

# Knowledge on sports nutrition among student-athletes in Perlis

Fariha Mohammad Fazilah<sup>1</sup>, Siti Azilah Atan<sup>2</sup>, Nurul Farha Zainuddin<sup>1</sup>, Ahmad Fikri Mohd Kassim<sup>1</sup>, Ahmad Dzulkarnain Ismail<sup>1</sup>, Al-Hafiz Abu Bakar<sup>1</sup>, Harris Kamal Kamaruddin<sup>1\*</sup>

<sup>1</sup>Faculty of Sports Science and Recreation, Universiti Teknologi MARA, Arau, Perlis, Malaysia, <sup>2</sup>Defence Fitness Academy, National Defence University of Malaysia, Kuala Lumpur, Malaysia

**ABSTRACT** **Introduction:** Sports nutrition is essential to improve exercise performance and maintain healthy body composition. However, the knowledge of balanced nutrition often being neglected by student-athletes and coaches. Aims: This study aimed to investigate sports nutrition knowledge across gender and level of participation. **Materials and Methods:** The participants were 178 university student-athletes (96 males and 82 females) actively competing in various individual and team sports. The student-athletes completed a sports nutrition knowledge survey to determine the adequate score (mean >75%). **Results:** The overall sports nutrition knowledge was inadequate (61.6% ± 13.1%), specifically only 29 student-athletes who obtained >75% or higher. Male student-athletes score slightly higher than females (62.4% vs 61.6% score), respectively. However, there is no significant difference between gender and level of participation ( $P > 0.05$ ). There was no significant difference between the level of participation ( $P > 0.05$ ). **Conclusions:** There was inadequate sports nutritional knowledge among student-athletes regardless of gender and level of participation. The intervention to enhance sports nutritional knowledge and a balanced diet is important for health and optimal athletic performance. Future studies are needed to examine athletes' behaviour and nutritional intake before training or competition.

**Key Words:** Dietary intake, nutrition assessment, nutritional knowledge, sports

\*Address for correspondence:

E-mail: [harris540@uitm.edu.my](mailto:harris540@uitm.edu.my)

Submitted: 08-Jun-2021 Accepted in Revised Form: 15-Feb-2022 Published: 11-Aug-2022

## INTRODUCTION

Nutritional intake facilitated sporting performance, physical activity and recovery (Jeukendrup 2017). Athletes need to develop healthy dietary habits to maintain optimum body weight and health while maximising the training effects (Andrews et al. 2016). Few studies have been shown that some athletes had inadequate dietary intake related to energy and nutrient needs (Asencio and Garcia-Galbis 2015; Magee et al. 2017). The daily recommendation of carbohydrate intake varies depending on training intensity; for example, for moderate to high-intensity exercise (1–4 h), a 5 and

12 g/kg body mass were needed, while during moderate to high intensity (~1 h) was 3–5 g/kg body mass (Thomas et al. 2016). However, athletes were found to lack nutrition knowledge such as nutrition recommendations, dietary supplements and energy intake (Heikkilä et al. 2018). Therefore, identifying athletes' nutritional knowledge that can enhance dietary intake is particularly important.

Student-athletes must excel in academics and on the field and often be involved in a long hour of sport-specific practices and training

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: [WKHLRPMedknow\\_reprints@wolterskluwer.com](mailto:WKHLRPMedknow_reprints@wolterskluwer.com)

**How to cite this article:** Fazilah, F. M., Atan, S. A., Zainuddin, N. F., Kassim, A. F., Ismail, A. D., Bakar, A. A., Kamaruddin, H. K. (2022). Knowledge on sports nutrition among student-athletes in Perlis. *Malaysian Journal of Movement, Health & Exercise*, 11(1), 11-14.

Access this article online	
Quick Response Code:	Website: <a href="https://www.mohejournal.org">https://www.mohejournal.org</a>
	DOI: 10.4103/mohe.mohe_1_21

regimens to be successful (Andrews et al. 2016). A part of the crammed training schedule, proper sports nutrition and effective eating habits is often overlooked (Andrews et al. 2016). The importance of balancing nutrition intake among student-athletes was sometimes not emphasised enough by the professional staff who have the most contact with them (e.g., coaches, athletic trainers, physical trainers) (Andrews et al. 2016). Studies have shown that student-athletes have low sports nutrition knowledge although findings are mixed due to differences in populations and measures (Heaney et al. 2011). According to Jacobson and Aldana (1992), only 26.7% of 812 student-athletes could correctly identify the difference of fat-soluble vitamins, and 50% knew precisely the protein's function. Later, they also found that 330 student-athletes were low in sports nutrition knowledge. Only 29% of them could identify the correct daily recommendation for carbohydrate intake and less than that could correctly identify protein and fat daily recommendation (Jacobson and Aldana 1992). Similarly, sports nutritional knowledge is poor among 400 collegiate athletes, with mean overall score of 54.9% with on 9% of athletes deemed to have sufficient nutritional knowledge (Magee et al. 2017). Specifically, most of the athletes were found to lack knowledge regarding fluid replacement and dehydration. In contrast, nutritional knowledge among collegiate runners was scored higher than 70% on iron hydration and daily nutrition needs (Zawila et al. 2003). There was no difference in nutrition knowledge difference in division level participation but students who took nutrition courses scored higher. Despite these findings, little research has explored the nutritional knowledge among Malaysian student-athletes. Researchers repeatedly highlight the nutritional knowledge disparities among European and American college athletes. Thus, there is a need for researchers to include studies among local athletes where have different training and academic scenario.

