

Sports nutrition knowledge, attitude, and practice among male gymnasium users in Jordan

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ABSTRACT

Introduction: Proper nutrition is important for the health and performance of athletes. However, a lack of knowledge might lead to negative attitude and poor dietary practices. This study aimed to determine the levels of nutrition knowledge, attitude, and practice (KAP) among male gymnasium users in Jordan. **Methods:** A total of 138 male gymnasium users (21.1±2.8 years) from Jordan were recruited. Their height, weight, body mass index, and age were recorded. The KAP-Sports nutrition questionnaire that contains 25 questions regarding knowledge on basic sports nutrition, 12 questions regarding usual food choices and practices, and 20 questions on attitude towards nutrition and sports-enhancing diet were administered. Descriptive and Pearson correlation analyses were used to analyse the data. **Results:** Majority of the participants had moderate knowledge on sports nutrition (77.6%), neutral attitude (84.7%), and fair dietary practice (67.4%). Mean score for knowledge, attitude and practice were 18.1±2.6, 58.8±6.2, and 29.7±3.6, respectively. There was significant, weak correlation between knowledge and attitude ($r=0.18$, $p=0.048$), as well as between knowledge and practice ($r=0.20$, $p=0.018$). **Conclusion:** Knowledge is important to affect positive attitude and good dietary practices. However, gymnasium users in Jordan did not have a high level of knowledge that could lead to their positive attitude and good dietary practices. Thus, sports nutrition education is recommended to ensure that adequate and correct knowledge are disseminated to gymnasium users.

Keywords: exercise, gym goers, KAP, physically active

INTRODUCTION

Gymnasium exercises require an array of physical attributes, which include strength, power, endurance, and aesthetics. They have become popular nowadays not only for health and fitness purposes, but also for physical appearances. Besides following a proper exercise regime with correct techniques, a balanced nutrition is also essential

(Farhud, 2015). The main dietary goal for gymnasium users is to have proper nutrition to ensure optimum health, fitness, performance, and also to promote healthy dietary practices in the long term (Iwasa-Madge & Sesbreno, 2022; Purcell, 2013). It has been reported that nutrient deficiency can negatively affect health and performance of an individual (Saunders & Smith, 2010). Nevertheless,

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as reported in a recent article, it is still one of the problems that physically active individuals and athletes face (Jordan, Albracht-Schulte & Robert-McComb, 2020).

Nutrition knowledge positively impacts the implementation of healthy eating habits (Bradette-Laplante *et al.*, 2017). A previous study reported that higher knowledge resulted in higher adherence to nutritional recommendations (Scalvedi *et al.*, 2021). A sufficient amount of energy must be consumed by physically active individuals and athletes. Their total energy intake requirement is usually higher than the general population because they burn more fuel to produce energy during exercise (France, 2011). At least 55-65% of total energy should come from carbohydrates, 10-35% from protein, and 20-35% from fat in order to meet the nutritional requirements of physically active individuals for health and sports efficiency (ACSM, 2009). Inadequate caloric intake may result in muscle loss, hormonal dysfunction, bone density loss or failure, increased weakness, injury, and illness risks, and a longer recovery time (Burke, Loucks & Broad, 2006). Low energy intake can also have an influence on the body's micronutrient levels. Vitamins and minerals are essential for metabolising energy substrates, aiding in tissue building, fluid balance, carrying oxygen etc. Furthermore, increased exercise-induced reactive oxidative stress among athletes can be reduced by certain vitamins and minerals (Beck *et al.*, 2021; Benardot, 2012).

A variety of factors influence an individual's eating habits and food choices. These factors include food supply and security, individual's diet, bad habits such as alcohol and drug dependency, low income, busy lifestyle, lack of social support (i.e., living alone), nutrition knowledge, as well as personal

or family attitudes (Thurecht & Pelly, 2020). Currently, the level of nutrition knowledge has been a popular question among researchers. This is because a person with lack of knowledge is most likely to have negative attitude and poor dietary practices (Bakhtiar *et al.*, 2021). Furthermore, it was reported that malnutrition is generally due to a lack of nutrition information rather than a lack of food (James, Ralph & Bellizzi, 1997).

