accompanied by a legend that will be put **above** the table.

PREPARATION OF THE ARTICLES

1. Title page: – includes the title of article (maximum 45 characters), the name of authors followed by surname, work place, mail address of the institute and mail adress and e-mail address of the first author. It will follow the name of article in the English language.

2. Summary: For original articles a summary structured like this is necessary: (Premize-Background, Obiective-Aims, Metode-Methods, Resultate-Results, Concluzii-Conclusions), in the Romanian language, of maximum 250 words, followed by 3-8 key words (if its possible from the list of established terms). All articles will have a summary in the English language. Within the summary (abstract) abbreviations, footnotes or bibliographic references should not be used.

Premises and objectives. Description of the importance of the study and explanation of premises and research objectives.

Methods. Include the following aspects of the study:

Description of the basic category of the study: of orientation and applicative.

Localization and the period of study. Description and size of groups, sex (gender), age and other socio-demographic variables should be given.

Methods and instruments of investigation that are used.

Results. The descriptive and inferential statistical data (with specification of the used statistical tests): the differences between the initial and the final measurement, for the investigated parameters, the significance of correlation coefficients are necessary. The specification of the level of significance (the value ***p*** or the dimension of effect ***d***) and the type of the used statistical test etc are obligatory.

Conclusions. Conclusions that have a direct link with the presented study should be given.

Orientation articles and case studies should have an unstructured summary (without respecting the structure of experimental articles) to a limit of 150 words.

3. Text

Original articles should include the following chapters which will not be identical with the summary titles: Introduction (General considerations), Hypothesis, Materials and methods (including ethical and statistical informations), Results, Discussing results, Conclusions and suggestions. Other type of articles, as orientation articles, case studies, Editorials, do not have an obligatory format. Excessive abbreviations are not recommended. The first abbreviation in the text is represented first *in extenso*, having its abbreviation in parenthesis, and thereafter the short form should be used.

Authors must undertake the responsibility for the correctness of published materials.

4. Bibliography

The bibliography should include the following data:

For articles from journals or other periodical publications the international Vancouver Reference Style should be used: the name of all authors as initials and the surname, the year of publication, the title of the article in its original language, the title of the journal in its international abbreviation (italic characters), number of volume, pages.

Articles: Pop M, Albu VR, Vişan D et al. Probleme de pedagogie în sport. Educaţie Fizică şi Sport 2000; 25(4):2-8.

Books: Drăgan I (coord.). Medicina sportivă, Editura Medicală, 2002, Bucureşti, 2002, 272-275.

Chapters from books: Hăulică I, Bălţatu O. Fiziologia senescenţei. In: Hăulică I. (sub red.) Fiziologia umană, Ed. Medicală, Bucureşti, 1996, 931-947.

Starting with issue 4/2010, every article should include a minimum of 15 bibliographic references and a maximum of 100, mostly journals articles published in the last 10 years. Only a limited number of references (1-3) older than 10 years will be allowed. At least 20% of the cited resources should be from recent international literature (not older than 10 years).

Peer-review process

In the final stage all materials will be closely reviewed by at least two competent referees in the field (Professors, and Docent doctors) so as to correspond in content and form with the requirements of an international journal. After this stage, the materials will be sent to the journal's referees, according to their profiles. After receiving the observations from the referees, the editorial staff shall inform the authors of necessary corrections and the publishing requirements of the journal. This process (from receiving the article to transmitting the observations) should last about 4 weeks. The author will be informed if the article was accepted for publication or not. If it is accepted, the period of correction by the author will follow in order to correspond to the publishing requirements.

Conflict of interest

The authors must mention all possible conflicts of interest including financial and other types. If you are sure that there is no conflict of interest we ask you to mention this. The financing sources should be mentioned in your work too.