Optimum nutrition supports and improves physical activity, sport and recovery (Karpinski 2012). To maintain proper body weight and overall health while maximising training effects, student-athletes must be familiar with the basic principles of sports nutrition. This learning must be balanced with their practice and competition schedules, academic coursework, personal preferences, cultural and religious influences and motivation for behaviour change (Heaney et al. 2011). However, to set up some counselling or educational programme, the foundation nutrition knowledge, followed by behaviours, must be understood. The purpose of this study was to determine the sports nutrition knowledge among Universiti Teknologi MARA Perlis university athletes across gender and participation levels.

## MATERIALS AND METHODS

### Participants

The participants for this study were 178 student-athletes level from Universiti Teknologi MARA (UiTM) Perlis in the northern region of Peninsular Malaysia, which was more than the minimum sample size of 20% for possible rejection (Krejcie and Morgan 1970). All the participated student-athletes were  $21.5 \pm 2.0$  years,

experience athletes in specific sports for  $2.5 \pm 3.0$  years and actively participated in 4–5 training sessions per week with at least 60 min per session. In addition, they were full-time students who had engaged in any competitive sporting event such as inter-university, inter-state or national level competition. A total of 30 individual or team sports have participated in the study. The characteristic of the participants is shown in Table 1.

### Instrument

The questionnaire on sport nutritional knowledge was created by Torres-McGehee et al. (2012). The questionnaire consisted of 21 true-false questions related to carbohydrates, proteins, fats, minerals, vitamins, hydrations, fitness and athletes' weight loss. A correct response was scored as +1 and an incorrect/unanswered response as 0. The maximum score for this test is 21, while the minimum score is 0. Scoring was marked independently by two researchers. The Malay translated questionnaire distributed with the Cronbach's alpha of 0.74–0.84 were detected. The participants were asked to answer the 20-item sport nutritional knowledge questionnaire. Examples of questions included 'protein is the main energy source for the muscle' and 'vitamin supplementation is recommended for all physically active people'. The responses to the sports nutrition questions were graded to determine the student-athletes nutrition knowledge score. When the student-athletes received an overall score of at least 75% out of 100%, they had adequate sports nutrition knowledge. A low level of nutrition knowledge was indicated by a score of <75% (Torres-McGehee et al. 2012).

### Data collection

All the data collection were collected using an electronic copy (Google forms). An electronic copy of the questionnaire was given to the participants containing a script to read and a letter explaining the purpose of the study and requesting their voluntary participation. The participants were informed that they could skip questions or leave the study at any time without consequence. Participants checked consent forms and were proceeded to answer the surveys. Participants were reminded to answer the questionnaire honestly and not to consult anyone for answers. Coaches or team captains were contacted to help the investigator data collection.

**Table 1: The characteristic of the student-athletes**

Characteristic	Frequency (%)
Gender	
Male	96 (53.9)
Female	82 (46.1)
<i>n</i>	178
Level of education	
Degree	85 (47.8)
Diploma	93 (52.2)
Level of participation	
College	31 (17.4)
Faculty	33 (18.5)
University	47 (26.4)
State	52 (29.2)
National	15 (8.4)

All survey data was kept anonymous, and consent forms were kept separately. The data collection was organised from September 2020 to March 2021 academic year. The study was approved University Research Ethics Committee UiTM (600-UiTMPs(HEA/KPP/KK-5/2) following the Helsinki guidelines.

### Statistical analysis

Data were analyzed using the descriptive Statistical Package for the Social Sciences (SPSS 26.0 version, Armonk, NY: IBM Corp.). The differences in nutritional knowledge scores between males and females were analyzed using independent *t*-tests. In comparison, a one-way analysis of variance (ANOVA) was utilised to determine the score difference between different levels of sporting participation levels. The data were reported in mean  $\pm$  standard deviation, and the significance level was set a  $P < 0.05$ .