Several researches have been conducted to assess the knowledge, attitude, and practice (KAP) levels regarding sports nutrition among athletes, but reports among gymnasium users are lacking to date. Research has shown that many athletes possess limited nutrition knowledge (Riviere *et al.*, 2021; Spendlove *et al.*, 2012). Possibly, this may represent a misunderstanding of ineligible individuals providing nutrition tips for athletes, which consequently leads to principles of nutrition being misunderstood and/or improperly applied (Zinn, Schofield & Wall, 2006). It was previously reported that sports nutrition education increases sports nutrition knowledge, attitude, and dietary practice (KAP) among university student athletes (Kamarun Zaman, Muhamad & Che Jusoh, 2021). Thus, focus should be placed on educating physically active individuals and athletes about sports nutrition to increase their knowledge level and to ensure that they are getting correct information from valid and reliable sources.

To date, reports on sports nutrition KAP among gymnasium users is lacking. Hence, this study aimed to assess the sports nutrition knowledge, attitude, and practice of male gymnasium users in Jordan, as well as to look at the correlations between them. Findings from this research will add knowledge regarding KAP assessment. This could also create awareness among gymnasium users and their coaches to

improve knowledge and avoid myths and misinformation, which hopefully might lead to a positive attitude and good dietary practices in order to achieve optimum health, fitness, and performance.

MATERIALS AND METHODS

Research design

This study was a quantitative, cross-sectional study that included the assessment of sports nutrition knowledge, attitude, and practice (KAP) among male gymnasium users in Jordan. This study obtained ethical approval from the Human Research Ethics Committee of Universiti Sains Malaysia (JEPeM- USM, Approval code: 21030216). The study was conducted between July to December 2021.

Study population and recruitment process

A total of 138 participants ($n=138$) were recruited via convenient sampling method from seven gymnasiums located in different states of Jordan, which included Irbid, Jarash, Ajloun, Al-Mafraq, Al-Zarqa'a, Al-Salt, and Al-Karak. Male gymnasium users who exercised in the gymnasium for more than three times per week at least six months prior to the study, healthy, aged between 18–35 years, and understood the English language were recruited. All participants were given a detailed explanation regarding the objectives, procedures, benefits, risks, and possible discomforts that might occur during this study before signing the informed consent form.

Study procedures

Researchers visited several gymnasiums in Jordan to recruit the participants. Upon obtaining their written informed consent, anthropometry measurements were carried out, including standing

height and body weight (Stadiometer, SECA 284, German), and body mass index (BMI) calculation. Participants were also asked about his age and education level, which were recorded in the sociodemographic form.

To assess KAP scores on sports nutrition, a validated questionnaire developed by Hornstrom *et al.* (2011) was used. Cronbach's alpha score for this questionnaire was 0.79. The questionnaire was in the English language and was self-administered by each participant. The researcher was on standby whenever assistance was needed. The questionnaire was divided into three sections:

i) The first section comprised of knowledge on basic sports nutrition, which consisted of 25 questions. Each correct answer was scored as one mark (1) and each incorrect answer was given a zero (0). Total score was calculated by summing up the marks obtained for all questions. The maximum score for knowledge was 25. Knowledge level was categorised into three levels: High (scores 20 - 25), Moderate (scores 15 - 19), and Low (scores 0 - 14).

ii) The second section comprised of nutrition choices and nutrition practices, which consisted of 12 questions. For questions 1 to 7, participants were required to choose one out of four answer options (1 = every day, 2 = most days, 3 = occasionally, and 4 = rarely). For questions 8 - 12, participants needed to choose one out of four answer options (4 = four times or more per day, 3 = two or three times per day, 2 = once per day, and 1 = less than once per day). Total score was calculated by adding the marks obtained for each of the 12 questions. The maximum score for practice was 48. The level of nutrition practice was categorised into three:

Good (scores 40 - 48), Fair (scores 29 - 39), and Low (scores 0 - 28).

iii) The third section comprised of questions on attitude towards nutrition and sports-enhancing diet, which consisted of 20 questions. This section required participants to choose one out of four options (1 = strongly agree, 2 = agree, 3 = disagree, and 4 = strongly disagree). Total score was calculated by summing the marks obtained from questions 1 to 20. The maximum score for attitude was 80. Attitude level was categorised into three levels: Positive (scores 65 - 80), Neutral (scores 48 - 64), and Negative (scores 0 - 47).

