

Scientific Journal of the Faculty of Medicine in Niš 2013;30(4):201-208

Original article ■

Nutritional Knowledge and Behavior Among Students Practicing Sports: Comparison Between Two Countries

Gabriele Trabucco¹, Maja Nikoić², Bojana Vuković Mirković²

¹University of Turin, Faculty of Medicine and Surgery, Italy

²University of Niš, Faculty of Medicine, Serbia

SUMMARY

Nutrition plays a very important role in every physical fitness program. Despite many advances in nutritional knowledge and dietary practices, sports nutrition-associated issues are still a challenge.

The aim of this study was to determine and compare nutritional knowledge and behavior among the youth practicing sports situated in two different European countries. Young athletes (n=84), aged 18-40 years from two different schools of medicine, situated in Turin (Italy) and Niš (Serbia), were included in the study. The participants completed two-part questionnaire about nutritional knowledge and behavior. The collected data was coded and used for evaluation.

The results revealed that the overall nutritional knowledge score of the Italian students (49% of all examinees) practicing sports was 66.7% compared to the Serbian students who also had good nutritional knowledge - 63%. The average number of meals was four per day, with lunch as the most frequent meal and about 30% of all examinees ate out "more than four times a week". There was a statistically significant difference between the groups concerning the sources from which the students obtained nutritional information: 26% of the Italian students obtained nutrition-related information from parents and 21% of them from their trainers. The main sources of obtaining nutrition information among Serbian participants were internet (29%) and school (24%).

Besides a positive attitude towards nutrition, good nutritional knowledge was observed in students practicing sports in Italy and Serbia.

Key words: nutrition, knowledge, students, sport

Corresponding author:

Bojana Vuković Mirković •

phone: 065 599 7059 •

e-mail: colorita018@yahoo.com •

INTRODUCTION

Nutrition is an important component of any physical fitness program. The main dietary goal for physically active individuals is to obtain adequate nutrition to optimize health and sport performance. According to the American College of Sports Medicine, American Dietetic Association, and Dietitians of Canada, physical activity, athletic performance and recovery from exercise are enhanced by optimal nutrition (1). Nutrition interacts not only with growth and development of young athletes, but also with recovery, performance, avoiding injury and problems that may arise as a result of nutritional deficiencies (2, 3). For young people practicing sports, proper nutrition is also important to promote healthy dietary practices in the long term (4).

However, physically active individuals might encounter numerous barriers regarding healthy eating, including deficits in nutrition knowledge, vegetarian or restricted dietary intake, or participation in excessive exercise (5). Also, a growing interest in supplementation of the diet has been observed in many countries (6, 7). Young people practicing sports should be better educated on dietary supplement intake in order to make its use safe, controlled and rational.

There have been few studies assessing nutrition knowledge, attitudes and behavior of students practicing sports (8).

AIM

The purpose of this study was to evaluate and compare nutritional knowledge and behavior among students practicing sports in two different European countries.

MATERIALS AND METHODS

Students practicing sports, aged 18 years and older, enrolled at the Faculty of Medicine in Turin, Italy, and in the Faculty of Medicine in Niš, Serbia, were invited to participate in the study voluntarily. The survey was conducted from February 2012 to April 2013 and it involved 152 randomly selected students practicing sport.

Participants completed a self-administered, originally constructed questionnaire developed by researchers according to similar studies (9, 10). A cover letter was included and the aims of the study were clearly stated on the introductory page, which also carried a statement ensuring anonymity. The authors followed the Declaration of Helsinki World Medical Association.

The questionnaire consisted of two parts. The first part comprised questions about individual demographic information (age, ethnicity, sex, and sport) and eating habits ("Do you follow a specific diet?"). Students were also asked: "Has anyone ever suggested changing the

eating habits?" and "Who do you feel most comfortable discussing your nutritional needs with?" The participants were instructed to rank their top choices regarding nutrition-related information. The second part of nutrition knowledge questionnaire comprised a true/false test with 30 items to assess their nutritional knowledge. The questions were categorized into four domains of nutrition: micronutrients, macronutrients, weight management and performance. The overall score of 75% or more indicated adequate nutritional knowledge.

