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Evaluation of Iranian College Athletes' Sport Nutrition Knowledge

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The purpose of this study was to assess the nutrition knowledge and the factors determining this knowledge in Iranian college basketball and football athletes. By highlighting gaps in nutrition knowledge of these athletes, sport nutrition professionals may begin to address these gaps by educating athletes with a view toward minimizing injury and enhancing sport performance. Sixty-six basketball and 141 football players (response rate 78.4%) from 4 medical and 8 nonmedical universities in Tehran agreed to participate in this cross-sectional study. A 2-part questionnaire was used; the first part comprised questions identifying demographic information, and the second part comprised a previously well-validated questionnaire on sport nutrition knowledge. The overall knowledge score was 33.2% (± 12.3%). Men scored 28.2% (± 12.7%), and women, 38.7% (± 14.2%). In both genders, the highest score was obtained for the nutrients subcategory, and the supplements subcategory was the most poorly answered. When compared with their peers, a significantly higher score was obtained by women ($p < .001$), athletes at medical universities ($p < .001$), and those obtaining nutrition information from reputable sources ($p = .03$). The coach was cited by 89.4% of athletes as their main source of nutrition information. This study showed that the sport nutrition knowledge of these athletes is inadequate. Considering that this substandard level of knowledge may contribute to poor dietary behaviors, these athletes would benefit from nutrition-related training and education.

Keywords: Tehran, basketball, football, university athletes

It is well recognized that optimal nutrition can enhance athletic performance (American College of Sports Medicine, American Dietetic Association, & Dietitians of Canada, 2000). However, numerous barriers can hinder college athletes from achieving optimal dietary practices, including a lack of time and space to prepare meals (in the confines of dormitories, apartments, or shared housing), insufficient financial resources, limited meal-planning and -preparation skills, and busy travel schedules (Malinauskas, Overton, Cucchiara, Carpenter, & Corbett, 2007; Palumbo, 2000). Previous studies on athletes' nutrition knowledge indicate that many college athletes do not understand basic nutrition concepts yet are receptive to receiving nutrition education (Cho & Fryer, 1974; Froiland, Koszewski, Hingst, & Kopecky, 2004; Grandjean, Hursh, Majure, & Hanley, 1981; Jonnalagadda, Rosenbloom, & Skinner, 2001; Perron & Endres, 1985; Werblow, Fox, & Henneman, 1978; Zawila, Steib, & Hoogenboom, 2003). Nutrition information is imparted to athletes from diverse sources including coaches, teammates, athletic trainers, fitness trainers, parents, supplement manufacturers, and the media (Rosenbloom, Jonnalagadda, & Skinner, 2002). Unfortunately, many of these sources are not suitable, and at times the information imparted is unreliable and only adds to the myths surrounding nutrition that may affect athletes' diet (Barr et al., 1997). In Tehran, football and basketball are popular sports that demand a high-intensity training and competition schedule. Each team member requires his or her own unique set of tailored nutrition guidelines that take into account position on the team and level of participation in the sport. In contrast to many other countries, Iranian schoolchildren do not receive any nutrition education as part of their school's routine curriculum, so when they become college athletes, they have a very limited nutrition knowledge base. Furthermore, there is no defined position for qualified nutrition professionals on sport-science teams in Iran, either at college or national level, and consequently many sport teams and organizations do not access sport-science or nutrition services. A previous study in this population revealed a central role for coaches and trainers in nutrition education (Mosavi Jazayeri & Amani, 2004). Most trainers were found to prescribe diet programs and advise consumption of anabolic hormones to their trainees, yet their nutrition knowledge was considered low.

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The current study is the first to assess the nutrition knowledge of Iranian college athletes. Findings will highlight the gaps in nutrition knowledge and validate the need to include nutrition professionals in sport-science teams. The aims of the current study were to investigate the level of nutrition knowledge of college football and basketball athletes and to assess the factors that determine adequate nutrition knowledge.

Material and Methods

Participants

Two hundred sixty-four football and basketball players attending Tehran universities (four medical and eight nonmedical) were selected to participate in a cross-sectional epidemiologic survey in 2008–2009. A list containing the athletes' contact details was obtained from each university's physical training department. Athletes were contacted personally by the research team at their training sessions and received information sheets explaining the purpose and procedure of this study. Two hundred twelve athletes consented to take part in the survey (142 football and 70 basketball players). The procedure and protocols of the study were approved by the ethics committee of Shahid Beheshti University of Medical Sciences and the Iranian Ministry of Education.

