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Knowledge, Attitudes, Practices on Nutrition and Supplement Use Among Athletes of State Universities in Sri Lanka

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ABSTRACT

Background: While a healthy and nutritious diet is crucial for optimizing athletic performance, there is often a gap in the level of knowledge, attitudes, and behaviors regarding sports nutrition among athletes.

Objectives: This study aimed to evaluate the knowledge, attitudes, and practices, along with the factors influencing food and nutritional behavior, in a group of Sri Lankan university athletes. The study also examined the habit of supplement usage among these study participants.

Materials & Methods: A descriptive cross-sectional online survey was carried out among undergraduate athletes in two state universities in Sri Lanka. Data were collected after informed consent. A pretested online questionnaire was used to assess sociodemographic information, knowledge, attitudes, and practices on nutrition and their associated factors, along with the pattern of supplement use. Score calculations, as well as descriptive and inferential statistical methods, were employed in data analysis.

Results: Out of 139 participants (aged 21-28 years, 51.8% male), a significant proportion (69%) had not received formal nutrition education. Surprisingly, 92.8% still achieved above-average knowledge scores for sports nutrition. Most received nutritional guidance from their coaches (62.6%), contributing to 59.7% adopting favorable dietary practices. Their primary challenge was limited access to healthy food options (36.7%). Impressively, an overwhelming majority displayed positive attitudes (99.3%). Interestingly, older athletes exhibited better knowledge ($p=0.008$), while those with lower BMI scores demonstrated good practices ($p=0.018$). Notable items included vitamins (17.3%), calcium (17.3%), and iron (13.7%) among the daily used supplements. However, a large majority did not consume supplements. Some athletes chose supplements on their own (19.4%), while others followed guidance from the coach (16.6%).

Conclusion: Despite lacking formal education in nutrition, Sri Lankan university athletes demonstrated noteworthy levels of knowledge, attitudes, and practices in sports nutrition.

INTRODUCTION

Nutrition in sports demands using scientifically backed health and nutrition-related information to improve the performance and recovery of athletes (Jovanov et al., 2019). Physical performance and fatigue experienced by athletes are influenced by their training, hydration, and nutrition, especially the carbohydrate stores. In addition, adequate intake of proteins, fats, vitamins, and minerals by athletes is important to meet their increased nutritional needs and to compensate for energy loss experienced during sports activities.(Baranauskas et al., 2015). The International Olympic Committee has described an entity termed Relative Energy Deficiency in Sport (RED-S) which is due to unintentional undereating. This includes various adverse effects, such as impaired endocrine function, immunity, cardiovascular health, and other metabolic functions, which occur as a consequence of energy deficiency in sports(Mountjoy et al., 2018). Thus, it is evident that adequate nutrition plays an important role in the performance and general health of athletes.

Adolescents and young adults have rapid physical growth with various metabolic and hormonal changes. (Desbrow, 2021; Stroud et al., 2015). It is also a period where nutrient stores needed for a person later on in their life are formed.(Desbrow, 2021). As a result, young athletes require nutrients for their growth in addition to the nutrition necessary for boosting performance and recovery. Thus, nutrition in young athletes is unique compared to that of adult athletes. Especially university athletes involved in sports while being engaged in their academic activities. Many factors, such as age, sex, economic status, food culture, and schedules, influence the nutrition of an athlete.(Bakhtiar et al., 2021; Baranauskas et al., 2015).

Nutrition knowledge is also the major factors that influences the diet of young athletes. In this current era, many sources are available to gather nutrition-related knowledge. The internet is one such leading source of information. However, it is debatable whether

the material freely available and circulated on the internet is reliable and scientifically sound. Misinformation can have detrimental effects on an athlete's health. Young athletes also rely on their coaches for nutritional advice, which emphasizes that coaches need to have a thorough knowledge of sports nutrition(Bakhtiar et al., 2021). Knowledge of nutrition influences nutrition-related attitudes and practices. Athletes with a basic understanding of sports nutrition have good dietary practices, such as consuming adequate carbohydrate-rich foods, fruits, and vegetables, while poor knowledge lead to unhealthy dietary practices. It has also been noted that when athletes have a better understanding of nutrition, they develop positive attitudes (Thapa et al., 2023). However, literature in this field is scarce in the developing world compared to that in developed countries. Therefore, assessing knowledge, attitude, and practices among university athletes helps us identify the main areas that need to be addressed to optimize their nutrition(Nazni & Vimala, 2010).

The use of nutritional supplements is commonly seen among young athletes. (Jovanov et al., 2019; Parnell et al., 2015). The common supplements that are used by young athletes are sports drinks, protein powders, vitamins, minerals, creatine, and fatty acid preparation. (de Silva et al., 2010; Jovanov et al., 2019; Parnell et al., 2015; Tian et al., 2009). Many use supplements as a means to improve their physical performance, recovery, and immunity. (Parnell et al., 2015). However, improper supplement use may lead to increased morbidity.(Tian et al., 2009). It has also been noted that a majority of young athletes do not seek advice on supplement use from reputable sources such as dieticians. (Jovanov et al., 2019). In a study conducted among Sri Lankan national-level athletes, 91.5% consumed supplements, and the majority (60.5%) used supplements without advice from experts.(Rashani et al., 2021).

Data on knowledge, attitudes, and practices on nutrition and supplement use among Sri Lankan university athletes is not available.

Hence, this study bridged the gap in literature. We aimed to describe the knowledge, attitudes, and practices regarding food, nutrition, and supplement use among Sri Lankan university athletes.

MATERIALS & METHODS

The questionnaire consisted of different sections to collect data on sociodemographic, nutrition education, nutrition knowledge, attitude, practices, supplement use, height, and weight. All questions were developed by the researchers after going through the available literature (Andrews et al., 2016; Nor Azizam et al., 2022). The questionnaire was reviewed and modified by content experts and was pretested among a group of 10 selected athletes from another state university.