Anthropometric measurements were performed with subjects in light clothing and barefooted, under standard procedure (11). Weight (kg) and height (m) were taken and body mass index (kg/m^2) was calculated.

Statistical analysis was performed with the use of Microsoft Excel (Microsoft Office, 2003). Descriptive statistics such as the means, standard deviation and frequencies were calculated. The association between the study variables was assessed by Chi-square (χ^2) analysis, and Student's t-test was performed for the comparison of means between continuous variables. Significance was accepted at $p < 0.05$.

RESULTS

A total of 84 questionnaires was completed by participants who practiced various sports disciplines within team sports (Table 1).

This corresponded to a response rate of 42.5% (84 out of 152 subjects). The respondents' mean age was 21.9 ± 3.9 years (range 18-30 years), and 49% were Italians. There were 60 males and 24 females among the examinees.

The mean body mass index (BMI) of the athletes was $23.6 \pm 2.9 \text{ kg}/\text{m}^2$. Among the students, 16 (19%) were classified as overweight and there were no underweight subjects ($\text{BMI} < 18 \text{ kg}/\text{m}^2$).

The results showed that only 3.57% of the examinees followed specific diet. The majority of the examinees (70%) gave negative answer to the question "Has anyone ever suggested changing of your eating habits?" with similar distribution among Italian and Serbian examinees.

Table 2 shows the sources from which the students obtained nutrition-related information. Twenty-six percent of the Italian students obtained nutrition information from parents and twenty-one percent of them from trainers. The main sources of nutrition information among Serbian participants were internet (29%) and school (24%).

Questions about the personal eating habits revealed that more than half of Italian participants (54%) ate out at least "1-2 meals per week". At the same time, there were only 30% of the Serbian students who ate out at least "1-2 meals per week". About 30% of all examinees ate out "more than four times a week".

Figure 1 presents the results related to frequency of meals consumed by participants per day. The average number of meals was four per day. There were 98% Italian students who had their dinner every day and 85% of them who had their breakfast every day. At the same time, 88% of the Serbian students had those meals every day. Regarding snacks, Italian students practicing sports consumed snacks more frequently than Serbian students.

The majority of participants (77% of both groups) did not use dietary supplements.

A large number of participants (Italians-66%, Serbians-81%) agreed about assigning importance to the figure of the trainer as a relevant person for obtaining nutrition-related information.

Finally, the levels of satisfaction with dietary practice were variable among students and higher in the Italian group (80%) than in the Serbian (56%). Also, the Italian males were more satisfied with their eating habits (90%) than females (50%). The difference between the levels of satisfaction with dietary practice, according to gender (52% male, 64% female), was not significant among the Serbian students.

The Italian students practicing sports had a better mean nutrition knowledge score (20 out of 30

questions or 66.7%) than the Serbian students (63%), but the difference was not significant ($p < 0.05$). Therefore, the students had good knowledge of nutrition. The majority of subjects had high level of knowledge about macronutrients. The basic nutritional knowledge concerning the dietary sources and roles of micronutrients was high for all participants. This section had the highest average scores and students were the most confident while giving answers related to this field. There was a significant difference in the knowledge concerning supplements among the two groups of participants (Table 3).

The Italian students were better informed concerning dietary fibers consumption and risk related to alcoholic drinks than the Serbian students, but the Serbian students had better knowledge about the recommended daily portion of vegetables (Table 4).

There was a statistically significant difference between the groups concerning the influence of balanced diet on athletic performance. Among the selected Serbian athletes, only 14% of them answered correctly about these issues, while 51% of Italian students gave correct answers (Table 5).

Table 1. Distribution of participant according to sports disciplines

Sport	Males	Females	No. (%) of total respondents
Team sports^a	51	20	71 (85%)
Water sports^b	4	2	6 (7%)
Long distance running or cycling	1	-	1 (1%)
Other^c	4	2	6 (7%)
Total	60	24	84 (100%)

^abasketball, handball, football, volleyball; ^bswimming, water polo, rowing; ^cthai box, fitness, motorcycling