Sport Nutrition Knowledge Questionnaire

A two-part questionnaire was distributed to participants. The first section of the questionnaire included demographic factors such as age, gender, source of nutrition information, type of university attended (medical or nonmedical), and whether athletes had completed any prior nutrition training. The second section comprised 88 nutrition knowledge questions and was originally designed by a panel of six New Zealand sport dietitians. It was assessed for content validity by the designers and a reviewer group; construct validity was ensured using a between-groups analysis of variance with five different population groups. The reliability of the questionnaire was ensured using test–retest analysis. This questionnaire was shown to be psychometrically valid and reliable and suitable for use in sporting groups (Zinn, Schofield, & Wall, 2005). The knowledge questionnaire is divided into five main subcategories: nutrient type (46 questions), recovery (7 questions), fluid (9 questions), weight control (15 questions), and supplements (11 questions). All response options to questions included an "unsure" option to eliminate the possibility of guessing at answers and also to differentiate the athletes who have correct, incorrect, or no knowledge. Answers were assigned a +1 score for a correct response and 0 score for an incorrect or unsure response for the purpose of determining the total mean percent correct score. For the rest of the analysis the answers were assigned three different codes, one for the correct response, one for the incorrect response, and one for "unsure." The questionnaire was translated into Persian and pilot tested for face and content validity with a group of 29 professionals (several university faculty members, the research committee, two registered physicians, and a dietitian). Minor syntax modifications were made to the questionnaire before commencement of the main study based on the pilot participants' responses.

Study Procedure

Hard-copy questionnaires along with participant information sheets were distributed to the athletes, and they were asked to complete the knowledge survey. Questionnaires were disseminated before and after training or workout sessions. Data from 5 participants were excluded because of incomplete questionnaires, which reduced the final population to 207 (response rate 78.4%).

Data Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS, version 16.0). Athletes' demographic data and their total and subcategory mean scores were calculated using descriptive statistics. An independent t test was administered to compare mean scores between genders. To assess the relationship between total knowledge score and the variables gender, age, sport category (football or basketball), university classification, completion of a nutrition course in university, and source of nutrition information, one-way analysis of variance was used. Linear-regression analysis with total knowledge score as the dependent variable and age, sex, sport category, university classification, completion of a nutrition course, and source of nutrition information as independent variables was performed. Tolerance values below 0.1 were considered indicators of disturbance in stability of the model by multicollinearity. Statistical significance was established at $p \leq .05$.

Results

Table 1 displays athletes' demographic data, as well as the mean nutrition knowledge score for each variable. The age of participants ranged from 17 to 24 years, with a mean of 21.8 (± 1.3). Men made up 52.7% of the sample. Overall, approximately one quarter of the athletes, all of whom were medical students, had completed a nutrition course at university. Tehrani athletes obtained their nutrition information from a wide variety of sources among which the coach was shown to be the main nutrition source for most. Television, radio, and the Internet constituted the second most popular nutrition information source. A nutritionist or dietitian was ranked in the top three sources by only 2 athletes.

Relationship Between Knowledge and Demographics

There was no statistically significant association between the variables age and sport type with total knowledge score.

Table 1 Demographic Characteristics of the Sample (*N* = 207)

Variable	Group	*n* (%)	Total mean correct score, %
Sport category	football	141 (68.1)	33.2 ± 17.3
	basketball	66 (31.9)	33.1 ± 19.1
Age, years	≤18	4 (1.9)	15.3 ± 9.8
	18–22	146 (70.5)	33.25 ± 17.8
	22–24	57 (27.5)	34.29 ± 19.9
Gender*	male	109 (52.7)	28.22 ± 15.6
	female	98 (47.3)	38.72 ± 16.7
University classification*	medical	62 (30.0)	39.0 ± 15.4
	nonmedical	145 (70.0)	19.5 ± 8.6
Completed a nutrition course in university*	yes	51 (24.6)	38.72 ± 16.2
	no	156 (75.4)	18.63 ± 9.1
Source of nutrition information (rank top 3)	coach	185 (89.4)	30.4± 16.2
	university classes	11 (5.3)	50.9 ± 6.5
	nutritionist or dietitian	2 (1.0)	92.0 ± 2.0*
	physician	3 (1.4)	87.5 ± 4.8
	magazine or newspaper	34 (16.4)	31.0 ± 19.9
	family member or friend	57 (27.5)	26.2 ± 13.4
	television, Internet, or radio	124 (59.9)	37.0 ± 18.4

*$p < .05$.