Specifications

The specifications must be made only linked to the people outside the study but which have had a substantial contribution, such as some statistical processing or review of the text in the English language. The authors have the responsibility to obtain the written permission from the mentioned persons with the name written within the respective chapter, in case the readers refer to the interpretation of results and conclusions of these persons. Also it should be specified if the article uses some partial results from certain projects or if these are based on master or doctoral theses sustained by the author.

Ethical criteria

The Editors will notify authors in due time, whether their article is accepted or not or whether there is a need to modify texts. Also the Editors reserve the right to edit articles accordingly. Papers that have been printed or sent for publication to other journals will not be accepted. All authors should send a separate letter containing a written statement proposing the article for submission, pledging to observe the ethics of citation of sources used (bibliographic references, figures, tables, questionnaires).

For original papers, according to the requirements of the Helsinki Declaration, the Amsterdam Protocol, Directive 86/609/EEC, and the regulations of the Bioethical Committees from the locations where the studies were performed, the authors must provide the following:

- the informed consent of the family, for studies in children and juniors;
- the informed consent of adult subjects, patients and athletes, for their participation;
- malpractice insurance certificate for doctors, for studies in human subjects;
- certificate from the Bioethical Committees, for human study protocols;
- certificate from the Bioethical Committees, for animal study protocols.

The data will be mentioned in the paper, in the section Materials and Methods. The documents will be obtained before the beginning of the study. Will be mentioned also the registration number of the certificate from the Bioethical Committees.

Editorial submissions will be not returned to authors, whether published or not.

FOR THE ATTENTION OF THE SPONSORS

Requests for advertising space should be sent to the Editors of the "Palestrica of the Third Millennium" journal, 1, Clinicilor St., 400006, Cluj-Napoca, Romania. The price of an A4 full colour page of advertising for 2012 will be EUR 250 and EUR 800 for an advert in all 4 issues. The costs of publication of a logo on the cover will be determined according to its size. Payment should be made to the Romanian Medical Society of Physical Education and Sports, CIF 26198743. Banca Transilvania, Cluj branch, IBAN: RO32 BTRL 0130 1205 S623 12XX (RON).

SUBSCRIPTION COSTS

The "Palestrica of the Third Millennium" journal is printed quarterly. The subscription price is 100 EUR for institutions abroad and 50 EUR for individual subscribers outside Romania. For Romanian institutions, the subscription price is 120 RON, and for individual subscribers the price is 100 RON. Note that distribution fees are included in the postal costs.

Payment of subscriptions should be made by bank transfer to the Romanian Medical Society of Physical Education and Sports, CIF 26198743. Banca Transilvania, Cluj branch, IBAN: RO32 BTRL 0130 1205 S623 12XX (RON), RO07 BTRL 01,304,205 S623 12XX (EUR), RO56 BTRL 01,302,205 S623 12XX (USD). SWIFT: BTRLRO 22

Please note that in 2010 a tax for each article submitted was introduced. Consequently, all authors of articles will pay the sum of 150 RON to the Romanian Medical Society of Physical Education and Sport published above. Authors who have paid the subscription fee will be exempt from this tax. Other information can be obtained online at www.pm3.ro "Instructions for Authors", at our e-mail address palestrica@gmail.com or at the postal address: 1, Clinicilor St., 400006, Cluj-Napoca, Romania, phone: +40264-598575.

INDEXING

Title of the journal: Palestrica of the third millennium – Civilization and sport

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Editor: "Iuliu Haţieganu" University of Medicine and Pharmacy of Cluj-Napoca and The Romanian Medical Society of Physical Education and Sports in collaboration with the Cluj County School Inspectorate

The level and attestation of the journal: a journal rated B+ by CNCSIS in the period 2007-2011 and certified by CMR since 2003

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Vol. 16, no. 3, Iulie-Septembrie 2015, 290–292

ÎN ATENŢIA COLABORATORILOR

Tematica revistei

Ca tematică, revista are un caracter multidisciplinar orientat pe domeniile biomedical, sănătate, efort fizic, ştiinţe sociale, aplicate la activităţile de educaţie fizică şi sport, astfel încât subiectele tratate şi autorii aparţin mai multor specialităţi din aceste domenii. Principalele rubrici sunt: „Articole originale" şi „Articole de sinteză".

