

Evaluation of energy consumption, macronutrients, and supplements intakes among university hockey players

Abstract

This study was a cross-sectional study involving hockey players among students at the International Islamic University Malaysia (IIUM) using convenient sampling method. Data were collected by using questionnaire consists of five parts including sociodemographic, physical activity, anthropometric measurement, dietary intake records and supplement intakes. The collected data was statistically analysed using t-test and descriptive statistic to assess the daily intake of energy, macronutrients and as appropriate for each question on the questionnaire. The male players remained more active than females and similarly, some of the male players were overweight and the females were underweight. The daily energy intake was significantly ($P < 0.001$) higher for males than for females. The energy intake of male respondents exceeded the recommended value in the RNI Malaysia 2005 whereas for female respondents it was significantly ($P < 0.001$) lower. When the energy intake of the male and female players was compared with the FIH & RNI, it was significantly ($P < 0.001$) lower. For the protein intake, both groups of respondents, males and females, did not achieve the recommended value of the protein intake in a day and consumed significantly lower FIH. Lastly, the male respondents have higher percentage of consumption of nutritional supplement, with 54.5%, as compared to the female respondents, with only 45.5% who consumed nutritional supplements. Compared to standard references, there was significant difference between energy (kcal), macronutrients (g) and macronutrients (expressed as % of total calorie intake) to the recommended value. Majority of the nutritional supplement consumer obtained information from trusted source. Therefore, nutritional education related to supplements is necessary to prevent any health-related problem and overuse/abuse of supplements.

Keywords: energy, consumption, macronutrients, supplements, intakes, hockey, players

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Introduction

The age ranges of 18 - 24 years is considered a time for youth entering to a new phase of life, which also known as college or university life. The process of entering college or university requires a lot of efforts to adapt with new surrounding in terms of study, friends, and social environment on campus. The students experience stress condition commonly during the process of adaptation.¹ Similar stress conditions are observed elsewhere in another study performed by Abdel Wahed & Hassan.² Similarity in both studies showed stress is significantly associated in female to male students. To manage stress/relieve stress, sports would be one of many preferred ways among students. It can be indoor or outdoor and according to a study by Hansmann, Hug and Seeland,³ outdoor activities or sports are more effective in reducing stress. For optimal performance in sports adequate amount of nutrients consumption is compulsory otherwise their performance will be affected. Different sports require different nutrition requirement. For example, according to International Hockey Federation (FIH),⁴ the recommendation of total calories for a hockey player to be consumed /day is 2500 - 3500 kcal for male and 2000 - 3000 kcal for female.

Literature indicates that the athletes, in general, consume nutrients lower than the recommended intakes.⁵ Consequently, this situation negatively affects their body function and performances in sport, cognitive and physical performances as well.⁶ The effect is worse

in females than male athletes and leads to eating disorder.⁷ Due to physiological reason, such as menstruation, female athletes are prone to have low nutrients and vitamins in their body compared to male athletes.

Currently, nutritional supplements are being consumed without proper knowledge who of lacking in certain types of nutrients in their body.⁵ The reasons for taking dietary supplements are subjective, but majority of the athletes said to be consuming nutritional supplements to enhance their performance in.^{5,8} However, the knowledge regarding the intake of dietary supplements seems to be inadequate among athletes.^{9,10} Therefore, this study aimed to assess energy, macronutrients, and supplements consumption among field hockey players.

Methods

Study design, respondents sample size

This study was a cross-sectional study involving hockey players among students at the International Islamic University Malaysia (IIUM) using convenient sampling method. The sample size was calculated according to the two means formula with the assumption of 95 confidence interval, with 80% power, using Khattak et al., (2002) standard deviation of ± 127 for energy intakes. Therefore, the total number of samples yield for this study was 50 hockey players, including 25 male and 25 females. The calculations as followed.

Two means formula:

$$n = \frac{2\sigma^2}{\Delta^2} \left(Z_{\frac{\alpha}{2}} + Z_{\beta} \right)^2$$

$$Z_{\frac{\alpha}{2}} = 1.96 \text{ (for 95\% CI)}$$

$$= \frac{2(127)^2}{(100)^2} (1.96 + 0.84)^2$$

$$Z_{\beta} = 0.84 \text{ (for 80\% power)}$$

$$= 25.29$$

$$\Delta = 100 \text{ (detectable difference)}$$

$$\approx 25$$

$$\sigma = 127 \text{ (sd for energy intake)}$$

Inclusion and exclusion criteria

The inclusion criteria included in the study were undergraduate and postgraduate students of the IIUM, Gombak and Kuantan Campus, age within 20 - 30 years old, male and female, a hockey player, involves in training session at least 3 times/week, 1-hour duration per session, with moderate to vigorous intensity. The exclusion criteria not the students either undergraduate or postgraduate the IIUM, less or more than 20 - 30 years of age, non-hockey players, involves in training session less than 3 times/week, less than 1-hour duration per session, with intensity less than moderate to vigorous intensity.