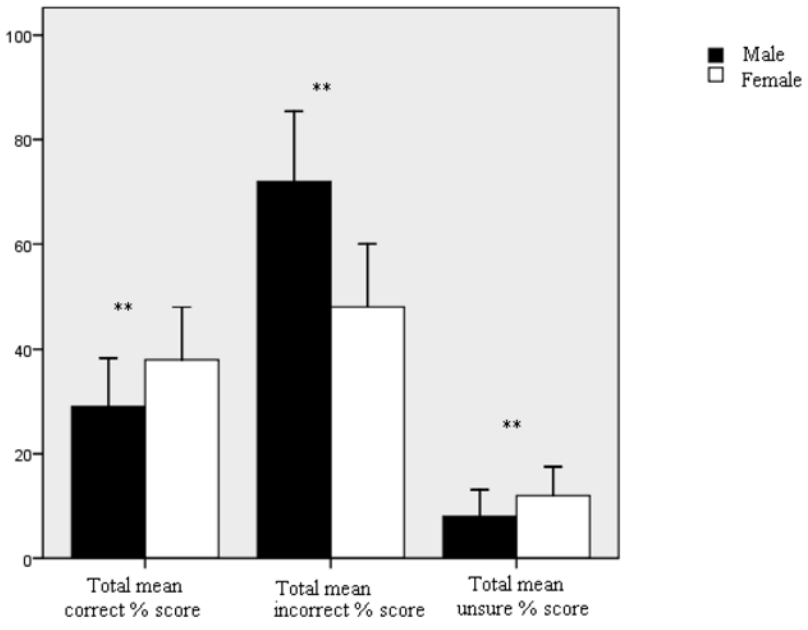

Figure 1 — Total mean percentage of correct, incorrect, and unsure answers. **$p \leq .05$.

However, there was a significant association between total knowledge score and the variables gender, $F(1, 205) = 18.06$, $p < .001$; university type, $F(1, 205) = 10.01$, $p < .001$; completion of a nutrition course at university, $F(1, 205) = 15.03$, $p < .001$; and source of nutrition information, $F(4, 202) = 13.11$, $p < .001$. Athletes who attended a medical university, had completed a university nutrition course, and obtained their sources of nutrition information from a dietitian or nutritionist achieved a greater total score than those who attended a nonmedical university, had no formal nutrition training, and had not received nutrition information from a dietitian or nutritionist. A linear regression showed that gender ($p < .001$), university type ($p < .001$), and nutrition information source ($p = .03$) could independently predict a higher nutrition knowledge score in this sample.

Sport Nutrition Knowledge

Figure 1 shows the total mean percentage of correct, incorrect, and unsure scores obtained by university football and basketball athletes. Women scored significantly higher in total knowledge ($p < .001$), had a significantly greater percentage of unsure responses ($p = .03$), and had fewer incorrect answers ($p < .002$) than men.

Subcategory Knowledge

Table 2 presents the mean subcategory percentage of correct, incorrect, and unsure scores for both genders. For most subcategory items there was a significant gender difference between nutrition knowledge scores. The direction of this difference was that women had higher scores for all subcategories, and for most items this difference was significant ($p \leq .05$).

Nutrients. The nutrients subcategory was the most correctly answered among all athletes ($p \leq .001$). Despite this, none of the athletes scored higher than 45.3% on these questions. Of the 46 questions in this section, 34 were about categorizing various foods as either high or low in carbohydrate, protein, fat, saturated fat, and cholesterol.

Fluid and Hydration. In the fluid and hydration subcategory, just under a third of men (27.3%) and a third of women (32.9%) were aware that thirst is not a good indicator of fluid needs, and only 12.0% and 8.2% of women and men, respectively, were knowledgeable about the optimal amount of fluid required in a 2-hr training session. Virtually none of the athletes (1.3% female, 0.6% male) could identify the correct range of carbohydrate in a sport drink.

Weight Control. The mean correct percentage for four weight-gain questions ranged from 5.2% to 17.9% in men and 9.5% to 17.4% in women. When asked about lean muscle-mass gain, 76.1% of participants believed that protein is the most important nutrient to increase in the diet.