Participants and protocol

A descriptive cross-sectional online survey using a Google form was carried out among undergraduate all types of athletes (Table 1 under results) after obtaining the informed consent in two state universities in Sri Lanka. Before obtaining the consent, exclusion criteria (the athletes who were already on diet plans for diseases) were indicated in the form. All athletes consented were included in the survey. The study was conducted from January to April of 2023. Ethical clearance was obtained from the Ethics Review Committee, Faculty of Medicine, University of Ruhuna (2020/P/032). Strict confidentiality was ensured throughout the study and the only the investigators were allowed the access to the Google form output.

Formulation of scores

Knowledge of sports nutrition was assessed using 10 questions that had 'Yes' or 'No' answers. The total knowledge score of an athlete, thus obtained, was 10 and the mean was 5. A knowledge score above 5 was taken as good knowledge. Attitudes on nutrition were also assessed using 10 questions, which were formulated with a Likert scale consisting of five possible responses ranging from "Strongly Agree" to "Strongly Disagree". The total

attitude score thus taken was 50, and a score above 25 was taken as positive attitudes. When assessing dietary practices, another 10 questions were used and the total score was 10. A total score above 5 was taken as good practice (Andrews et al., 2016). Body mass index (BMI) was calculated using self-reported weight and height. Food consumption was interpreted using Food-based dietary Guidelines for Sri Lankans (Nutrition Division, 2022).

Statistical analysis

Minitab was used as the statistical package. Descriptive statistics, along with Pearson correlation coefficient, Fisher's exact test, and chi-square test, were used in the analysis of data. Pearson's correlation coefficient was used to find out the correlation between age, BMI, and scores for knowledge, attitudes, and practices. Chi-squared test was used in the analysis between the monthly income categories (below 50000 LKR and 50000 LKR or above), knowledge (good – score above 5, poor – score 5 or below), practices categories (good – score above 5, bad – score 5 or below), between the monthly income categories and attitudes (good – score above 25, bad – score 25 or below). When $P < 0.05$ was considered as significant. Data associated with the paper is available from the corresponding author upon reasonable request.

RESULTS

Demographic characteristics of the participants

A total of 139 university athletes participated in the online survey, falling within the age range of 21-28 years. The gender distribution was fairly balanced, with males making up a slight majority at 51.1%. The mean age ($\pm$ SD) of the athletes in the study was 23 ($\pm$ 1) years, indicating a homogenous age group. In terms of body mass index (BMI), the mean ($\pm$ SD) value was 21.6 ($\pm$ 3.4) kg/m², suggesting that the majority of the athletes were within a healthy weight range, with minimal variability.

Table 1. Basic characteristics of the study participants

Character	Male (N=71)	Female (N=68)
Age (Mean $\pm$ SD)	23 $\pm$ 1	23 $\pm$ 1
BMI (Mean $\pm$ SD)	22 $\pm$ 3	21 $\pm$ 4
<i>Smoking (%)</i>		
Non-smoker	84.5	98.5
Ex-smoker	8.4	00
Current smoker	7.0	1.4
<i>Alcohol consumption (%)</i>		
Never	52.8	92.6
Stopped	8.4	0.0
Occasional (social drinker)	23.9	7.3
Infrequently (maximum of 1-2 times per month)	12.6	00
Frequently (1-2 times per week)	2.8	00
Daily	00	00
<i>Type of sports (%)</i>		
Athletics	22.5	20.6
Badminton	23.9	26.5
Basketball	8.5	2.9
Cricket	12.7	-
Elle	9.9	16.2
Football	1.4	-
Hockey	18.3	20.6
Karate	1.4	-
Rugby	2.8	-
Swimming	4.2	1.5
Volleyball	9.9	17.6
Wrestling	1.4	-
Netball	-	7.4
Weightlifting	2.8	-
Boxing	1.4	-
Other	3.0	1.4
<i>Total monthly family income (LKR) (%)</i>		
<5000		5.8
5000 – 10,000		9.3
>10,000 – 50,000		43.9
>50,000 – 100,000		22.3
>100,000		18.7

Note: LKR =Sri Lankan rupees

The majority of athletes were engaged in team sports, although the study did not specify the exact percentages for individual versus team sports. A significant majority of the athletes led a healthy lifestyle in terms of substance use.

Specifically, 91.9% reported that they were non-smokers and 71.9% indicated that they had never consumed alcohol. This suggests that many participants were conscious of the potential negative impacts of smoking and

alcohol consumption on athletic performance and overall health.

Most of the athletes (43.9%) had a family income between LKR 10,000 – LKR 50,000 and only a small percentage of them (31.7%) received additional financial support from university authorities for their nutrition or sports. (Table 1).

Nutrition knowledge and education

Only 30.9% of the study participants reported that they had received a formal education on sports nutrition/nutrition. The majority (51.8%) of them did not know about the Food-based Dietary Guidelines for Sri Lankans.

Their awareness of basic nutrition was grossly inadequate, and the majority were unaware of the types of nutrients and different food groups that should be included in the regular diet (Table 2).