Ethical considerations

Details regarding the research were provided to respondents and informed consent was obtained from the respondents prior data collections. Their agreement was included in the study. The protocol of the study was approved by Kulliyah Postgraduates Research Committees (KPGRC). The respondents voluntarily consented to be included in this study after the aim and procedure of the study were explained to them.

Data collection

Data were collected by using questionnaire consists of five parts including sociodemographic, physical activity, anthropometric measurement, dietary intake records and supplement intakes. The socio-demographic part included the name, age, gender, programme, year of study, scholarship, email address and telephone number.

The second part included the physical activity in which the respondents were required to recall their frequency of training in a week and the duration of training in one session for the past few weeks. Respondents were also questioned how long they have involved in hockey sport.

The third part included anthropometry of the respondents where the respondents performed self-reporting of their weight and height to calculate Body Mass Index (BMI). Body mass index was calculated based on WHO recommendation which was categorized as underweight (less than 18.5 kg/m²), normal (18.5 -24.9 kg/m²), overweight (25 -29.9 kg/m²) and obese (more than 30 kg/m²). The fourth part was on dietary intakes data among the players. It was performed using self-reporting method as well and relied on three days food record which included one day of weekends and two days of weekdays. The respondents were instructed/requested to provide detailed information regarding their dietary intakes including the nutritional supplements. Information required included time and place of consumption, method of preparation of the food consumed, description and amount regarding the food intake. They were required to fill out the details regarding their food intake during main meals (breakfast, lunch and dinner) and also snacks (morning tea, afternoon

tea and supper). The respondents were asked to eat normally and stay close as much as possible to their usual dietary intakes and to be exact in recording their food intakes. The no details on any mealtime in the questionnaires were assumed as the respondent skipped the meal. Instructions on how to fill and complete the food record were attached with an example/sample completed diet recall and photograph of estimated portion sizes on selected foods for easy felling of the questionnaire. The selected food items were shown to the respondents in portion sizes by using the kitchen utensil (spoons, cup, glass, bowl etc). As for chicken, fish and meat, the portion sizes were described in matchbox size while for foods like egg, bread slices, biscuits, and fruit, were described in counts.¹¹ While for food products, name of the brand and other details (weight, flavours etc) were required to be filled out in the questionnaire. This was performed to have a precise evaluation of the usual amount of food consumed and to avoid any possible overestimation of food intakes.

The 5th part of the questionnaire included the supplements consumption among the players. This part comprised of nine questions. In the first question, the respondents were asked whether he/she consume any nutrient supplements in their daily intakes. If the response said yes, only then were required to continue answering the following eight questions. The respondents were asked regarding the type of supplement, amount of money spent on the supplement in a year, place of purchasing, frequency of supplements intakes, reason of consumption, main influencer to consumption, source of information and the most trusted source of information for the respondents. These questions were adopted from the study of Kiertcher and DiMarco.⁵

Energy and nutrients assessments

Dietary analysis

The complete food records were analysed by using Nutritionist Pro, Version 2.4.1 (First Data Bank, Inc., San Bruno, CA). For processed and packaged foods, the energy and nutritional information were obtained by referring at the nutritional facts table provided at the same package. Energy and macronutrient estimated were based exclusively on the amount of the food consumption as reported in the food record. Micronutrients (vitamins and minerals) were not recorded in the analysis of the nutrient intakes. The calculation for energy and macronutrients (carbohydrates, protein and fat) were performed for each day and the average amount /day was estimated/recorded. For the amount of energy and macronutrients intakes kilocalorie (kcal) & grams were used respectively.

The average amount of energy and macronutrients were compared with recommended dietary allowance by Recommended Nutrient Intakes (RNIs) for Malaysia, and International Hockey Federation (FIH). For the comparison with Recommended Nutrient Intakes (RNIs) for Malaysia 2005 was used to assess the adequacy of energy and macronutrients intakes according to the age group of 19 -29 years old. Based on this group of age, the recommended total energy intake in a day was 2400 kilocalorie for males and 2000 kilocalorie for females. The recommended total protein intake in a day was 62 grams and 55 grams for males and females respectively. The carbohydrate and fat were not compared as both of this nutrient are energy balancing nutrient as it can be changed according to daily needs. The percentage of macronutrients intakes in a day also compared with the mean value according to the guidelines: 55-70, 10-15, 20-30 % of energy for carbohydrate, protein and fat respectively.¹²

The mean value of energy and protein intakes of the respondents were also compared with the recommendation of total energy intake for

a hockey player according to International Hockey Federation (FIH). According to FIH, a hockey player is recommended to consume 2500 - 3500 and 2000 - 3000 kcal males & females' players respectively.