Supplements. Supplements was the most poorly answered subcategory, with the least mean percentage of correct answers. No significant gender differences in scores were noted. There was a significantly higher percentage of unsure responses in this subcategory than in others ($p = .029$).

Discussion

This is the first study to assess the nutrition knowledge of university football and basketball players in Tehran. A limited level of knowledge was observed in both genders, as evidenced by only one third of the questions being correctly answered. The total mean percentage of incorrect responses dominated over the unsure score, which is a concern. If an athlete selected the unsure category, he or she might seek relevant information about that topic, but in the current study a high percentage of incorrect answers may indicate that these athletes believe the information they have is true. Tehrani athletes answered correctly less than half the questions in each of the nutrition subcategories. The score obtained in this study is lower than those reported in similar studies conducted worldwide. Dunn, Turner, and Denny (2007) reported a mean nutrition knowledge score of 51.5% (± 13.5%) in a group of college athletes from several sports. Higher scores were reported in female college cross-country runners (57.2%) by Zawila et al. (2003) and in college track athletes (58%) by Rash, Malinauskas, Duffrin, Barber-Heidal, and Overton (2008). However, most authors do not provide information regarding questionnaire psychometrics, and few tend to use reliable and valid questionnaires to assess nutrition knowledge. Therefore a valid (content, construct) and reliable (test–retest) questionnaire was used in the current study (Zinn et al., 2005).

Subcategory Knowledge Scores

The subcategory of nutrient type yielded the highest mean score in both genders, which is a score similar to that reported in New Zealand rugby coaches (61.5%) using the same questionnaire (Zinn, Schofield & Wall, 2006). The next highest mean scores were obtained for the recovery subcategory for men and then the weight-control subcategory for women.

Table 2 Subcategory Scores, %, *M* ± *SD*

Category (number of questions)	Correct knowledge	Incorrect knowledge	Unsure
Nutrient type (46)			
men	30.9 ± 15.4	59.1 ± 11.7[NS]	7.6 ± 6.4
women	42.6 ± 18.6	45.6 ± 16.8	11.4 ± 11.1
Fluid (9)			
men	27.9 ± 16.9	65.2 ± 17.5	5.2 ± 3.7
women	38.2 ± 17.5	48.3 ± 14.0	16.1 ± 12.6
Recovery (7)			
men	29.3 ± 15.7[NS]	68.1 ± 17.1	7.9 ± 4.2
women	38.4 ± 15.2	50.2 ± 13.9	13.7 ± 9.6
Weight control (15)			
men	27.6 ± 14.7	63.2 ± 17.5[NS]	6.2 ± 5.8
women	39.1 ± 16.7	47.2 ± 14.2	10.9 ± 10.5
Supplements (11)			
men	25.4 ± 15.2[NS]	66.3 ± 14.9	10.0 ± 10.2
women	35.3 ± 15.4	46.7 ± 21.6	16.2 ± 10.4

[NS]Not significant between genders.

Fluid and Hydration. Although women were significantly more knowledgeable than men regarding hydration, the total percentage of correct responses among both genders was still low—about one third of the questions were answered correctly. Slightly more than one third of Tehrani college athletes were aware that thirst is not a good indicator of fluid needs. This finding is vastly different from that in Rosenbloom et al.'s (2002) study, in which most participants were aware of this hydration fact. Very few of the Tehrani athletes were able to provide the correct answer to the question relating to fluid requirements for a 2-hr training session. We acknowledge that to determine optimal fluid requirements, each athlete's requirement should be assessed on an individual basis, rather than providing a group-based guideline. Therefore we recognize that the "correct" answer to the question addressing fluid requirements may be challenged based on current thinking in this area of sport nutrition. This could be a possible explanation as to why these scores were so low. A recommendation can be made that such fluid questions not be used in future studies addressing knowledge on fluid requirements.

Weight Control. About half the responses of college athletes in the weight-control subcategory were inaccurate. This indicates that weight-related nutrition knowledge of Tehrani college athletes is being clouded by numerous misconceptions and myths. This finding is similar to that reported by other studies, and it is likely that these athletes are exposed to inaccurate nutrition beliefs and practices (Marquart & Sobal, 1994; Zinn et al., 2006). Most Tehrani university athletes were confused about the role of protein, and more than two thirds believed that protein powder can increase muscle mass. Rosenbloom et al. (2002) found that 47% of men and 43% of women believed protein supplements to be necessary, whereas only 13% of Jacobson, Sobonya, and Ransone's (2001) participants thought this. The fitness industry and media, as nutrition information sources for both coaches and athletes, may play a role in these erroneous beliefs (Zinn et al., 2006). There is no scientific evidence that supplementing an already adequate diet with protein will further increase muscle mass compared with increasing total energy intake (Phillips, 2004).