Exemplificăm rubrica „Articole de sinteză" prin temele importante expuse: stresul oxidativ în efortul fizic; antrenamentul mintal; psihoneuroendocrinologia efortului sportiv; cultura fizică în practica medicului de familie; sporturi extreme şi riscuri; determinanţi emoţionali ai performanţei; recuperarea pacienţilor cu suferinţe ale coloanei vertebrale; sindroame de stres şi psihosomatică; educaţia olimpică, aspecte juridice ale sportului; efortul fizic la vârstnici; tulburări ale psihomotricităţii; pregătirea sportivă la altitudine; fitness; biomecanica mişcărilor; testele EUROFIT şi alte metode de evaluare a efortului fizic; reacţii adverse ale eforturilor; endocrinologie sportivă; depresia la sportivi; dopajul clasic şi genetic; Jocurile Olimpice etc.

Dintre articolele consacrate studiilor şi cercetărilor experimentale notăm pe cele care vizează: metodica educaţiei fizice şi sportului; influenţa unor ioni asupra capacităţii de efort; profilul psihologic al studentului la educaţie fizică; metodica în gimnastica sportivă; selecţia sportivilor de performanţă.

Alte articole tratează teme particulare vizând diferite sporturi: înotul, gimnastica ritmică şi artistică, handbalul, voleiul, baschetul, atletismul, schiul, fotbalul, tenisul de masă şi câmp, luptele libere, sumo.

Autorii celor două rubrici de mai sus sunt medici, profesori şi educatori din învăţământul universitar şi preuniversitar, antrenori, cercetători ştiinţifici etc.

Alte rubrici ale revistei sunt: editorialul, actualităţile editoriale, recenziile unor cărţi - ultimele publicate în domeniu, la care se adaugă şi altele prezentate mai rar (invenţii şi inovaţii, universitaria, preuniversitaria, forum, remember, calendar competiţional, portrete, evenimente ştiinţifice).

Subliniem rubrica "Memoria ochiului fotografic", unde se prezintă fotografii, unele foarte rare, ale sportivilor din trecut şi prezent.

De menţionat articolele semnate de autori din Republica Moldova privind organizarea învăţământului sportiv, variabilitatea ritmului cardiac, etapele adaptării la efort, articole ale unor autori din Franţa, Portugalia, Canada.

Scopul principal al revistei îl constituie valorificarea rezultatelor activităţilor de cercetare precum şi informarea permanentă şi actuală a specialiştilor din domeniile amintite. Revista îşi asumă şi un rol important în îndeplinirea punctajelor necesare cadrelor didactice din învăţământul universitar şi preuniversitar precum şi medicilor din reţeaua medicală (prin recunoaşterea revistei de către Colegiul Medicilor din România), în avansarea didactică şi profesională.

Un alt merit al revistei este publicarea obligatorie a cuprinsului şi a câte unui rezumat în limba engleză, pentru toate articolele. Frecvent sunt publicate articole în extenso într-o limbă de circulaţie internaţională (engleză, franceză).

Revista este publicată trimestrial iar lucrările sunt acceptate pentru publicare în limba română şi engleză. Articolele vor fi redactate în format WORD (nu se acceptă articole în format PDF). Expedierea se face prin e-mail sau pe dischetă (sau CD-ROM) şi listate, prin poştă pe adresa redacţiei. Lucrările colaboratorilor rezidenţi în străinătate şi ale autorilor români trebuie expediate pe adresa redacţiei:

Revista «Palestrica Mileniului III»
Redactor şef: Prof. dr. Traian Bocu
Adresa de contact: palestrica@gmail.com sau traian_bocu@yahoo.com
Adresa poştală: Str. Clinicilor nr.1 cod 400006, Cluj-Napoca, România
Telefon:0264-598575
Website: www.pm3.ro

Obiective

Ne propunem ca revista să continue a fi o formă de valorificare a rezultatelor activităţii de cercetare a colaboratorilor săi, în special prin stimularea participării acestora la competiţii de proiecte. Menţionăm că articolele publicate în cadrul revistei sunt luate în considerare în procesul de promovare în cariera universitară (acreditare obţinută în urma consultării Consiliului Naţional de Atestare a Titlurilor şi Diplomelor Universitare).

Ne propunem de asemenea să încurajăm publicarea de studii şi cercetări, care să cuprindă elemente originale relevante mai ales de către tineri. Toate articolele vor trebui să aducă un minimum de contribuţie personală (teoretică sau practică), care să fie evidenţiată în cadrul articolului.

În perspectivă ne propunem îndeplinirea criteriilor care să permită promovarea revistei la niveluri superioare cu recunoaştere internaţională.

STRUCTURA ŞI TRIMITEREA ARTICOLELOR

Manuscrisul trebuie pregătit în acord cu prevederile Comitetului Internaţional al Editurilor Revistelor Medicale (http://www.icmjee.org).

Numărul cuvintelor pentru formatul electronic:

– 4000 cuvinte pentru articolele originale,
– 2000 de cuvinte pentru studiile de caz,
– 5000–6000 cuvinte pentru articolele de sinteză.

Format pagină: redactarea va fi realizată în format A4. Paginile listate ale articolului vor fi numerotate succesiv de la 1 până la pagina finală.

Font: Times New Roman, mărime 11 pt.; redactarea se va face pe pagina întreagă, cu diacritice, la două rânduri, respectând margini egale de 2 cm pe toate laturile.

Ilustraţiile:

Figurile (grafice, fotografii etc.) vor fi numerotate consecutiv în text, cu cifre arabe. Vor fi editate cu programul EXCEL sau SPSS, şi vor fi trimise ca fişiere separate: „figura 1.tif", „figura 2. jpg", iar la solicitarea redacţiei şi în original. Fiecare grafic va avea o legendă care se trece **sub** figura respectivă.

Tabelele vor fi numerotate consecutiv în text, cu cifre romane, şi vor fi trimise ca fişiere separate, însoţite de o legendă ce se plasează **deasupra** tabelului.

PREGĂTIREA ARTICOLELOR

1. Pagina de titlu: – cuprinde titlul articolului (maxim 45 caractere), numele autorilor urmat de prenume, locul de muncă, adresa postală a instituţiei, adresa poştală şi adresa e-mail a primului autor. Va fi urmat de titlul articolului în limba engleză.

2. Rezumatul: Pentru articolele experimentale este necesar un rezumat structurat (Premize-Background, Obiective-Aims, Metode-Methods, Rezultate-Results, Concluzii-Conclusions), în limba română, de maxim 250 cuvinte (20 de rânduri, font Times New Roman, font size 11), urmat de 3–5 cuvinte cheie (dacă este posibil din lista de termeni consacraţi). Toate articolele vor avea un rezumat în limba engleză. Nu se vor folosi prescurtări, note de subsol sau referinţe.

Premize şi obiective: descrierea importanţei studiului şi precizarea premizelor şi obiectivelor cercetării.

Metodele: includ următoarele aspecte ale studiului:

Descrierea categoriei de bază a studiului: de orientare sau aplicativ.

Localizarea şi perioada de desfăşurare a studiului. Colaboratorii vor prezenta descrierea şi mărimea loturilor, sexul (genul), vârsta şi alte variabile socio-demografice.

Metodele şi instrumentele de investigaţie folosite.