Table 2. Sources of nutrition-related information

Source	No. (%) of users among Italian students	No. (%) of users among Serbian students	Chi square test	P value
Internet	19	29	3.82	>0.05
Parents	26	17	4.79	<0.05*
Books	15	21	1.29	>0.05
Newspapers	18	17	0.16	>0.05
School	9	24	10.09	<0.05*
Trainers	21	10	7.05	<0.05*
Friends	13	13	0.02	>0.05
Radio/TV	3	20	16.22	<0.05*

*statistically significant

Table 3. Basic nutritional knowledge about micronutrients

Statement	ITA	SRB	Chi square test	P value
	Correct answers	Correct answers		
Milk is a good source of calcium for all ages	39 (95%)	41 (95%)	0.37	>0.05
The iron deficiency (anemia) leads to reduction of oxygen carrying capacity in the blood	34 (83%)	41 (95%)	2.26	>0.05
Cheese is a good source of iron in the diet	33 (80%)	39 (91%)	0.80	>0.05
Those who follow diet without meat are at high risk of iron deficiency	26 (63%)	29 (67%)	0.52	>0.05
The iron contained in meat and iron content in food of plant origin are absorbed at the same rate by the organism	30 (73%)	27 (63%)	2.09	>0.05
Banana and avocado are good sources of potassium	39 (95%)	34 (79%)	7.30	<0.05*
Vitamin supplements are recommended to all people who practice physical activity	16 (39%)	7 (16%)	7.19	<0.05*
The vitamins are good sources of energy	19 (46%)	21 (49%)	0.05	>0.05
Carrot is a good source of vitamin A	18 (44%)	40 (93%)	20.81	<0.05*
Salt is an essential element of a healthy diet	34 (83%)	23 (53%)	6.96	<0.05*

*statistically significant

Table 4. Basic nutritional knowledge about dietary fibers and beverage

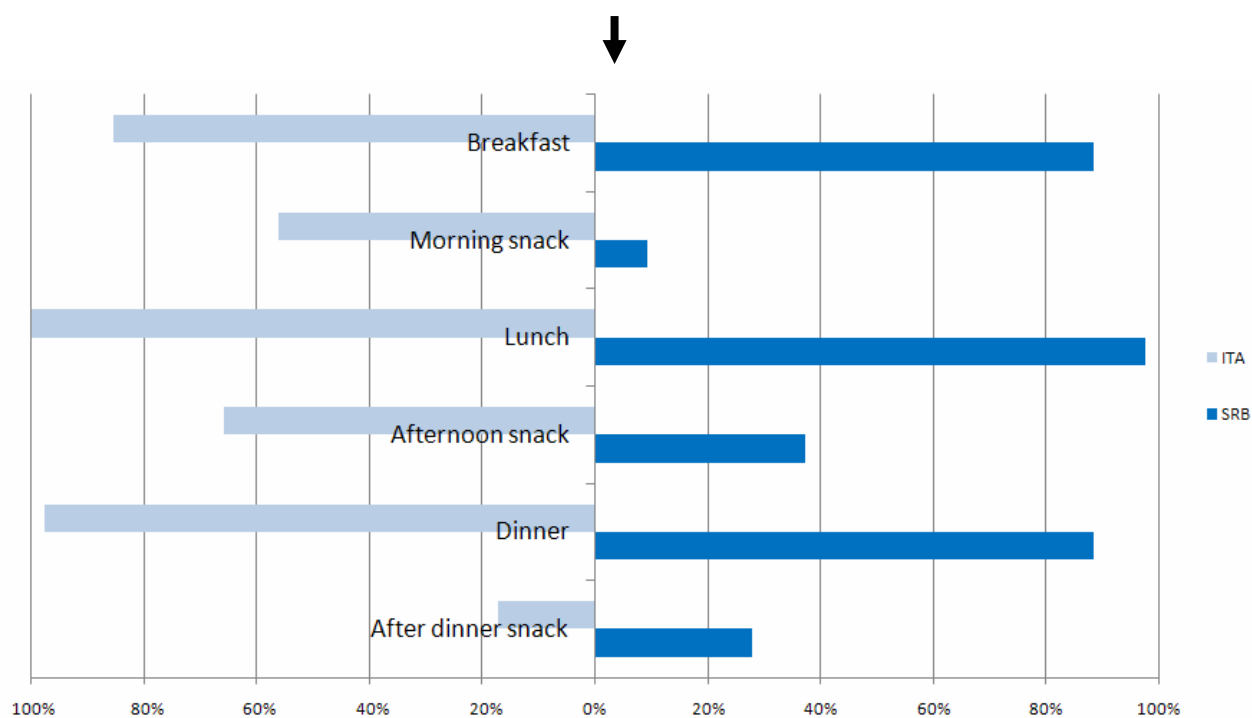
Statement	ITA	SRB	Chi square test	P value
	Correct answers	Correct answers		
The dietary fiber can help to reduce constipation, reduce the level of cholesterol in the blood and prevent the occurrence of certain cancers	36 (88%)	36 (84%)	0.89	>0.05
Bread and cereals are the only source of dietary fiber	37 (90%)	27 (63%)	7.92	<0.05*
Two servings of vegetables a day reach the recommendations of a healthy and balanced diet.	28 (68%)	39 (91%)	7.16	<0.05*
Vegetables: fresh, frozen and canned ones have the same nutritional value	39 (95%)	37 (86%)	1.33	>0.05
The reduction of 4% of body weight during exercise can affect athletic performance	29 (71%)	26 (60%)	0.50	>0.05
Sports drinks are the best solution to replace fluids lost during exercise	26 (63%)	30 (70%)	0.39	>0.05
The consumption of alcohol may alter the absorption and utilization of some nutrients	36 (88%)	39 (91%)	0.21	>0.05
At equal weight, alcohol has more calories than proteins	34 (83%)	21 (49%)	8.60	<0.05*