Statistical analysis

The collected data was statistically analysed using Statistical Package for Social Sciences (SPSS) version 12.1. Descriptive statistic was carried out to analyze the daily intake of energy, macronutrients (carbohydrate, protein and fat) and as appropriate for each question on the questionnaire. The results were reported in the form of mean, standard deviation and percentages. One sample *t*-test was used to compare the total energy and macronutrients (carbohydrate, protein and fat) as well as the percentages with the standard references. Independent *t*-test was used to compare the mean of total energy and macronutrients (carbohydrate, protein and fat) intake between male and female hockey players. The significant difference was ascertained at 95 % interval.

Results

As mentioned earlier, that a total of 50 payers both sexes were included, and the data collected on them are presented in the following sections.

Physical activity levels (PALs)

The Table 1 shows the duration and frequency of physical activity of the respondents. All respondents practiced moderate and of vigorous-intensity physical activities as it was one of the inclusive criteria for this study. The result showed male hockey players had higher frequency (5 times) of training in a week (12 respondents) compared to female hockey players (5 respondents).

Table 1 Duration and frequency of physical activity of the respondents

Variables	No (%)		
	Total (N=50)	Males (N=25)	Females (N=25)
Duration of training in a session			
2 hours	18 (36)	6 (24)	12 (48)
3 hours	32 (64)	19 (76)	13 (52)
Frequency of training in a week			
3 times	13 (26)	5 (20)	8 (32)
4 times	20 (40)	8 (32)	12 (48)
5 times	17 (34)	12 (48)	5 (20)

Anthropometric measurements

The data on some of the anthropometric measurements is shown in the Table 2. The mean body mass index (BMI) for the respondents was 22.05 ± 2.229 kg/m² which is in the normal range of BMI according to WHO.¹³ Based on their BMI classification, 2 female players were under-weight and 5 male players were over-weight and the rest of the players both male and female were in the category of normal weight (Table 3).

Mean intake of energy and macronutrients intakes

The mean intake of the energy of the respondents was 2133 ± 568 kcal/day. The daily energy intake was significantly (P<0.001) higher for males than for females. The male respondents mean energy intake was 2547 ± 503 kcal/daily whereas the female intake was 1719 ± 220kcal/day. Statistical analysis shows that there was significant

(P<0.001) difference for the macro-nutrient consumption among the male and female player (Table 4). A similar pattern was observed for energy contribution from the macronutrients as shown in the Table 5.

Table 2 Anthropometric measurements of the respondents by sex

Anthropometrics parameters	Mean±SD		
	Male and females (N=50)	Males (N=25)	Females (N=25)
Height (cm)	163.3±7.303	170.2±2.375	156.5±2.519
Weight (kg)	59.5±10.706	69.2±4.123	49.8±4.583
Body mass index (kg/m ²)	22.05±2.229	23.83±1.241	20.28±1.428

Table 3 Classification of BMI of the respondents by sex

Classification of BMI (kgm ⁻²)	Numbers (%)		
	Total (N=50)	Males (N=25)	Females (N=25)
Underweight (<18.5)	2(4)	0(0)	2(8)
Normal (18.5-24.9)	43(86)	20(80)	23(92)
Overweight (>24.9)	5(10)	5(20)	0(0)

Table 4 Mean macronutrient (g) intake of the respondents

Macronutrient	Mean±SD			p-value*
	Total (N=50)	Males (N=25)	Females (N=25)	
Carbohydrate (g)	268±67	322±49	215±28	0.001
Protein (g)	111±36	139±31	84±12	0.001
Fat (g)	68±25	79±29	56±13	0.001

*Independent t-test

Table 5 Percent contribution of macronutrient to total energy consumption

Variables	Mean±SD			p-value*
	Total (N=50)	Males (N=25)	Females (N=25)	
Carbohydrate (%)	51±5.14	51±6.9	50±2.56	0.55
Protein (%)	21.4±3.575	22±3.13	21±3.81	0.07
Fat (%)	27.7±3.996	26.1±2.78	29.4±4.37	0.002

*Independent t-test

Comparison of energy and protein intakes with the references

The energy intake of male respondents exceeded the recommended value in the RNI Malaysia 2005 whereas for female respondents it was significantly (P<0.001) lower as shown in the Table 6. As for protein intake, both male and female responders achieved and significantly (P<0.001) exceed of the RNI for Malaysian (Table 6).

