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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 ($p = 0.05$).

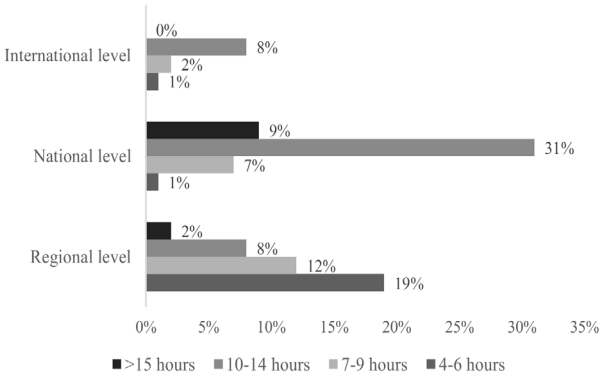

Fig. 1 – The number of hours spent in training per week.

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).

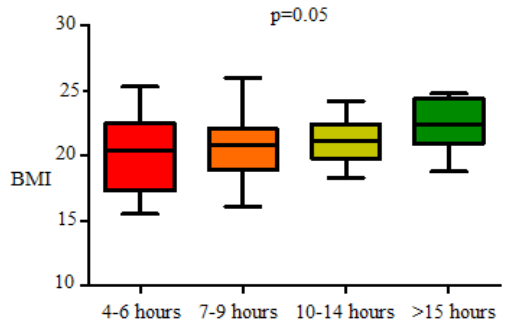

Fig. 2 – The relationships between BMI and the number of hours spent in training (NS).

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).

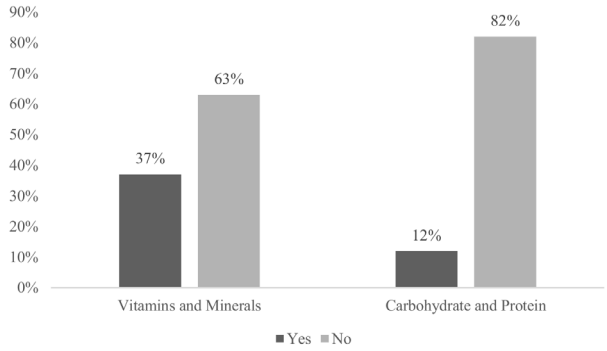

Fig. 3 – Consumption of food supplements.

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.

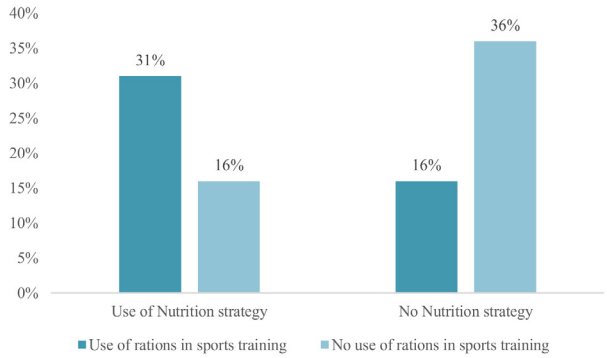

Fig. 4 – The use of food rations in direct relationship with the use of food strategies ($p = 0.001$).

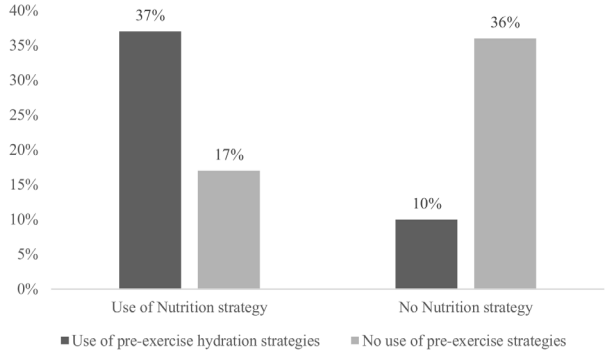

Fig. 5 – The main relationship between the use of hydration strategies and food intake strategies ($p = 0.0001$).

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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