Table 5. Importance of nutrition in weight management and performance

Statement	ITA Correct answers	SRB Correct answers	Chi square test	P value
An athlete who practices a discipline of endurance (e.g., distance running) should follow a different diet than an athlete practicing non-endurance discipline (e.g. race 100m)	33 (80 %)	35 (81%)	0.11	>0.05
A balanced diet should be presented in terms of percentage, as below: 40% carbohydrates, 20% fats, 40% proteins	15 (37%)	14 (33%)	0.33	>0.05
A person physically fit accustomed to following a balanced diet can improve his/her athletic performance by consuming more nutrients	21 (51%)	6 (14%)	14.98	<0.05*
Skipping meals is justified if you need to lose weight quickly	40 (98%)	38 (88%)	1.84	>0.05
If you are trying to lose weight, carbohydrates should come exclusively from fruit and vegetables and not from bread and pasta	17 (41%)	10 (23%)	2.95	>0.05

*statistically significant

Trabucco G. Nutritional knowledge and behavior among students practicing sports

**Figure 1.** Meals consumed daily

DISCUSSION

This study shows that the nutritional knowledge among university athletes in Turin was good and similar to their peers in Serbia. Possible reasons for good scores could include curriculum competency for nutrition at the faculties of medicine and students' understanding of the importance of following healthy eating among physically active people.

Students included in the study practiced a wide range of sports, which eliminated any assumptions that responses from students were sport-related (e.g., sports that rely on high-intensity training, such as football or aesthetic sports, such as gymnastics or dance).

Students used different sources for obtaining nutrition information. In Serbia, the country in transition, the economic and financial crisis compromise the health care system, as well as the science of nutrition, and examinees specify that their dominant source of information were internet and school. Trainers and registered dietitians are the primary sources for obtaining nutrition-related information in many developed countries. In the present study, the nutrition information among Italian students comes from their parents and trainers, which is similar to the findings of other researches (5, 7).

The majority of participants ate out from 1-2 times a week, and some of them more than four times a week. These numbers are surprising considering the prevalence of fast food consumption in today's world.

In both groups, participants used to skip more than one meal, which is one of the reasons for low energy intake. Thus, students practicing sports should be advised against skipping meals and encouraged to consume healthy snacks. An athlete cannot sustain optimal performance with a low energy intake. According to Valliant et al., the most common reason for skipping meals is the lack of time (12). Many athletes face barriers that preclude them from maintaining a steady diet schedule. These barriers include class schedules, work, practice, studying, and having time for family and friends. Future studies should address these barriers and propose solutions to accommodate students and their busy schedules.