Comparison of energy and macronutrient with RNIs of International Hockey Federation (FIH)

When the energy intake of the male and female players was compared with the FIH & RNI, it was significantly lower (Table

7). In terms of percentage of energy contributed from the intake of carbohydrate, both male and female respondents did not reach the recommendation value of 65 % (Table 7). The percentage difference decreased was -19.53% for male respondents and 22.42 % for female respondents. In the present study, it is evident that there is significant difference (<0.05) between the percentages contributed by carbohydrate with the recommended value.

For the protein intake, both group of respondents, males and females, did achieve the recommended value of the protein intake in a day (Table 7). The percentage difference for male and female respondents was 32.60 and 12.53 % respectively. The percent contribution of fat to total energy shows that both sexes reached the recommended value by the FIH.

Table 6 Comparison of energy and macronutrient intakes of the respondents with RNIs for Malaysia 2005

Variables	Observed Mean±SD	Reference (RNIs, 2005)	% Difference	p-value
Energy intake (kcal/d)				
Males	2547±503	2440	4.4	0.296
Females	1719±219	2000	-14.06	< 0.001
Protein intake (g/d)				
Males	139.4±31	62	124.76	< 0.001
Females	84±12	55	51.86	< 0.001

Table 7 Comparison of energy and macronutrient intakes of the respondents with RNIs by International Hockey Federation (FIH)

Variables	Observed mean±SD	Reference (FIH, 2007)	% Difference	p-value*
Energy intake (kcal/d)				
Males	2547±503	3000	-15.09	<0.001
Females	1719±219	2500	-31.25	<0.001
Carbohydrates (%)				
Males	51.3±6.85	65	-19.53	<0.001
Females	50.4±2.57	65	-22.42	<0.001
Protein intake (g/kg)				
Males	1.9±0.47	1.5	32.6	<0.001
Females	1.7±0.29	1.5	12.53	0.004
Fat (%)				
Males	26.1±2.78	22.5	15.86	<0.05
Females	29±4.37	22.5	30.6	<0.05

*One sample t-test

Nutritional supplement consumption

The result of this study shows that from the 50 respondents, 22 (44%) respondents consumed nutritional supplements in their dietary intake (Table 4). Male respondents have higher percentage of consumption of nutritional supplement, with 54.5 %, as compared to the female respondents, with only 45.5% who consumed nutritional supplements.

It was observed that the preferences of respondents in taking nutritional supplements was highest (59.1) in taking the Vitamins supplements. Followed by the mineral's supplements, with 36.4 %, and other type of supplements such as sport drinks by 4.5 %. Both male and female respondents have more preference for vitamins supplements in daily intake with 58.3 and 60 % respectively (Table 8).

Table 8 Preferences in consumption of supplement

Supplement	Total (N=22)	No (%)	
		Males (N=12)	Females (N=10)
Vitamins	13 (59.1)	7 (58.3)	6 (60)
Herbs or botanical	0 (0)	0 (0)	0 (0)
Minerals	8 (36.4)	5 (41.7)	3 (30)
Other supplements	1 (4.5)	0 (0)	1 (10)

Among the respondents 40.9 % consumed nutritional supplements once a day. Followed by consumption of supplements when needed with 31.8 and 27.3% took nutritional supplements twice a day. Among male respondents who consumed nutritional supplements, half of them consumed the nutritional supplement once a day. While among female respondents were in the category of highest frequency of respondents consumed it only when needed. In the current study, it can be observed that the reason of consuming nutritional supplements was to protect their bones and joints (27.3%), to heal an injury (22.7%), to increase muscle strength (13.6%), improve performance (13.6%), for health (9.1%), provide energy (4.5%), improve endurance (4.5%), and to prevent fatigue (4.5%).

Among male respondents, the reasons they take nutritional supplements in daily intake were to protect their joints and bones (33.3%), to heal an injury (16.7%), for muscle strength (16.7%), to improve performance (25%), to improve endurance (8.3) and to prevent fatigue (8.3%). While in the group of female respondents, their reason in taking nutrition supplements were to heal injury (30%), to protect joints and bones (20%), for health (20%), for muscle strength (10%) and to provide energy (10%).

The influences for taking nutritional supplements among the respondents were themselves (31.8%), teammates (13.6%), doctor (13.6%), pharmacist (13.6%), registered or sport dietitians (13.6%), friend (9.1%) and coach (4.5%). The highest influence for male and female respondents comes from themselves, with 33.3 and 30% respectively. The sources of information regarding the nutritional supplements which obtained by the respondents. The information obtained from pharmacist (27.3%), internet (22.7%), doctor (22.7%), registered or sport dietitian (18.2%) and magazine or book (9.1%).

