ORIGINAL STUDIES

Histopathological changes in the brain and myocardium of trained animals supplemented with hemp oil

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Abstract

Background. Our previous research regarding the favorable effect of dietary supplementation with hemp (Cannabis sativa) oil on the aerobic capacity of rats led us to study the histological changes induced in tissues under the same conditions.

Aims. We studied the experimental effect of training at different intensities, with or without hemp seed oil supplementation, on the brain and myocardium of rats.

Methods. The research was conducted in four groups (n = 10 animals/group) of adult male Wistar rats, trained at different intensities. Groups I and III included animals supplemented with hemp oil. In all groups we studied the histological changes in the brain and myocardium. Exercise training was conducted for 28 days.

Results. Training with loading induced histological changes of necrosis/apoptosis in the brain and did not cause histological changes in the myocardium during the study.

Conclusions. Post-exercise neuronal changes of necrosis/apoptosis support the experimental hypothesis of brain neurogenesis and plasticity in the central nervous system. Hemp oil supplementation has a reduced neuroprotective effect in trained animals.

Keywords: rats, exercise, brain, heart, hemp oil.

The effects of focused pulsed electromagnetic field therapy in patients with knee osteoarthritis. A randomised, placebo-controlled study

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Abstract

Background. Pulsed electromagnetic field therapy (PEMF) is a promising method for the treatment of knee osteoarthritis. An increasing number of placebo-controlled randomised clinical trials have demonstrated its antalgic and exercise capacity improvement effects in knee osteoarthritis patients. Still, there is no standardisation of the optimal frequency and intensity of the PEMF.

Aims. The aim of the trial was to study the effects of exposure to low frequency (1.5 Hz) medium intensity (30 mT) PEMF in patients with bilateral knee osteorathritis, displaying a Kellgren-Lawrence radiologic score of ≥1 and a pain visual analogue scale of ≥4, despite chronical use of nonsteroidal antiinflammatory and chondroprotective drugs.

Methods. 70 consecutive patients diagnosed with knee osteorthritis were randomly divided into two groups: an active and a placebo group, at a 1:1 ratio. The placebo group was treated with local ultrasound therapy (0.5W/cm^2), local peloidotherapy (Techirghiol mud) and a form of continuous magnetic field similar in intensity to the magnetic field of the Earth for 15 minutes a day. The active group was treated with local ultrasound therapy (0.5W/cm^2), local peloidotherapy and a 1.5 Hz frequency and a 300 Gauss intensity (30 mT) focused pulsed electromagnetic field for 15 minutes a day. The total duration of treatment was 10 days.

Results. 65 of the 70 patients included finished the study (32 in the active group and 33 in the placebo group). At the end of the 10 days of treatment, there was a significant improvement in both groups in the pain visual analogue scale and the Western Ontario and McMaster Universities Osteoarthritis (WOMAC) score, compared to the initial evaluation ($p \leq 0.05$). There was no overall statistically significant difference in the improvement of the two parameters in the active versus the placebo group. However, in a subgroup analysis, after having excluded the advanced knee osteoarthritis patients, with Kellgren-Lawrence scores of 3 and 4, the patients treated with PEMF had superior improvement of the pain visual analogue scale and of the WOMAC score ($p \leq 0.05$).

Conclusions. Ultrasound and peloidotherapy are efficient in reducing pain and the WOMAC score in knee osteoarthritis patients displaying a radiologic Kellgren-Lawrence score of ≥1 and a visual analogue scale for pain of ≥4, who had had an unsatisfactory response to nonsteroidal antiinflammatory and chondroprotective drugs. Low frequency (1.5 Hz) medium intensity (30 mT) PEMF added benefit to these therapies, by significantly reducing pain and the WOMAC score in patients with early and moderate knee osteoarthritis (radiologic Kellgren-Lawrence score of 1 and 2).

Keywords: pulsed electromagnetic field, knee osteoarthritis, exercise.

The motor and emotional behavior of animals exposed to chronic anakinetic stress

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Abstract

Background. Starting from existing studies on the influence of acute anakinetic stress on the motor and emotional behavior of rats, we studied the influence of chronic anakinetic stress on the same indicators.

Aims. The influence of experimental chronic anakinetic stress on aerobic exercise capacity, on spontaneous motility and emotional behavior was studied.

Methods. Groups (n = 10 animals/group): group I – exercise trained animals for 42 days; group II – training (21 days) preceded by anakinetic stress through immobilization (21 days); group III – training (21 days) preceded by anakinetic stress alternating with physical exercise (21 days). Anakinetic stress was induced by the immobilization of the rats for 3 hours/day. In order to determine exercise capacity, the running test was used. The monitored indicators were emotional behavior and motility. The time moments included in the study were T_1, T_{21}, and T_{42}. Statistical calculations were performed using the SPSS 13.0, Statistica 8.0 and Microsoft Excel applications.