The questionnaires helped us realize that the level of the nutritional knowledge is not homogeneous in our interviewees. The evolution of new knowledge about sports nutrition usually starts with a basic concept that must be further refined; to move from individual nutrients to food, from 'one size fits all' to the individual needs and practices of different athletes, and from single issues to an integrated picture of sports nutrition. The transition from theory to practice usually requires an educational program.

Therefore, of absolute importance are sources of information from which the students practicing sports can learn about nutrition. Therefore, it is very important that these sources are constantly being updated and that athletes followed them up during their training.

Nutrition professionals (e.g. dietitian) should be cautious when giving nutritional advices to athletes. Furthermore, adequate sports nutrition knowledge can improve the standard of care (e.g. injury prevention, rehabilitation) (8). Dietary education is useful in improving dietary intake and nutrition knowledge among athletes. Future education needs to focus on counseling athletes about meeting the appropriate energy requirements according to their activity level as well as consuming adequate amount of nutrients (13).

Nutritional education programs should involve both athletes and their trainers. They should be instructed by qualified nutrition educators (e.g., dietitians) and participate in continuous education through workshops and courses which help them improve trainers' nutritional knowledge, attitudes and practices (6, 12). Having in mind various criteria relevant for sports in which more strength and high speeds are required (power sports, aesthetic sports), it is not surprising that nutritional knowledge differs among sportsmen and trainers. This should be kept in mind in education planning (14, 15).

There are some study limitations. This investigation is based on subjects' self-reports and it is possible that they might not have told the truth, especially if they felt comfortable. However, we believe that the approach to testing (groups, anonymity, etc) and our experience from previous studies reduced this possibility. Also, the sample size of the study was small and the response rate was low, which can create bias. Finally, the survey included only 30 questions about nutritional knowledge.

CONCLUSIONS

The present study demonstrated that students practicing sports in Turin and in Nis have good nutrition-related knowledge, but their nutritional behavior is lacking. Furthermore, dietitians with an expertise in sport nutrition are qualified professionals who should be the students' primary source for obtaining diet information.

**Part of this paper was presented at the 54th Congress of biomedical students in Serbia with international participation, Kopaonik, Serbia, April 28-May 2, 2013.*

References

- American College of Sports Medicine, American Dietetic Association, Dietitians of Canada. Nutrition and athletic performance: joint position statement. *Med Sci Sports Exerc* 2009;41(3):709-31.
<http://dx.doi.org/10.1249/MSS.0b013e31890eb86>
PMid:19225360
- Dunford M. American Dietetic Association. Sports, Cardiovascular, and Wellness Nutritionists Dietetic Practice Group. *Sports Nutrition: A Practice Manual for Professionals*. 4th edition. Chicago Ill; American Dietetic Association. 2006, pp.10-21.
- Rodriguez NR, DiMarco NM, Langley S; American Dietetic Association; Dietitians of Canada; American College of Sports Medicine. Nutrition and Athletic Performance. Position of the American Dietetic Association, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance. *J Am Diet Assoc* 2009;109(3):509-27.
<http://dx.doi.org/10.1016/j.jada.2009.01.005>
- Jeukendrup A, Cronin L. Nutrition and Elite Young Athletes. *Med Sport Sci* 2011;56:47-58.
<http://dx.doi.org/10.1159/000320630>
PMid:21178366
- Bonci CM, Bonci LJ, Granger LR, Johnson CL, Malina RM, Milne LW. et al. National Athletic Trainers' Association position statement: preventing, detecting, and managing disordered eating in athletes. *J Athl Train* 2008;43(1):80-108.
<http://dx.doi.org/10.4085/1062-6050-43.1.80>
PMid:18335017 PMCID:PMC2231403
- Blagojević A, Simonović N. Znanje, stavovi i ponašanje studenata farmacije i medicine u vezi sa upotrebom dijetetskih suplemenata. *Studentski Medicinski glasnik* 2011; II(1-4): 4-8. (in Serbian)
- Giammarioli S, Boniglia C, Carratù B, Ciarrocchi M, Chiarotti F, Mosca M, Sanzini E. Use of food supplements and determinants of usage in a sample Italian adult population. *Public Health Nutr* 2012;1:1-4.
- Heaney S, O'Connor H, Michael S, Gifford J, Naughton G. Nutrition knowledge in athletes: a systematic review. *Int J Sport Nutr Exerc Metab* 2011;21(3):248-61.
PMid:21719906
- Jessri M, Jessri M, RashidKhani B, Zinn C. Evaluation of Iranian college athletes' sport nutrition knowledge. *Int J Sport Nutr Exerc Metab* 2010;20(3):257-63.
PMid:20601743
- Nazni P, Vimala S. Nutrition Knowledge, Attitude and Practice of College Sportsmen. *Asian J Sports Med* 2010;1(2):93-100.
PMid:22375196 PMCID:PMC3289172
- Lee DR, Neiman CD. *Nutritional assessment*, 4th ED. Singapore: Mc-Graw-Hill Education, 2007.
- Valliant MW, Emplainscourt HP, Wenzel RK, Garner BH. Nutrition Education by a Registered Dietitian Improves Dietary Intake and Nutrition Knowledge of a NCAA Female Volleyball Team. *Nutrients* 2012; 4(6): 506-16.
<http://dx.doi.org/10.3390/nu4060506>
PMid:22822449 PMCID:PMC3397349
- Walsh M, Cartwright L, Corish C, Sugrue S, Wood-Martin R. The body composition, nutritional knowledge, attitudes, behaviors, and future education needs of senior schoolboy rugby players in Ireland. *Int J Sport Nutr Exerc Metab* 2011;21(5):365-76.
PMid:21799215
- Torres-McGehee TM, Pritchett KL, Zippel D, Minton DM, Cellamare A, Sibilia M. Sports Nutrition Knowledge Among Collegiate Athletes, Coaches, Athletic Trainers, and Strength and Conditioning Specialists. *J Athl Train* 2012;47(2):205-11.
PMid:22488287 PMCID:PMC3418133
- Jacobson BH, Sobonya C, Ransone J. Nutrition practices and knowledge of college varsity athletes: a follow-up. *J Strength Cond Res* 2001 ;15(1):63-8.
PMid:11708709