## RESULTS

The overall sports nutrition knowledge for student-athletes was  $61.6\% \pm 13.1\%$  out of 100% score below the average adequate knowledge of 75% (Torres-McGehee *et al.* 2012). Only 29 student-athletes achieve an adequate sports nutrition knowledge score of 75% or higher with a mean score of  $89.5\% \pm 11.0\%$ . The remaining 149 student-athletes who obtained inadequate nutritional knowledge score have a mean score of  $57.1\% \pm 10.5\%$ .

The nutritional knowledge score for male student-athletes were  $61.6\% \pm 12.4\%$  while for female were  $61.6\% \pm 14.0\%$ , which both was inadequate score. An independent *t*-test was used to determine the difference between male ( $n = 96$ ) and female ( $n = 82$ ) and there was no significant difference between gender  $t(176) = 0.728, P = 0.395$ .

Student-athletes who had to compete in national have the highest nutritional knowledge score ( $64.7\% \pm 13.2\%$ ) compared with other levels of participation. In contrast, faculty-level student-athletes had the least nutritional knowledge ( $57.4\% \pm 13.7\%$ ) [Table 2]. However, neither level of participation achieved adequate sports nutritional knowledge scores. The one-way ANOVA analysis revealed no significant differences in the level of participation ( $F_{[4, 173]} = 1.243, P = 0.294$ ).

## DISCUSSION

The vast majority of the student-athletes had inadequate sports nutrition knowledge score. Only 16.3% ( $n = 29$ ) out of 178

student-athletes scored 75% on nutritional knowledge test. It is now apparent that these student-athletes lack nutrition knowledge and compete in various competition levels with inadequate nutrition knowledge. The current finding was similar to previously reported where the athlete was found to be lack nutritional knowledge (Andrews *et al.* 2016; Bird and Rushton 2020). According to Andrews *et al.* (2016), student-athletes rely on nutrition knowledge from coaches, sports trainers or trainers within different departments. Perhaps, this study's lack of nutritional knowledge may be due to the lack of emphasis on nutrition from this support group.

Furthermore, there is evidence of different nutritional knowledge among the coaching staff. Torres-McGehee *et al.* (2012) revealed that the strength and conditioning trainers and the athletic trainer had an adequate nutritional knowledge score of  $\sim 77.8\%$ , while the team coaches were 65.9%. The average scores for the athletes were 54.9%, indicating a lack of emphasis on nutritional knowledge among athletes by coaches. Coaching staff such as trainers and sports specialist also did not demonstrate sufficient high sports nutritional knowledge (Rockwell *et al.*, 2001).

The gender differences between males and females seem to have similar inadequate sports nutritional knowledge. In contrast, Spronk *et al.* (2015) study revealed that female athletes have higher nutritional knowledge and diet quality than male counterparts, with 5.6% and 5.6%, respectively. In addition, the author reported that female athletes tend to consult with a professional dietitian and to seek advice. Similarly, female distance runners were found to have adequate nutritional knowledge where bodyweight management and nutrition likely affect performance (Zawila *et al.* 2003). Other studies also indicated that female athletes formerly had significantly better nutritional knowledge than males regardless of age range, level of education or team/individual sport participation (Spendlove *et al.* 2012). At the same time, female elite ultramarathon runners have a higher nutritional score than their male counterparts (Citarella *et al.* 2019).

Another important finding in this study was that there was no significant difference in the level of participation among the student-athletes. It seems that student-athletes who had experience competing at the national level have higher sports nutritional knowledge; however, the score is inadequate and did not significantly differ between other participation levels. A study by Andrews *et al.* (2016) discovered no difference between the level of sports nutrition knowledge between senior and junior players (experience vs. less experience). A study conducted by Grete *et al.* (2011) found no similar finding in sports nutritional knowledge between class years among softball players. Thus, the athlete's sports nutritional knowledge was indistinguishable between difference competing levels. Furthermore, it is difficult to compare previous studies since there were inconsistencies in sample size, population and inconsistent measuring tools used and intervention.

This study poses several limitations. The finding of this study was only generalised only to student-athletes to University Teknologi

**Table 2: Sport nutritional knowledge at a different level of participation levels**

Level of participation	n	Score mean $\pm$ SD (%)
College	31	61.7 $\pm$ 15.2
Faculty	33	57.4 $\pm$ 13.7
University	47	61.7 $\pm$ 12.7
State	52	63.2 $\pm$ 12.7
National	15	64.7 $\pm$ 13.2

*n* = Number of participants; <75% score consider inadequate nutritional knowledge. SD: Standard deviation

MARA Perlis, where it did not imply to all student-athletes in Malaysia. There is no assessment on the daily energy intake, food habit, hydration level or nutrition education course to understand student-athletes' regular nutritional intake.