Statistical analysis

Data were analysed using the IBM SPSS Statistics for Windows version 26.0 (IBM Corp, Armonk, New York, USA). Descriptive statistics and Pearson correlation analysis were carried out and the results were presented as mean±standard deviation (SD). Statistical significance was accepted at $p<0.05$.

RESULTS

In this study, a total of 138 male gymnasium users were recruited and completed the study. Anthropometry data of the participants are presented in Table 1. Education level of all participants was Bachelor's degree. The average duration of participation in gymnasium exercise was 2.46 ± 1.5 years, at least three times per week.

Table 1. Anthropometric data of the participants ($N=138$)

Characteristics	Mean±SD
Age (years)	21.1±2.8
Height (cm)	173.7±8.1
Weight (kg)	67.2±10.6
Body mass index (kg/m ²)	22.2±3.1

Table 2 shows the mean KAP score, as well as the frequency and percentage of each level of knowledge, attitude, and practice. The mean scores for knowledge, attitude, and practice were 18.1 ± 2.6 , 58.8 ± 6.2 , and 29.7 ± 3.6 , respectively. Majority of the participants had moderate level of knowledge on sports nutrition ($n=107$), making up 77.6%; while only 4.3% ($n=6$) and 18.1% ($n=25$) of the participants had low and high knowledge on sports nutrition, respectively. Out of 25 questions for knowledge, there were five questions that were wrongly answered by majority (more than 50%) of the participants. These questions asked about protein as the main energy source during exercise and fluid intake during exercise.

A majority (84.7%; $n=117$) of the participants had a neutral attitude, while another 5.1% ($n=7$) of participants had positive attitude and the remaining 10.2% ($n=14$) had negative attitude with regards to sports nutrition. It is interesting to highlight that majority of the participants (91.3%) cared about their coach's opinion in considering sports-enhancing diet practices and about 80% of the participants reported that their coach suggested that they should adopt a sports-enhancing diet. However, about 50% of them felt that their training schedule posed a problem to sports-enhancing diet practices.

For dietary practice, a total of 93 participants (67.4%) had a fair score and 45 participants (32.6%) had a poor score. However, none of the participants (0%) obtained a good score with regards to sports nutrition practice. From the data, it was noted that 50.7% of them frequently ate fast food like burgers, fried chicken, and sausages. In addition, majority had once a day or less of fruits (62%) and vegetables (71%).

Pearson correlation analysis revealed that there was a significant, positive

Table 2. KAP results of the participants ($N=138$)

KAP items	Mean score \pm SD	n (%)
Knowledge	18.1 \pm 2.6	
High (20-25 scores)		25 (18.1)
Moderate (15-19 scores)		107 (77.6)
Low (0-14 scores)		6 (4.3)
Attitude	58.8 \pm 6.2	
Positive (65-80 scores)		7 (5.1)
Neutral (48-64 scores)		117 (84.7)
Negative (0-47 scores)		14 (10.2)
Practice	29.7 \pm 3.6	
Good (40-48 scores)		0 (0.0)
Fair (29-39 scores)		93 (67.4)
Poor (0-28 scores)		45 (32.6)

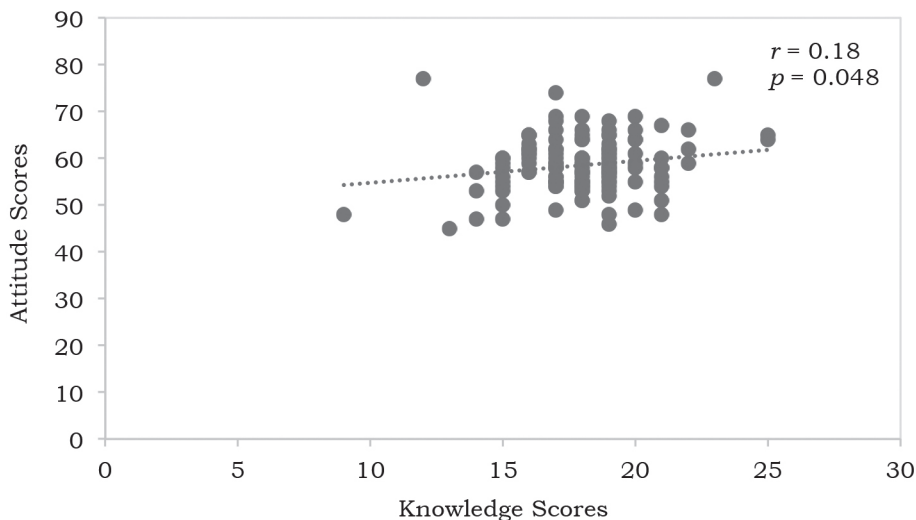
weak correlation between knowledge and attitude ($r=0.18$, $p=0.048$) (Figure 1), as well as knowledge and practice ($r=0.20$, $p=0.018$) (Figure 2). However, attitude and practice were not significantly correlated ($p=0.696$).