NUTRITIVNA ZNANJA I PONAŠANJA STUDENATA KOJI SE BAVE SPORTOM: POREĐENJE DVE ZEMLJE

Gabriele Trabucco¹, Maja Nikolić², Bojana Vuković-Mirković²

¹Fakultet za medicinu i hirurgiju Univerziteta u Torinu, Italija

²Univerzitet u Nišu, Medicinski fakultet, Srbija

Sažetak

Ishrana ima izuzetno važnu ulogu u svakoj vrsti fizičke aktivnosti. Uprkos unapređenju nutritivnih znanja i same dijetetske prakse, pitanja vezana za ishranu sportista i dalje su izazov.

Cilj ovog rada bio je da se oceni i uporedi nutritivno znanje i ponašanje među mladima koji se bave sportom iz dve različite evropske zemlje. U istraživanje su bili uključeni mladi sportisti (n=84) starosti 18-

40 godina, sa dva različita medicinska fakulteta iz Torina (Italija) i iz Niša (Srbija). Ispitanici su popunili upitnik sastavljen iz dva dela, sa pitanjima o nutritivnom znanju i ponašanju. Sakupljeni podaci su kodirani i upotrebljeni za procenu.

Rezultati su pokazali da je ukupan skor nutritivnog znanja italijanskih studenata (49% ispitanika) koji se bave sportom 66,7%, u odnosu na studente iz Srbije, koji su takođe imali dobar skor znanja o ishrani - 63%. Prosečan broj obroka je četiri dnevno, uz ručak kao najčešći obrok, a oko 30% ispitanika obrokovalo je van kuće, "više od četiri puta nedeljno". Postojala je statistički značajna razlika između grupa u pogledu izvora iz kojih su studenti sticali znanja vezana za ishranu: 26% italijanskih studenata dobijalo je informacije o ishrani od roditelja, a njih 21% od svojih trenera. Glavni izvori informacija vezani za ishranu među ispitanicima iz Srbije bili su internet (29%) i škola (24%).

Pored pozitivnog stava prema ishrani, uočeno je dobro znanje vezano za ishranu kod studenta koji se bave sportom u Italiji i Srbiji.

Ključne reči: ishrana, znanje, studenti, sport