## CONCLUSION

This research provides athletes with details on the prevalence of nutritional awareness among university athletes. Although there was no difference in sports nutrition knowledge in gender and level of participation, the overall knowledge exhibits an inadequate level. Low nutrition knowledge could lead to poor dietary choices that inhibit improper refuelling for recovery and maintaining sporting performance. Student-athletes in Malaysia may have different sporting contexts and coaching scenarios where hectic training schedules and academics must be balanced. Future research should include investigating knowledge, perception and behaviour of student-athletes in a sport-specific recommendation. In addition, dietary habits pre- and post-training/event, competition meals and regular food intake should be obtained to investigate the improvement of sports nutritional knowledge.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

- Andrews, A., Wojcik, J. R., Boyd, J. M., & Bowers, C. J. (2016). Sports nutrition knowledge among mid-major division I university student-athletes. *Journal of Nutrition and Metabolism*, 2016, 3172460.
- Asencio, L. B., & Garcia-Galbis, M. R. (2015). Energy and macronutrient intake in female athletes. *Nutricion Hospitalaria*, 32(5), 1936-1948.
- Bird, S. P., & Rushton, B. D. (2020). Nutritional knowledge of youth academy athletes. *BMC Nutrition*, 6(1), 1-8.
- Citarella, R., Itani, L., Intini, V., Zucchinali, G., Scevaroli, S., Kreidieh, D., Tannir, H., El Masri, D., & El Ghoch, M. (2019). Nutritional knowledge and dietary practice in elite 24-hour ultramarathon runners: A brief report. *Sports*, 7(2), 44.
- Grete, R. H., Carol, A. F., Jane, E. E., & Kimberli, P. (2011). Nutrition knowledge, practices, attitudes, and information sources of mid-American conference college softball players. *Food and Nutrition Sciences*, 2(2), 109-117.
- Heaney, S., O'Connor, H., Michael, S., Gifford, J., & Naughton, G. (2011). Nutrition knowledge in athletes: A systematic review. *International Journal of Sport Nutrition and Exercise Metabolism*, 21(3), 248-261.
- Heikkilä, M., Valve, R., Lehtovirta, M., & Fogelholm, M. (2018). Nutrition knowledge among young Finnish endurance athletes and their coaches. *International Journal of Sport Nutrition and Exercise Metabolism*, 28(5), 522-527. doi: 10.1123/ijnsnem.2017-0264.
- Jacobson, B. H., & Aldana, S. G. (1992). Current nutrition practice and knowledge of varsity athletes. *The Journal of Strength & Conditioning Research*, 6(4), 232-238.
- Jeukendrup, A. E. (2017). Periodized nutrition for athletes. *Sports Medicine (Auckland, N.Z.)*, 47(Suppl 1), 51-63. doi: 10.1007/s40279-017-0694-2.
- Karpinski, C. (2012). Exploring the feasibility of an academic course that provides nutrition education to collegiate student-athletes. *Journal of Nutrition Education and Behavior*, 44(3), 267-270.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610.
- Magee, P. J., Gallagher, A. M., & McCormack, J. M. (2017). High prevalence of dehydration and inadequate nutritional knowledge among university and club level athletes. *International Journal of Sport Nutrition and Exercise Metabolism*, 27(2), 158-168. doi: 10.1123/ijnsnem.2016-0053.
- Rockwell, M. S., Nickols-Richardson, S. M., & Thye, F. W. (2001). Nutrition knowledge, opinions, and practices of coaches and athletic trainers at a division I university. *International Journal of Sport Nutrition and Exercise Metabolism*, 11(2), 174-185.
- Spendlove, J. K., Heaney, S. E., Gifford, J. A., Prvan, T., Denyer, G. S., & O'Connor, H. T. (2012). Evaluation of general nutrition knowledge in elite Australian athletes. *British Journal of Nutrition*, 107(12), 1871-1880.
- Spronk, I., Heaney, S. E., Prvan, T., & O'Connor, H. T. (2015). Relationship between general nutrition knowledge and dietary quality in elite athletes. *International Journal of Sport Nutrition and Exercise Metabolism*, 25(3), 243-251.
- Thomas, D. T., Erdman, K. A., & Burke, L. M. (2016). Position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and athletic performance. *Journal of the Academy of Nutrition and Dietetics*, 116(3), 501-528. doi: 10.1016/j.jand.2015.12.006.
- Torres-McGehee, T. M., Pritchett, K. L., Zippel, D., Minton, D. M., Cellamare, A., & Sibilia, M. (2012). Sports nutrition knowledge among collegiate athletes, coaches, athletic trainers, and strength and conditioning specialists. *Journal of Athletic Training*, 47(2), 205-211.
- Zawila, L. G., Steib, C. S. M., & Hoogenboom, B. (2003). The female collegiate cross-country runner: Nutritional knowledge and attitudes. *Journal of Athletic Training*, 38(1), 67.