Table 2. Awareness of the basic principles of nutrition

Character (N=139)	Yes	No/ Do not know
Receipt of formal education on sports nutrition (%)	30.9	69.1
Awareness of the presence of food-based dietary guidelines for Sri Lankans (%)	42.4	51.8
<i>Awareness of the types of nutrients that should be included in a regular daily diet (%) *</i>	Written the nutrient	
Carbohydrates		27.3
Proteins		40.2
Fats		15.1
Vitamins		21.6
Minerals		10.8
<i>Awareness of the types of food groups that should be included in the regular daily diet (%) †</i>	Written the food category	
Carbohydrates rich food		25.9
Protein-rich food		43.9
Fruits		24.4
Vegetables		24.4
Seeds and nuts		10.8
Milk and dairy products		11.5

*Note: *56.8% of them have not written nutrients*

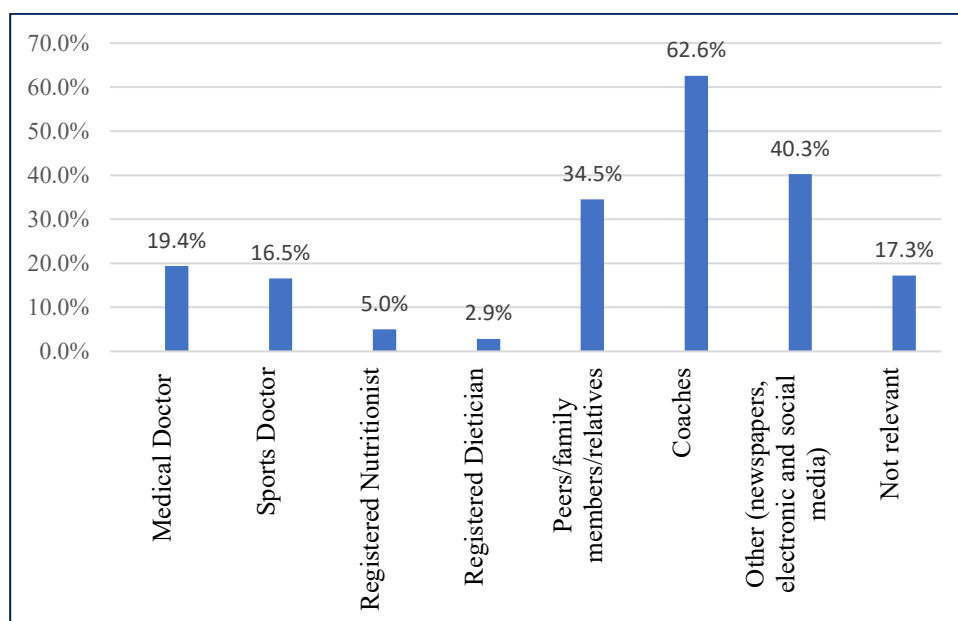
†49.6% of them have not mentioned food categories. Food categories were defined according to Food Food-Based Dietary Guidelines for Sri Lankans

The majority of them showed a satisfactory knowledge of different aspects of sports nutrition. With regards to carbohydrates, most of them (81.3%) recognized the importance of carbohydrates to improve endurance and minimize fatigue. More than half of them (65.5%) identified that carbohydrate loading is

important before competitions. The majority knew that high-quality proteins help improve muscle mass (94.2%) and the importance of the timing of protein intake to facilitate the building of muscle mass (95.0%). Most of them (89.9%) were aware that dehydration impairs physical performance (Table 3).

Table 3. Knowledge of sports nutrition

Knowledge characters (N=139)	(N) % Yes	(N) % No
Adequate carbohydrates in the diet improve endurance and minimize fatigue.	(113) 81.3	(26) 18.7
Carbohydrate loading is important before the competition.	(91) 65.5	(48) 34.5
High-quality protein is useful in improving muscle mass.	(131) 94.2	(08) 5.8
Dietary protein requirement varies with nature and the frequency of the exercise.	(118) 84.9	(21) 15.1
Timing of protein intake with exercise is important to improve the muscle mass.	(132) 95.0	(07) 5.0
Excess vitamin supplementation may harm the physically active person.	(97) 69.8	(42) 30.2
Sports drinks contain electrolytes.	(103) 74.1	(36) 25.9
The dietary requirement varies with the type of training.	(124) 89.2	(15) 10.8
Dehydration can impair physical performance.	(125) 90.0	(14) 10.0
Lack of iron in the diet can result in fatigue, injury, and illness.	(121) 87.0	(18) 13.0

**Figure 1.** Sources of nutritional/dietary advice.

The sources of information on sports nutrition varied among the athletes, and the coaches were

the main ones. Obtaining advice from a registered nutritionist/dietician was the least reported source (Figure 1).

Attitudes toward sports nutrition

They demonstrated positive attitudes regarding some aspects of sports nutrition. Most of them believed that proper nutrition is important not only to maintain and improve general health, but also to improve performance, body

composition, and physical fitness. Further, the majority thought that the nutrition necessary for an athlete is different from a person in the general community and they saw the necessity of qualified professionals to look after their nutrition at the university (Table 4).

Table 4. Attitudes toward sports nutrition

Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	(N)%				
Nutrient requirements for athletes are different from the general community.	(68) 48.9	(55) 39.6	(13) 9.3	(01) 0.7	(02) 1.4
Requires a qualified, dedicated professional to look after the nutrition at your institution/training center.	(41) 29.5	(63) 45.3	(63) 20.9	(04) 2.9	(02) 1.4
Appropriate nutrition maintains body composition and physical fitness.	(48) 34.5	(71) 51.0	(17) 12.2	(01) 0.7	(02) 1.4
Appropriate regular nutrition improves general health	(55) 39.6	(59) 42.4	(20) 14.4	(02) 1.4	(03) 2.1
Improved nutrition changes the performance	(44) 31.6	(65) 46.8	(28) 20.1	(00) 0.0	(02) 1.4
A high amount of water intake increases body weight.	(22) 15.8	(41) 29.5	(29) 20.9	(32) 23.0	(15) 10.8
Protein and vitamin supplements are essential for athletes.	(57) 41.0	(55) 39.6	(19) 13.7	(06) 4.3	(02) 1.4
Fasting is the best method to lose weight.	(17) 12.2	(30) 21.6	(35) 25.1	(31) 22.3	(26) 18.7
It is necessary to follow a strict dietary regimen every day.	(20) 14.4	(45) 32.4	(45) 32.4	(15) 10.8	(14) 10.0
Expensive foods are better and important for good performance	(16) 11.5	(30) 21.6	(32) 23.0	(33) 23.7	(33) 20.1

However, some of them held onto misconceptions. Most of them perceived that the intake of water increases their body weight, which may affect their water intake during competitions. A large majority believes that the consumption of protein and vitamin supplements is essential in sports. A

considerable number of participants, though not the majority, thought that it is necessary to consume expensive food to get adequate nutrition. The majority of them perceived that fasting is the best method to lose weight. When both “agreed” and “strongly agreed” are taken together, collectively, it can be considered that

they perceived as proposed daily dietary regimes need to be followed strictly (Table 4).