Results. Experimental immobilization contributes to the diminution of hyperkinetic stress controlled by exercise, as well as of involuntary motility and emotional behavior. Training determines significant increases in aerobic exercise capacity and significant decreases in the spontaneous motility and emotional behavior score, which might contribute to the improvement of physical performance in athletes.

Conclusions. Anakinetic stress followed by physical exercise has an unfavorable influence on aerobic exercise capacity, it increases the spontaneous motility score and decreases the emotional behavior score. Training preceded by alternating anakinetic and hyperkinetic stress determines significant increases in aerobic exercise capacity, insignificant decreases in the motility score, and significant decreases in the emotional behavior score.

Keywords: anakinetic stress, physical exercise, open field test, rats.

Heart rate and salivary cortisol changes in stress caused by intense short duration exercise in sedentary people

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Abstract

Background. Intense short duration exercise is a type of stress, especially for sedentary individuals.

Aims. The objective of this study was to reveal dynamic changes comparatively, in stress caused by intense short duration exercise, for two parameters, in physically sedentary persons.

Methods. The chosen subjects were selected to meet the requirements of the study. Stress was represented by intense short duration exercise, performed on a Monark Ergomedic 839E cycle ergometer. The parameters analyzed were heart rate and salivary cortisol. Evaluative statistics were based on Student t test.

Results. Heart rate presented the most intense significant increase, immediately in the pre-exercise period. Salivary cortisol increased significantly immediately post-stress compared to the pre-stress time.

Conclusions. 1) Intense short duration athletic stress has, in sedentary persons, an important impact on heart rate and salivary cortisol. 2) There were differences in the dynamic evolution between heart rate and salivary cortisol. 3) Heart rate variations have shown that in this type of stress, emotional changes are anticipatory. 4) Salivary cortisol changes show that changes in oxidative stress induced by analyzed exercise are more intense post-stress. 5) The results obtained are consistent with the latest bibliographic data on stress caused by exercise. 6) The two studied parameters could be considered important markers of stress induced by intense short duration exercise, for sedentary persons.

Keywords: stress, intense short duration exercise, heart rate and salivary cortisol.

Influence of chronic hypobaric hypoxia exposure and lycopene administration on the tissue oxidant/antioxidant balance in physical exercise

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Abstract

Background. The antioxidant effects of lycopene, evidenced in vitro and in vivo under pathological conditions, led us to study in an experimental model of complex combined stress (exposure to moderate hypobaric hypoxia and physical exercise) the changes in the tissue oxidant/antioxidant (O/AO) balance following lycopene supplementation.

Aims. The influence of chronic hypobaric hypoxia exposure and lycopene supplementation on tissue redox homeostasis under physical exercise conditions was studied in the brain, myocardium, lungs and striated muscles.

Methods. The research was performed in 3 groups of white male Wistar rats: group I – control group, sedentary rats under normoxia conditions; group II – animals exposed to hypobaric hypoxia for 42 days (corresponding to the altitude of 2500 m), followed by exercise under normoxia conditions; group III – animals exposed to moderate hypobaric hypoxia for 42 days, followed by lycopene administration and daily exercise. Exposure was simulated in the hypobaric chamber for 42 days, 20 hours a day, at 2500 m. Groups II and III were trained daily for 42 days under normoxia conditions, using the swimming test. Group III received 0.0375 mg/kg body weight lycopene by oral gavage, before exercise, daily. In order to measure the indicators of the oxidant/antioxidant (O/AO) balance, tissue samples were taken from the brain, myocardium, lungs and femoral quadriceps muscle. On day 3, the following were determined: malondialdehyde (MDA), protein carbonyls (PC), glutathione (GSH) and total sulfhydryl (SH) groups.

Results. Our results support the protective effect of lycopene against OS, with a significant PC decrease in the myocardium and lungs and an insignificant PC decrease in the brain and muscles after chronic exposure to hypoxia and exercise. Antioxidant defense shows an insignificant decrease on account of GSH in the brain, myocardium and lungs and a significant decrease on account of the same indicator in the muscles of the group exposed to hypoxia, lycopene supplementation and exercise.

Conclusions. Chronic hypoxia exposure and lycopene supplementation followed by physical exercise for 42 days has protective effects on the O/AO balance at muscular level, with a significant decrease in GSH and induces redox changes with a decrease in PC at myocardial and pulmonary level, and the maintenance of OS on account of a significant increase in MDA in the myocardium.

Keywords: chronic exposure, hypobaric hypoxia, lycopene, oxidant/antioxidant balance, physical exercise.

Making serv action more efficient in female volley-ball through attentional training

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Abstract

Background. The theory of sport, as well as for the sport practice, scientific research leading to success is of particular importance. Research factors that can influence success, as well as the quality of these influences can become basic steps to improve sporting activity.