DISCUSSION

In general, results from the KAP analysis showed that the mean scores for knowledge, attitude, and practice (18.1 \pm 2.6, 58.8 \pm 6.2, and 29.7 \pm 3.6, respectively) corresponded to moderate,

neutral, and fair levels, respectively. In addition, it was found that knowledge and attitude, as well as knowledge and practice were significantly correlated, but there was no significant correlation between attitude and practice. These findings suggested that knowledge is a significant factor that affects attitude and practice.

As shown in Table 2, majority (77.6%) of the participants had a moderate knowledge regarding sports nutrition. As mentioned, studies among gym users

**Figure 1.** Correlation between knowledge scores and attitude scores

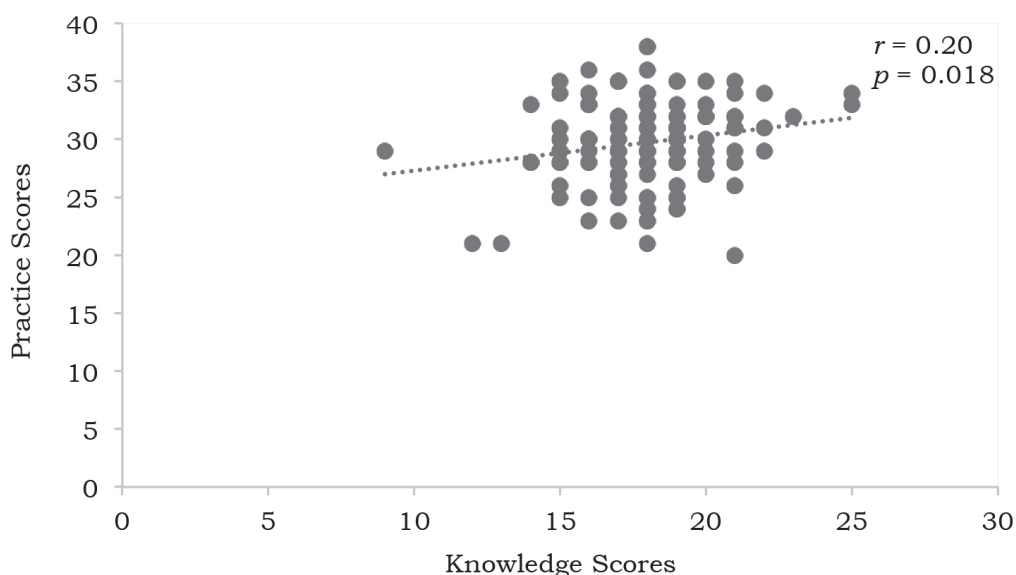


Figure 2. Correlation between knowledge scores and practice scores

are lacking to date, with less than five similar studies available in the literature. However, a previous study among university student athletes, which used a similar questionnaire to this present study, also reported that majority of the participants had a moderate knowledge level (Kamarun Zaman, Muhamad & Che Jusoh, 2021). In contrast to the present study findings, Wahlang & Baruah (2020) found that gym members in Guwahati, India had good knowledge, whereby males had better knowledge than females. The questionnaire used to assess nutrition knowledge level consisted of 19 sets of statements with three possible answers - “yes”, “no”, and “don’t know”. For evaluation, a correct answer was considered as one point, while an incorrect answer or a “don’t know” was regarded as zero. Another previous study reported that majority of their amateur male bodybuilders had excellent knowledge, with only 8.6% having mediocre understanding (Wamiti, 2015). A five-question questionnaire

was used to measure the participants’ nutrition knowledge. The overall score was calculated after each response was graded, where the lowest score was 6 and the maximum score was ten. This study reported that the average score for knowledge was 9.2. Thus, it is speculated that the present study finding was not similar to these previous studies due to differences in the questionnaire used.