Dietary practices and supplement use

Among the participants, there were non-vegetarian, lacto-ovo-vegetarian, ovo-vegetarian, strict vegetarian, and lacto-vegetarian of 77.7%, 6.4%, 6.4%, 5.8% and

2.9% respectively. Most of them showed favorable dietary practices for an athlete, and they consumed both homemade food and food from canteens/restaurants (Table 5).

Vitamins/multi-vitamins, calcium, and iron reported the highest rates among the daily consumed supplements (Table 6).

Table 5. Dietary practices of the athletes

Dietary practices (N=139)	Yes (N)%	No (N)%
Change dietary patterns at the time of competition.	(92) 66.2	(47) 33.8
Practice carbohydrate loading before competition.	(79) 56.8	(60) 43.2
Use sports drinks during exercise/competition.	(74) 53.2	(65) 46.8
Get a balanced diet for three main meals per day.	(83) 59.7	(56) 40.3
Time meals according to the training sessions and the competition.	(89) 64.0	(50) 36.0
Change the type of food/meal that fits the timing of the training or competition.	(99) 71.2	(40) 28.8
Consume homemade food.	(94) 67.6	(45) 32.4
Skip meals before the competition.	(56) 40.3	(83) 59.7
Miss breakfast frequently.	(47) 33.8	(92) 66.2
Consume food from canteens/restaurants.	(92) 66.2	(47) 33.8

Supplement use was mostly on their own by the athletes themselves, with minimal influence from the coaches/trainers. very low. However, the main source of guidance on supplement use was from their coaches (Figure 2). They faced difficulties in getting a healthy diet, mainly due to a lack of accessibility to healthy food items and unaffordability (Figure 3).

Association of knowledge, attitudes, and practices scores with selected variables

A satisfactory level of knowledge was defined as achieving a total score exceeding 5, and the majority of participants (92.8%) exhibited a commendable knowledge base concerning sports nutrition. The analysis revealed a statistically significant positive correlation between knowledge score and age. However,

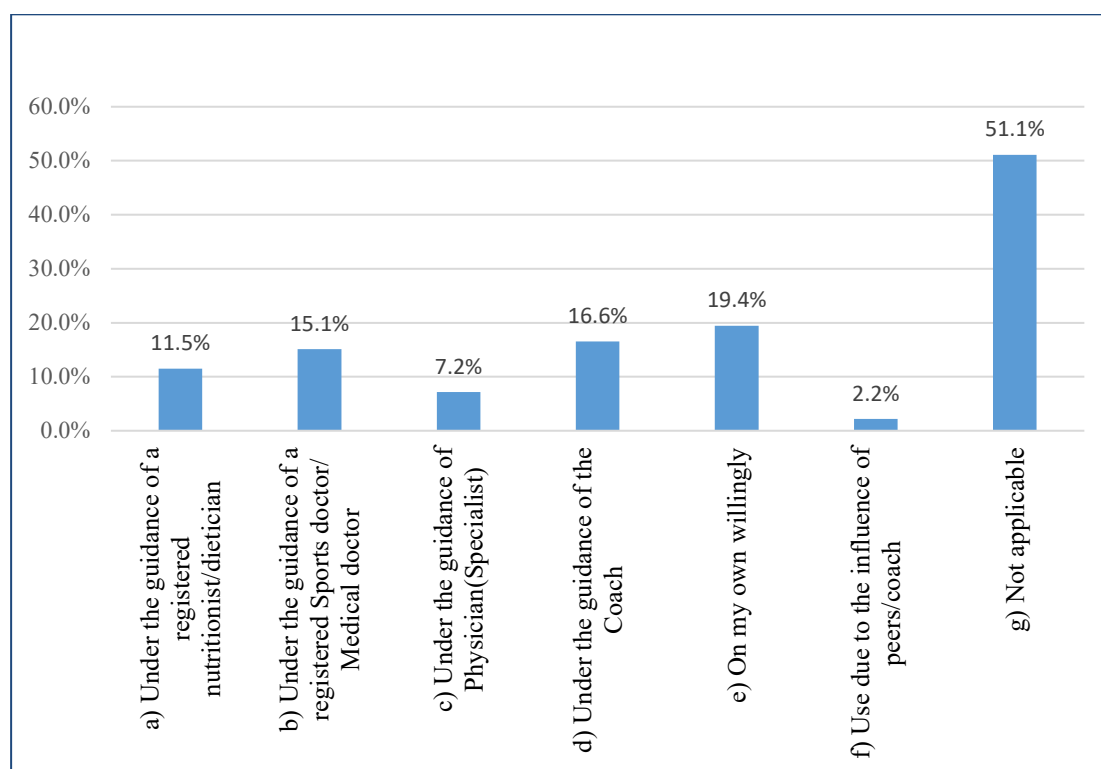
there were no statistically significant correlations observed between knowledge score and BMI or income levels (Table 7).