Aims. The paper aims at highlighting the use of an attention program designed to optimize the serve game action in performance volleyball.

Methods. We have studied two female volleyball teams, close in value, of A2 level in the Northern Series. Experimental group 1 (n = 12), to which a program designed to optimize the serve game action was applied, CSU Oradea LPS, and control group 2 (n = 12) who followed a traditional training program, CNE CSS Baia Mare.

The improvement of the attention capacity was tried by using a number of 12 exercises that are part of a complex technical and tactical training. The quantification of the results was done using SPSS 15.0, mixed ANOVA, Student test, for paired and independent focus groups, and, for assessing serve activities, for practical reasons, the so-called composite index.

Results. The data for assessing serve actions reveal a significant level for the S0 and S3 value only in one experimental group, which supports the proposed program's effectiveness. For attention control group 2, the development falls into to the normal limits for this game action.

Conclusion. The scores achieved in four levels of serve action analyzed indicate that the number of actions that do not cause major difficulties in building attacking actions for the opponent is higher than the actions with a high degree of difficulty. If for the high level game of volleyball, risk acceptance for each high-difficulty action is normal, we cannot say the same about actions in the A2 division investigated.

Keywords: service, precision, attention, volley-ball.

Original aspects regarding the relationship between motor proficiency age and chronological age in primary school students

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Abstract

Background. Knowledge doubled by a clear understanding of the main factors involved in the psychomotor phenomenon (in this case strength and balance), as well as of the relationships established between those factors in relation to the subjects' chronological age.

Aims. Our experiment envisages an analysis of the relationship between motor proficiency age and chronological age of primary school students, based on the information provided by the Bruininks-Oseretsky Test - Second Edition (BOT-2) applied for the first time in Romania.

Methods. Forty subjects were selected to participate in this research experiment (20 boys and 20 girls), 1st up to 4th grade students, coming from urban and rural environments alike. The subjects' evaluation took place from March 20, 2010 until June 4, 2010 and consisted of 14 items of strength and balance subtests provided by the Bruininks-Oseretsky Test. In terms of computer software and specific tools for statistical analysis of the obtained data, the following instruments were used: BOT-2 ASSISTTM, Scoring and Reporting System (integrated software of the Bruininks-Oseretsky Test), MINITAB 15.1 of MINITAB Inc. and MICROSOFT EXCEL 2003.

Results. The tests revealed that with regard to balance, medium motor proficiency age (11 years and 5 months) was higher by 2 years and 2 months than the medium chronological age of the tested subjects (9 years and 3 months), the check of the statistical hypothesis performed by dependent t-test revealed a statistically significant difference of means (p=0,005 is smaller than 0,05). Regarding the strength subtest, the medium motor proficiency age (9 years and 10 months) is higher by 7 months than the chronological age (9 years and 3 months), and in this case the check of the statistical hypothesis performed through the same test, revealed a statistically insignificant difference of means (p=0,178 is higher than 0,05).

Conclusions. The analysis of the results obtained on the tested subjects allows us to confirm the research hypothesis regarding the balance subtest and to accept the null hypothesis for the strength factor. We can conclude as well that the use of the Bruininks-Oseretsky Test sed for the first time in Romania, within an experimental research, represents, besides an original approach, a major opportunity for obtaining valuable data regarding several psychomotor characteristics of primary school students.

Keywords: motor proficiency age, chronological age, evaluation, primary school, strength, balance.

Lactate tolerance training in football increases performance

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Abstract

Background. The football game is a mixed sport in terms of the energy systems' contribution to supporting exercise. Medium lactacidemia specific to football game varies between 8 and 12 mmol/l. A value of the blood lactate concentration above 6 mmol/l influences the exercise capacity.

Aims. This research wishes to argue in favor of the lactate tolerance training resulting in increased anaerobic exercise capacity.

Methods. The experiments lasted 8 weeks and have been performed with the participation of a number of 22 junior football players between the ages of 17 and 18. The 22 subjects were divided equally into two groups, the experiment group and the control group. The subjects of both groups were examined during an initial and a final test, both structured in a way that would simulate a football game specific effort, meaning a high-intensity exercise alternated with active recovery breaks. The experiment consisted of 8 weekly cycles, the first and last being dedicated to the initial and final test respectively, meanwhile cycles 2 to 7 consisted of actual exercise (5 trainings + 1 game). The training of both groups developed simultaneously and was identical, except for Tuesday, when the subjects of the experiment group performed a 30-40 minute set of lactic-anaerobic exercises.

Results. The analysis and interpretation of the results revealed a spectacular increase in performance for the subjects of the experiment group, who performed lactic-anaerobic exercises, amid a lactacidemia with no significant differences between the subjects of the two groups.