Supplements. Supplements was the lowest scored subcategory in this study. This is in line with results from other studies in which vitamin supplementation and related issues were prime areas of misconception (Zawila et al., 2003). This topic is often confusing because of its widespread and regular debate in the media and marketing strategies by supplement manufacturers and pharmacies. Iranian athletes are too exposed to misleading commercial advertisements from fitness industries, as well as from retailers who promote supplements despite their benefits not being scientifically justified.

Almost two thirds of the athletes stated that vitamin supplements should be routinely taken by athletes. Best-practice sport nutrition guidelines do not support this notion and maintain that an adequate diet can provide sufficient vitamins for athletic performance. Supplementation is only indicated for athletes who are severely restricting calories, those missing out on certain food groups and not replacing with nutrient-rich equivalents, or vegans (Clark, 2008).

Relationship Between Knowledge and Demographics

The combination of three variables—gender, university type, and nutrition information source—influenced the total knowledge score in this study. Higher scores were obtained if athletes were women, attended a medical university, and obtained their nutritional information from a dietitian or nutritionist or university classes. Dunn et al. (2007) found that female athletes scored slightly higher than their male counterparts on their nutritional knowledge questionnaire, as well as each recommendation section. In contrast, knowledge was reported to be the same in both genders in two other studies (Rash et al., 2008; Rosenbloom et al., 2002). Previous studies demonstrated that athletes who had completed a nutrition course in college scored higher on nutritional knowledge tests than those who had not (Barr, 1987; Zawila et al., 2003). The current study also supports this by finding that medical university athletes, who normally undertake nutrition science courses, scored significantly higher than athletes from nonmedical universities. This suggests that all college athletes in Tehran could benefit from additional nutrition information offered in relevant classes at university or by suitably qualified personnel (dietitians or nutritionists) at their sports clubs.

This study showed that much of the nutrition information is provided to athletes by sources or personnel not suitably qualified to do so, such as coaches, television, the Internet, and radio. An example of this would be the frequent broadcasting of Iranian cooking shows on which chefs may deliberately impart their own nutrition opinions to the public. These results are in agreement with previous studies citing magazines, parents, and coaches as the primary sources of nutrition information (Zawila et al., 2003).

Iranian college athletes were less likely to obtain their nutrition information from reputable sources such as nutritionists or dietitians (2 participants), physicians (3 participants), and university classes (11 participants). In contrast, Jacobson et al.'s (2001) participants mostly obtained their nutritional information from reputable sources such as strength and conditioning coaches, athletic trainers, or university classes; this shows a shift from earlier studies in which magazines were the primary source of nutrition information (Jacobson & Alanda, 1992; Jacobson & Gemmel, 1991).

It is important to note that many Iranian strength and conditioning coaches or trainers undertake little nutrition-specific education in their training and are not able to provide the same service as a sport dietitian or nutritionist. The difference in responses for sources of information in this study compared with international

studies could be partly attributed to the lack of suitably qualified sport-science professionals available to Iranian college athletes. Iranian college athletes face many difficulties during their athletic career because of a lack of appropriate facilities and a lack of access to reputable personnel to provide relevant information. In a study conducted in 2004 in Iran, it was shown that this lack of facilities and information also applies to bodybuilding trainees, for whom 96.8% of trainers did not know the importance of minerals and 88.2% did not know the importance of water (Mosavi Jazayeri & Amani, 2004). This is a concern considering the fact that trainers and coaches are the main source of nutrition information for Tehrani college athletes.

Conclusion

Although sport nutrition education may benefit athletes, Iranian college and club entities are lacking in the sport-science and nutrition services needed to provide best-practice nutrition information to their athletes. Although most Iranian coaches are misinformed about nutrition science, they play the central role in training and educating athletes. The results of this study showed a wide gap in the nutrition knowledge among Tehrani college athletes. Our results suggest that college athletes could benefit from nutrition courses at university as a cost-effective and accessible way of obtaining reputable nutritional information. These results also suggest that management personnel of sport teams could attempt to secure funding to contract with dietitians and nutritionists to provide best-practice current and relevant sport nutrition information to the team.

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