Positive attitudes were defined as achieving a total score of above 25, and the majority (99.3%) of them had positive attitudes towards sports nutrition. Attitude scores did not show any statistically significant association with age, BMI, or income category (Table 7).

It was considered “good practice” when the total score for practices was above 5, and a significant majority (59.71%) of them had overall good practices. Practice scores showed a negative association with BMI, while there was no association with age or monthly income (Table 7).

Table 6. Supplement consumption

Type of the supplement	Daily	Frequently (3 - 4 days/week)	Sometimes (1 - 2 days/week)	Rarely (2 - 3 days/month)	Not at all
	(N)%				
Vitamin/multi-vitamins	(24)17.3	(24)17.3	(36)25.9	(22)15.8	(33)23.7
Calcium	(24)17.3	(16)11.5	(38)27.3	(17)12.2	(44)31.7
Iron	(19)13.7	(20)14.4	(39)28.0	(23)16.6	(38)27.3
Whey-proteins	(18)12.9	(33)23.7	(26)18.7	(11)7.9	(51)36.7
Casein	(14)10.0	(17)12.2	(34)24.4	(18)12.9	(56)40.3
Carnitine	(10)7.2	(24)17.3	(26)18.7	(19)13.7	(60)43.2
Creatine	(11)7.9	(18)13.0	(32)23.0	(20)14.4	(58)41.7
Nitrate	(9)6.4	(21)15.1	(30)21.6	(19)13.7	(60)43.2
Phosphates	(13)9.3	(23)16.6	(25)17.9	(16)11.5	(62)44.6
Bicarbonate	(11)7.9	(21)15.1	(29)20.9	(14)10.0	(64)46.0

**Figure 2.** Sources of directions for using supplements.

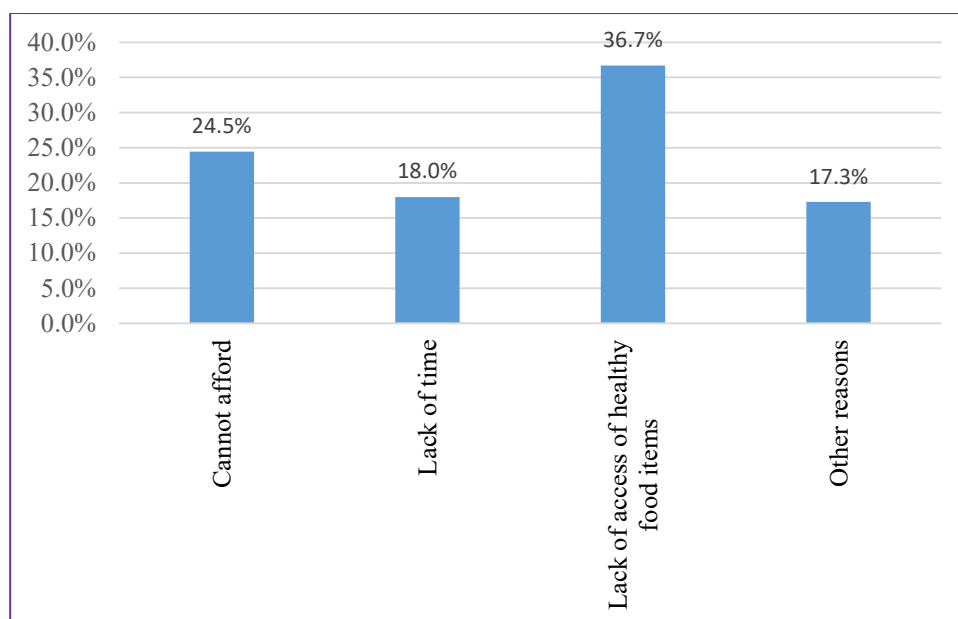


Figure 3. Reasons for consuming an unhealthy diet.

Table 7. Association of knowledge, attitudes, and practices scores with age, BMI, and income

Variables		r	p
Age	Knowledge score	0.224	0.008
	Attitude score	0.103	0.228
	Practice score	0.050	0.556
BMI	Knowledge score	0.018	0.348
	Attitude score	-0.038	0.656
	Practice score	-0.201	0.018
Income category	Practice score categories		0.630*
	Attitude score categories		0.381*
	Knowledge score categories		0.583*

*Note: BMI = Body mass index, Pearson correlation, *Chi-squared test was used in the analysis. $P < 0.05$ was considered as significant.*

DISCUSSION

Knowledge on nutrition

We found that the knowledge of basic nutrition is grossly inadequate and the majority of university athletes did not receive a formal education on nutrition. Most of the athletes

were not aware of the main nutrients and the main food categories that need to be included in the daily diet. Even though their basic nutrition knowledge is poor, the majority of them showed satisfactory knowledge of different aspects of sports nutrition. Findings from an Indian study corroborated this observation; they revealed commendable

knowledge levels on sports nutrition among college-level sports participants (Nazni & Vimala, 2010). In contrast, an American study focusing on female university indoor volleyball athletes showed inadequate knowledge on sports nutrition and suboptimal dietary practices falling short of recommended guidelines (Danh et al., 2021). Contrasting results were observed in a study done among track and field Indian athletes, among whom a significant majority (92%) had a good basic knowledge of sports nutrition and 42% were aware of the different food groups (Supriya & Ramaswami, 2013). A study conducted among adolescent sports trainees in Bangladesh showed that 89.6% of the athletes had not received an education on nutrition but more than half (57.3%) had good nutrition knowledge (Bakhtiar et al., 2021). According to research conducted in Nepal, 85.9% of the athletes had not attended a nutrition class, but 54.1% of them had good knowledge (Thapa et al., 2023). In contrast to this Heikkilä et al. described that Finnish endurance athletes tend to have a low average knowledge score on nutrition (Heikkilä et al., 2018). The similarities of the findings in studies done in Bangladesh, Nepal, and India with the present study could be due to more or less similar socioeconomic and literacy backgrounds of the South Asian countries.