Conclusions. Lactate tolerance training enhanced performance and the capacity to tolerate increased blood lactate levels. A player who tolerates increased blood lactate levels performs better.

Keywords: blood lactate, lactate tolerance training, exercise capacity, football game.

The effects of exercise on rat sciatic nerve regeneration

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Abstract

Background. The favorable effect on in vitro cellular growth and development, produced by the reactive species of oxygen and nitrogen and the beneficial antioxidant effect of moderate exercise could stimulate the peripheral nerve regeneration and could have neuroprotective action.

Aims. We intended to study the exercise influence on early phase of neuromotoric functional recovery by measuring the sciatic functional index (SFI) in rats with peripheral nerve lesions.

Methods. The sciatic nerve was acutely injured by crush lesion in Wistar rats, white, male. The control group (n=10) was sedentary; the exercise group (n=10) was subjected to 14 days of swimming exercise training, starting with the 14^{th} day after surgery.

Results. During the early phase of the recovery period, exercise training enhanced functional recovery. The SFI was significantly better in the trained group than in the control group.

Conclusions. 1) Exercise training enhances the return of motoric function in the early phase of recovery from peripheral nerve lesion. 2) The beneficial effects of 14 days of swimming training after crush could persist in the late phase of peripheral nerve recovery. 3) The exercise represents a kinetotherapeutic intervention which must be applied from the early phase of peripheral nerve regeneration, together with other therapeutic interventions.

Keywords: exercise, sciatic nerve, regeneration.

REVIEWS

The protocol scheme for the rehabilitation of the painful dysfunctional syndromes of the wrist-hand-finger complex

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Abstract

Regardless of the pathology of the wrist-hand-finger complex (rheumatologic, orthopedic, traumatic, peripheral neurological diseases) or the therapy required (surgical or pharmacological), the final aim for the patient is independence in the activities of daily living, and social and professional reintegration.

These goals can be reached only with a functional rehabilitation program, with improvement of the quality of life on all levels – physical, functional, psychological, professional and economical.

The authors propose a synthesis regarding the approach of the painful dysfunctional syndromes of the wrist-hand-finger complex, organized in therapeutic protocols easy to understand and to use by all specialists involved in this pathology.

Keywords: wrist-hand-finger complex; painful dysfunctional syndromes; functional rehabilitation; therapeutic protocol.

Architectural adaptation of bone to mechanical loading

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Abstract

The effects of physical exercise on bone resistance have been proved in several studies.

Over the years, numerous investigations that reveal the positive effect of physical activity on bone mineral density have shown that these effects are localized and depend on specific sports activity. Differences in bone mineral density between athletes and sedentary subjects are shown in trabecular areas of the skeleton.

The skeleton strength depends largely on bone mineral density but also on bone architecture at macroscopic and microscopic scale (trabecular bone microarchitecture).

Bone overall geometry can be modified by physical exercise. It appears that mechanical stimuli have a positive effect on longitudinal bone growth. An elongation of bone segments between 1 and 3% was observed in the dominant upper limb of tennis players who began the practice of sport in childhood or adolescence. Cross-sectional studies have shown that mechanical loading improves bone resistance through cortical thickness adaptation.

In animals, an 8% increase in the bone trabeculae of the tibial epiphyses after three weeks of exercise on the treadmill has been demonstrated. Other microarchitecture adaptations have been highlighted by research: increased trabecular bone volume, reduced intratrabecular space, increased trabecular thickness.

Knowledge of the effects of mechanical loading on bone architectural parameters is necessary to optimize the benefits of physical activity on bone strength.

Keywords: mechanical stimuli, bone microarchitecture, physical activity.

Oradea, a city with an old tradition and special results in the Romanian water polo

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Abstract

Along the years, among all team games played in Oradea, the water polo has obtained the best results in the national and international competitions, has promoted numerous athletes in the national Olympic lots for seniors and juniors.

Nevertheless, the evolution of this discipline has never presented a special interest for those who have studied the history of sport in Oradea. Taking all this into account, we have considered that such a paper to be topical and that it would be useful to those interested in the history of sport in Oradea, and especially in the evolution of the polo in our city.

During the process of documentation we have studied encyclopedic works, monographs of the Romanian polo, articles from local and central newspapers, documents from the leadership forum of the polo in our country, as well as from the polo clubs from Oradea. For better information we have studied a rich iconographic material, we have talked to players, coaches, leaders and other persons who possessed documentary material concerning our theme.

This paper approaches aspects from the beginnings of the water polo in Oradea, its evolution, the most important results obtained by our teams during the national and international competitions, their contribution in the forming of the Olympic teams for seniors and juniors. We also present players, coaches and leaders who had a significant recognition locally and nationally.

Keywords: history of sport, water polo, Oradea.