Rezultatele vor prezenta datele statistice descriptive şi inferenţiale obţinute (cu precizarea testelor statistice folosite): diferenţele dintre măsurătoarea iniţială şi cea finală, pentru parametri investigaţi, semnificaţia coeficienţilor de corelaţie. Este obligatorie precizarea nivelului de semnificaţie (valoarea ***p*** sau mărimea efectului ***d***) şi a testului statistic folosit etc.

Concluziile care au directă legătură cu studiul prezentat.

Articolele de orientare şi studiile de caz vor avea un rezumat nestructurat (fără a respecta structura articolelor experimentale) în limita a 150 cuvinte (maxim 12 rânduri, font Times New Roman, font size 11).

3. Textul

Articolele experimentale vor cuprinde următoarele capitole: Introducere, Ipoteză, Materiale şi Metode (inclusiv informaţiile etice şi statistice), Rezultate, Discutarea rezultatelor, Concluzii (şi propuneri). Celelalte tipuri de articole, cum ar fi articolele de orientare, studiile de caz, editorialele, nu au un format impus.

Răspunderea pentru corectitudinea materialelor publicate revine în întregime autorilor.

4. Bibliografia

Bibliografia va cuprinde:

Pentru articole din reviste sau alte periodice se va menţiona: numele tuturor autorilor şi iniţialele prenumelui, anul apariţiei, titlul articolului în limba originală, titlul revistei în prescurtare internaţională (caractere italice), numărul volumului, paginile

Articole: Pop M, Albu VR, Vişan D et al. Probleme de pedagogie în sport. Educaţia Fizică şi Sportul 2000; 25(4):2-8.

Cărţi: Drăgan I (coord.). Medicina sportivă aplicată. Ed. Editis, Bucureşti 1994, 372-375.

Capitole din cărţi: Hăulică I, Bălţatu O. Fiziologia senescenţei. În: Hăulică I. (sub red.) Fiziologia umană. Ed. Medicală, Bucureşti 1996, 931-947.

Începând cu revista 4/2010, fiecare articol va trebui să se bazeze pe un minimum de 15 şi un maximum de 100 referinţe bibliografice, în majoritate articole nu mai vechi de 10 ani. Sunt admise un număr limitat de cărţi şi articole de referinţă (1-3), cu o vechime mai mare de 10 ani. Un procent de 20% din referinţele bibliografice citate trebuie să menţioneze literatură străină studiată, cu respectarea criteriului actualităţii acesteia (nu mai vechi de 10 ani).

Procesul de recenzare (peer-review)

Într-o primă etapă toate materialele sunt revizuite riguros de cel puţin doi referenţi competenţi în domeniu respectiv (profesori universitari doctori şi doctori docenţi) pentru ca textele să corespundă ca fond şi formă de prezentare cerinţelor unei reviste serioase. După această etapă materialele sunt expediate referenţilor revistei, în funcţie de profilul materialelor. În urma observaţiilor primite din partea referenţilor, redacţia comunică observaţiile autorilor în vederea corectării acestora şi încadrării în cerinţele de publicare impuse de revistă. Acest proces (de la primirea articolului până la transmiterea observaţiilor) durează aproximativ 4 săptămâni. Cu această ocazie se comunică autorului daca articolul a fost acceptat spre publicare sau nu. În situaţia acceptării, urmează perioada de corectare a articolului de către autor în vederea încadrării în criteriile de publicare.

Conflicte de interese

Se cere autorilor să menţioneze toate posibilele conflicte de interese incluzând relaţiile financiare şi de alte tipuri. Dacă sunteţi siguri că nu există nici un conflict de interese vă rugăm să menţionaţi acest lucru. Sursele de finanţare ar trebui să

fie menţionate în lucrarea dumneavoastră.

Precizări

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- adeverinţă din partea Comisiilor de Etică, pentru protocolul de studiu pe subiecţi umani;
- adeverinţă din partea Comisiilor de Bioetică, pentru protocolul de studiu pe animale.

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