In the present study, the coaches emerged as the primary source of nutrition knowledge while registered nutritionists and dieticians were consulted least. In line with this, several other studies showed similar findings where coaches/trainers were the main source of information. Danh et al. disclosed that the top source of information among female volleyball athletes was their trainers (Danh et al., 2021). A study conducted in Nepal revealed that coaches were the main source of nutrition-related information (24.9%) (Thapa et al., 2023). An online survey among Malaysian university students revealed that their academicians are the primary reference for their knowledge (Nor Azizam et al., 2022). In contrast to this, Australian team sports players prefer the dietician to obtain the sports nutrition information (Trakman et al., 2019). A study

conducted in Bangladesh revealed that the main source of nutrition information is textbooks (37%) (Bakhtiar et al., 2021). Coaches play a key role in enhancing the nutrition-related knowledge of athletes. Thus, steps must be taken to enhance the nutrition-related knowledge of coaches, to ensure that they convey correct information to their trainees. It has also been observed that athletes who receive formal education on nutrition have better knowledge scores (Abbey et al., 2017). This signifies that there is a need to provide more opportunities for university athletes to receive a formal nutrition education.

In the present study, it was found that, with increasing age, the athletes showed better knowledge scores. However, knowledge score did not show a significant association with BMI and income categories. This finding was further supported by a research conducted in Bangladesh which has suggested a significant association between knowledge score and age, but not with BMI (Bakhtiar et al., 2021). This phenomenon may be due to the notion that athletes may improve their knowledge of healthy dietary habits through years of training and experience, potentially enhancing their performances.

Attitudes towards nutrition

In this study, a significant majority of athletes (99.2%) displayed positive attitudes towards sports nutrition. They recognized the role of proper nutrition in enhancing physical fitness, performance, and overall health. However, some held unfavorable beliefs, such as considering fasting a quick weight-loss method or thinking that increased water intake leads to weight gain (29.5%). In addition to that, there was a considerable number of participants holding to the misconception that expensive foods are superior for performance enhancement. This could discourage exploring alternative low-cost, locally available dietary sources for nutrition. In comparison to the diet of the general population, athletes require specialized nutrition to meet their heightened physical activity levels and increased fluid needs due to sweating (Rodriguez et al., 2009).

In a study conducted among 102 Indian college sportsmen, the majority of the athletes (60%) believed that the nutritional needs of the athletes are different from those of the normal population which is similar to the findings of the present study (Nazni & Vimala, 2010). Athletes need adequate fluids before, during, and after exercises to avoid potentially life-threatening dehydration and heat injuries (Rodriguez et al., 2009). In contrast to the present study, the negative viewpoint that water intake increases weight was not commonly seen among college athletes in India and 86.6% strongly disagreed with this statement (Nazni & Vimala, 2010). This negative viewpoint may adversely affect the fluid intake by the athletes, which can have detrimental effects on their health. Among 178 track and field athletes in India, only 47% showed positive attitudes towards nutrition, which is in disagreement with the findings of the current study. Many Indian athletes strongly disagreed (60%) with the incorrect statements "fasting is the best method to lose weight while it was 21.6% in our study. According to their findings 46% were in the view that expensive foods are better and improve athletic performance when we found it was 21.6% (Supriya & Ramaswami, 2013). It is a positive sign that athletes believing good nutrition improves athletic performance, which is consistent with the findings of the present study.

According to the current study, attitudes did not show any statistically significant relationship with age, BMI, or income. Other researchers also suggested that attitudes were not associated with age or BMI among adolescent sports trainees in Bangladesh (Bakhtiar et al., 2021). In a study done in Nepal among national-level athletes, it was observed that attitude was not associated with age or income (Thapa et al., 2023).

Dietary practices and supplement use

The majority of the athletes had good dietary practices (59.71%) according to the present study. Many practiced carbohydrate loading before the competition, used sports drinks

during the competition, and obtained three main meals per day containing a balanced diet. They also timed meals and changed the type of food intake during training sessions and competitions. Consuming homemade food, not skipping meals during competitions, and not missing breakfast frequently were some of the good practices observed among the participants of the current study.

A study conducted among college athletes in India showed that only a few athletes practiced carbohydrate loading (38%) (Nazni & Vimala, 2010). This is in contrast to the findings in the present study. However, in a study conducted among national-level athletes in Nepal, the majority consumed recommended carbohydrate intake (Thapa et al., 2023). A high carbohydrate diet before competitions improves muscle glycogen stores, which in turn improves athletic performance (Rodriguez et al., 2009). Sports drinks are a convenient dietary supplement that is used by athletes as a quick way to replenish water and electrolytes (Rodriguez et al., 2009). About 53.2% of the athletes in this study used sports drinks while its use was not common among Indian college-level athletes (Nazni & Vimala, 2010; Supriya & Ramaswami, 2013) and USA football players (34.1%) used sports drinks daily (Abbey et al., 2017).

The training diet for athletes should consist of an adequate amount of nutrients to provide fuel for the additional energy requirement. The majority of Indian track and field athletes (54%) did not change their dietary pattern during times of competition (Supriya & Ramaswami, 2013) which is not in line with our findings. However, another research among Indian college athletes demonstrated that the significant number of them (63.3%) reported changing their dietary patterns at times of competition in line with the present study (Nazni & Vimala, 2010). Athletes should be knowledgeable about the type, size, and timing of meals before exercise, during exercise, and the recovery period (Rodriguez et al., 2009). Hence, they themselves have the

capacity to manage their diet to a reasonable extent.