Although all participants in the present study had a bachelor’s degree, less than 20% of them had a high knowledge level regarding sports nutrition. This could be attributed to lack of awareness, ignorance, or due to misunderstanding/misleading nutrition information received from people who are not qualified to provide such information. Besides that, it might also be due to their Bachelor’s degree, which was not related to nutrition or sports nutrition. Sports nutrition education is essential to increase knowledge of individuals (Bakhtiar et al., 2021, Siti Soraya et al., 2018; Rossi

et al., 2017). As reported in a previous study, athletes' knowledge level was significantly increased after attending sports nutrition classes, with majority of them having a high level of knowledge (Kamarun Zaman *et al.*, 2021). Thus, it is important to provide correct and appropriate nutrition knowledge on a regular basis through proper educational training. It is important to choose a suitable content, study duration, and teaching techniques to ensure effective knowledge dissemination. Online classes or micro-credential courses can be considered as one of the feasible ways to get knowledge.

As mentioned, majority of the participants in the present study had a moderate level of sports nutrition knowledge. Hence, it was not surprising to observe that majority of them had a neutral attitude (84.7%) and fair dietary practice (67.4%), with only 5.1% of participants having a positive attitude and none of them had good dietary practice. Likewise, Kamarun Zaman *et al.* (2021) also found that majority of their participants did not have a positive attitude and good dietary practice. In fact, majority of them had a neutral attitude (57.1%) and poor dietary practice (71.4%). Wamiti (2015) also reported that majority (56.2%) of the bodybuilders recruited in the study had a negative attitude regarding nutrition despite excellent knowledge level obtained by the participants. This was quite surprising and it was speculated that this situation might be attributed to a lack of awareness despite having substantial knowledge.

The correlation analysis revealed that knowledge was significantly correlated with attitude and practice (Figures 1 and 2). The correlation was positive, which meant that as knowledge increased, attitude and practice also improved. This explains the neutral average score for attitude and fair average score

for practice obtained in this study in response to the moderate knowledge level of the participants (Table 2). However, the correlation observed in the present study ($r < 0.4$) was weak, according to LaMorte (2021), who described that an r value between 0.4 - 0.6 is considered as moderate, while $r \geq 0.6$ is considered as a strong correlation. This positive correlation also can be seen in a previous study, which found that increased knowledge after attending a nutrition class also increased the participants' attitude and dietary practice (Kamarun Zaman *et al.*, 2021). In this previous study, the percentage of participants having a positive attitude increased from 42.9% to 61.9%, while the percentage of participants having poor dietary practice reduced from 71.4% to 23.8%.

Similarly, researchers also noted that individuals who are familiar with nutrition guidelines will more likely incorporate them into their everyday eating patterns (Parr, Porter & Hodgson, 2016). In the study, a total of 348 coaches, 179 athletic trainers, and 2,977 athletes in high school and college settings answered a set of questionnaires about their nutrition knowledge and practices. Participants were quizzed on their knowledge, comprehension, and application of the basic four dietary groups (vegetables and fruits, grain foods, milk and milk products, and protein foods). As a result, 68% of the participants were aware of the basic four dietary groups and 71% of the participants consumed them accordingly.

CONCLUSION

In conclusion, knowledge is important to affect a positive attitude and good dietary practice. Male gymnasium users in Jordan did not have a high knowledge that could lead to their positive attitude and good dietary practices.

Sports nutrition education is therefore recommended to ensure that adequate and correct knowledge are disseminated to this population in order to improve their attitude and dietary practices. Future studies may look at actual dietary intake and its relation to knowledge level, as well as gender differences.

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Authors' contributions

Al-Quran M, principal investigator, led the data collection, data analysis and interpretation, and prepared the draft of the manuscript; Muhamad AS, conceptualised and designed the study, advised on data analysis and interpretation, reviewed the manuscript; Ahmad NS and Ooi FK, advised on data analysis and interpretation, reviewed the manuscript.

Conflict of interest

Authors declare no conflict of interest.

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