Practice score was not associated with age or income, but it was negatively associated with BMI in the present study. Athletes with low BMI were observed to have good practices. In contradiction to this, practice score was associated with income according to a study conducted among national-level athletes in Nepal. Athletes with a high family income had good practice scores compared to those with a low family income (Thapa et al., 2023). As a low-income country, this is an area that needs to be researched further in Sri Lanka.

The majority of the Sri Lankan university athletes were non-vegetarians and only a minority were strict vegetarians. This is consistent with the findings of many other studies conducted among athletes (Ciuris et al., 2019; Long et al., 2011) and it has been found that only 8% of international athletes are vegetarians (Malsagova et al., 2021). Yet, data is scarce to suggest that one type of a particular diet is superior to others in terms of improving performances (Malsagova et al., 2021).

Multivitamins/vitamins, calcium, iron, and whey proteins were commonly used supplements by university athletes daily, according to the present study. In support to this finding, another local study had shown that among national-level athletes aged 18-35 years, multivitamins were the most commonly used supplement (de Silva et al., 2010). Young athletes frequently use supplements to improve their performance in highly competitive sports (Parnell et al., 2015). A study done in Singapore showed that sports drinks (90.4%), multivitamins (30.2%), and traditional products like essence of chicken (11.1%) and bird's nest (11.1%) were among the commonly used supplements. However, among 348 international-level athletes, proteins were the principal supplement used (Jovanov et al., 2019). This distinction may be due to regional differences in the availability and affordability of supplements.

Among the supplement users, most of the athletes had decided to take supplements on their own without the guidance of a nutritionist/dietician in the current study. Similarly, another local study displayed only a very few of the national-level athletes obtained specialist advice prior to supplement use (de Silva et al., 2010). In an international study, coaches were identified as the main source of information among 348 international-level athletes (Jovanov et al., 2019). Coaches had the greatest influence on supplementation use by junior national-level track and field athletes in the United Kingdom; though they had access to a dietician, they did not utilize that opportunity properly (Nieper, 2005). It is evident that coaches play a crucial role and therefore it is necessary to improve their knowledge with regards to supplement use. Unsupervised supplement use exposes the athletes to many health risks and doping (Rashani et al., 2021). In addition to that, steps need to be taken to further improve the knowledge on supplement use among university athletes.

In the present study, lack of access to healthy food was the main reason for consuming an unhealthy diet. Inability to afford and lack of time were some of the other reasons rated highest. American football players also stated that they do not have time to prepare a healthy meal and they did not also consider the cheap food options healthy (Long et al., 2011). In congruent with the findings, Australian elite athletes also reported time constraints as a major barrier to obtaining a healthy diet. Financial difficulties were also among their other reasons (Heaney et al., 2008).

The main strength of our study was being able to explore a group of athletes who had been under researched. However, the small sample size and selection of only two state universities are some of the limitations. Thus, we recommend future studies with a larger sample size, including both state and non-state universities.

CONCLUSIONS

Sri Lankan university athletes have satisfactory knowledge, attitudes, and practices regarding sports nutrition, even though the majority had not received a formal education on sports nutrition. However, there is a noticeable gap in their understanding of fundamental nutritional concepts. Interestingly, coaches play a significant role in shaping athletes' nutritional habits. Financial constraints and limited access to nutritious food options emerge as the primary barriers to maintaining a healthy diet. This highlights the pressing need for the implementation of structured educational programs which target both athletes and coaches. It is recommended to improve the availability healthy-low-cost food options for athletes.

CONFLICT OF INTEREST

The authors declare that they do not have a conflict of interest regarding the funding or the manuscript.

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AUTHOR CONTRIBUTION

Chandima Madhu Wickramathilake – contributed to concept, design, data collection, data analysis & manuscript writing, Yasara N. Randombage - data analysis & manuscript writing, Ananda Chandrasekara - concept, design, data collection, and manuscript review. All authors read and approved the final version of the manuscript.

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REFERENCES

- Abbey, E. L., Wright, C. J., & Kirkpatrick, C. M. (2017). Nutrition practices and knowledge among NCAA Division III football players. *J Int Soc Sports Nutr*, 14, 13. <https://doi.org/10.1186/s12970-017-0170-2>
- Andrews, A., Wojcik, J. R., Boyd, J. M., & Bowers, C. J. (2016). Sports Nutrition Knowledge among Mid-Major Division I University Student-Athletes. *J Nutr Metab*, 2016, 3172460. <https://doi.org/10.1155/2016/3172460>
- Bakhtiar, M., Masud-Ur-Rahman, M., Kamruzzaman, M., Sultana, N., & Rahman, S. S. (2021). Determinants of nutrition knowledge, attitude and practices of adolescent sports trainee: A cross-sectional study in Bangladesh. *Heliyon*, 7(4), e06637. <https://doi.org/10.1016/j.heliyon.2021.e06637>
- Baranauskas, M., Stukas, R., Tubelis, L., Žagminas, K., Šurkienė, G., Švedas, E., Giedraitis, V. R., Dobrovolskij, V., & Abaravičius, J. A. (2015). Nutritional habits among high-performance endurance athletes. *Medicina (Kaunas)*, 51(6), 351-362. <https://doi.org/10.1016/j.medici.2015.11.004>
- Ciuris, C., Lynch, H. M., Wharton, C., & Johnston, C. S. (2019). A Comparison of Dietary Protein Digestibility, Based on DIAAS Scoring, in Vegetarian and Non-Vegetarian Athletes. *Nutrients*, 11(12). <https://doi.org/10.3390/nu11123016>
- Danh, J. P., Nucci, A., Andrew Doyle, J., & Feresin, R. G. (2021). Assessment of sports nutrition knowledge, dietary intake, and nutrition information source in female collegiate athletes: A descriptive feasibility study. *J Am Coll Health*, 1-9.

- <https://doi.org/10.1080/07448481.2021.1987919>
- de Silva, A., Samarasinghe, Y., Senanayake, D., & Lanerolle, P. (2010). Dietary supplement intake in national-level Sri Lankan athletes. *Int J Sport Nutr Exerc Metab*, 20(1), 15-20. <https://doi.org/10.1123/ijsnem.20.1.15>
- Desbrow, B. (2021). Youth Athlete Development and Nutrition. *Sports Med*, 51(Suppl 1), 3-12. <https://doi.org/10.1007/s40279-021-01534-6>
- Heaney, S., O'Connor, H., Naughton, G., & Gifford, J. (2008). Towards an understanding of the barriers to good nutrition for elite athletes. *International Journal of Sports Science & Coaching*, 3(3), 391-401.
- Heikkilä, M., Valve, R., Lehtovirta, M., & Fogelholm, M. (2018). Nutrition Knowledge Among Young Finnish Endurance Athletes and Their Coaches. *Int J Sport Nutr Exerc Metab*, 28(5), 522-527. <https://doi.org/10.1123/ijsnem.2017-0264>
- Jovanov, P., Đorđić, V., Obradović, B., Barak, O., Pezo, L., Marić, A., & Sakač, M. (2019). Prevalence, knowledge and attitudes towards using sports supplements among young athletes. *J Int Soc Sports Nutr*, 16(1), 27. <https://doi.org/10.1186/s12970-019-0294-7>
- Long, D., Perry, C., Unruh, S. A., Lewis, N., & Stanek-Krogstrand, K. (2011). Personal food systems of male collegiate football players: a grounded theory investigation. *J Athl Train*, 46(6), 688-695. <https://doi.org/10.4085/1062-6050-46.6.688>
- Malsagova, K. A., Kopylov, A. T., Sinitsyna, A. A., Stepanov, A. A., Izotov, A. A., Butkova, T. V., Chingin, K., Klyuchnikov, M. S., & Kaysheva, A. L. (2021). Sports Nutrition: Diets, Selection Factors, Recommendations. *Nutrients*, 13(11). <https://doi.org/10.3390/nu13113771>
- Mountjoy, M., Sundgot-Borgen, J. K., Burke, L. M., Ackerman, K. E., Blauwet, C., Constantini, N., Lebrun, C., Lundy, B., Melin, A. K., Meyer, N. L., Sherman, R. T., Tenforde, A. S., Klungland Torstveit, M., & Budgett, R. (2018). IOC consensus statement on relative energy deficiency in sport (RED-S): 2018 update. *Br J Sports Med*, 52(11), 687-697. <https://doi.org/10.1136/bjsports-2018-099193>
- Nazni, P., & Vimala, S. (2010). Nutrition knowledge, attitude and practice of college sportsmen. *Asian J Sports Med*, 1(2), 93-100. <https://doi.org/10.5812/asjism.34866>
- Nieper, A. (2005). Nutritional supplement practices in UK junior national track and field athletes. *Br J Sports Med*, 39(9), 645-649. <https://doi.org/10.1136/bjsm.2004.015842>
- Nor Azizam, N. S., Yusof, S. N., Amon, J. J., Ahmad, A., Safii, N. S., & Jamil, N. A. (2022). Sports Nutrition and Food Knowledge among Malaysian University Athletes. *Nutrients*, 14(3). <https://doi.org/10.3390/nu14030572>
- Nutrition Division, M. o. H. (2022). Food Based dietary Guidelines for Sri Lankans. <https://nutrition.health.gov.lk/english/resource/1317/>
- Parnell, J. A., Wiens, K., & Erdman, K. A. (2015). Evaluation of congruence among dietary supplement use and motivation for supplementation in

young, Canadian athletes. *J Int Soc Sports Nutr*, 12, 49. <https://doi.org/10.1186/s12970-015-0110-y>

Rashani, S. A. N., Pigera, S., Fernando, P. N. J., Niriella, M. A., Jayawickreme, S. J., & De Silva, A. P. (2021). Dietary Supplement Usage, Associated Knowledge and Attitudes of Sri Lankan National-Level Athletes: A Cross Sectional Study. *Journal of Exercise and Nutrition*, 4(3).

Rodriguez, N. R., Di Marco, N. M., & Langley, S. (2009). American College of Sports Medicine position stand. Nutrition and athletic performance. *Med Sci Sports Exerc*, 41(3), 709-731. <https://doi.org/10.1249/MSS.0b013e31890eb86>

Stroud, C., Walker, L. R., Davis, M., & Irwin, C. E., Jr. (2015). Investing in the health and well-being of young adults. *J Adolesc Health*, 56(2), 127-129. <https://doi.org/10.1016/j.jadohealth.2014.11.012>

Supriya, V., & Ramaswami, L. S. (2013). Knowledge, Attitude And Dietary

Practices Of Track And Field Athletic Men And Women Aged 18-22 Years. *International journal of innovative research and development*, 2.

Thapa, M., Neupane, A., Shrestha, S. K. D., Nepal, P., Upadhyaya, A., Niraula, P., Shrestha, R. K., & Sunuwar, D. R. (2023). Factors affecting nutritional knowledge, attitude, practices and dietary intake among national players in Kathmandu, Nepal: a cross-sectional study. *BMC Sports Sci Med Rehabil*, 15(1), 73. <https://doi.org/10.1186/s13102-023-00691-7>

Tian, H. H., Ong, W. S., & Tan, C. L. (2009). Nutritional supplement use among university athletes in Singapore. *Singapore Med J*, 50(2), 165-172.

Trakman, G. L., Forsyth, A., Hoyer, R., & Belski, R. (2019). Australian team sports athletes prefer dietitians, the internet and nutritionists for sports nutrition information. *Nutr Diet*, 76(4), 428-437. <https://doi.org/10.1111/1747-0080.12569>