From all the sources of nutritional supplements information obtained by the respondents, pharmacist and internet obtained the highest percentage by 27.3 % as the most trusted source of information of the nutritional supplements. In addition, the group of healthcare professionals, which are pharmacist, doctor and dietitian obtained more percentage compared to the other sources, with 68.2 %, as the trusted source in getting the information.

Discussion

This study attempted to assess the dietary and nutritional supplements intake among university hockey players. The assumption of this study was that the dietary intake of hockey players is below than the Recommended Nutrients Intakes (RNIs). The dietary intakes

of the hockey players were compared with reference values according to RNIs for Malaysia (2005) and FIH.⁴ Based on the anthropometric data, both group of sex had a mean BMI in the normal ranges of BMI for their respective ages. Although the data revealed that the mean of BMIs among the respondents were within the normal range, two female respondents were classified as underweight ($BMI < 18.5 \text{ kgm}^{-2}$) and five male respondents were overweight being with their $BMI > 24.9 \text{ kgm}^{-2}$. This is a potential area for improvement as BMI influences the performance of sportsmen in general. According to Marc, Sedeaud, Guillaume, Rizk and Schipman,¹⁴ BMI of an athlete does relate to the performance of the players. In addition, from their study, they found that the best 10 athletes who performed, were in the normal range of BMI. Similarly, the finding of Sedeaud, et al.,¹⁵ also obtained the same findings, in which they found speed and BMI of an athlete are significantly associated with one another. The overall findings of the current study showed dietary intake of the university students playing hockey reached to the RNIs for Malaysians. However, the intakes were below the recommendation by FIH. The respondents also include nutritional supplements in their daily routine intakes.

The energy intake of male respondents in this study were in accordance with the energy intake reported elsewhere by Ziegler et al.,¹⁶ Garcin¹⁷ ranging from 2054 - 2837 kcal daily. However, the energy intake for male respondents in the current study was lower compared to the energy intake of male respondents in study performed by Gamit,¹⁸ in which the average energy was 3980.5 kcal per day. The mean energy intakes were also lower from the study conducted by Baranaukas et al.,¹⁹ in which the mean energy intake of the respondents ranged from 2730 - 3952 kcal. The mean energy intake of the female respondents corresponded with the average energy intakes by the female figure skating athletes, which was 1416 kcal/day in the study performed by Ziegler et al.,¹⁶ and 1778 kcal/day Garcin et al.,¹⁷ study.

The carbohydrates intake by the male respondents was in the range of mean intake of carbohydrate reported by Ziegler et al.,¹⁶ Farajian et al.,²⁰ Hinton et al.,²¹ and Garcin et al.,¹⁷ with range of carbohydrate intakes from 312 - 361 g/day. In contrast, the carbohydrate intake among female respondents from this recent study was higher by 32.2 g than the value recorded in study performed by Ziegler et al.¹⁶ However, the value from this study was lower as compared to the study conducted by Mullinix et al.,²² Farajian et al.,²⁰ Hinton et al.,²¹ and Garcin et al.,¹⁷ in which the value of carbohydrate intake were 282, 248, 298, 229.36 g/day respectively.

Protein intake of male respondents were accordance with the mean values from a study of Ziegler et al.,¹⁶ and Farajian²⁰ with the value of 129g and 146 g respectively. However, mean protein intake of male respondents in the present study were higher than the mean value of protein intake of a study conducted by Hinton et al.,²¹ and Garcin et al.,¹⁷ which value of 96.2 g and 90.6 g respectively. The protein intake was higher than the result from study conducted by Ziegler et al.,¹⁶ Mullinix et al.,²² Hinton et al.,²¹ and Garcin et al.,¹⁷ by 18.5, 4.5, 15.7 and 21.5 g/day respectively.

The mean fat intakes of the male respondents did not match as reported in study a by Ziegler et al.,¹⁶ Farajian et al.,²⁰ Hinton et al.,²¹ and Garcin et al.,¹⁷ with range of fat intake from 87.7 - 153 g/day. Comparing the results with a study performed by Ziegler et al.,¹⁶ Farajian et al.,²⁰ Hinton et al.,²¹ and Garcin et al.,¹⁷ the female respondents from this recent study appeared be to consume less fat in their daily dietary intakes.

The variations in the mean energy and macronutrients consumption among the male and female respondents from the present study and

previous studies is due to the location differences where the studies were conducted. The individual dietary pattern is different according to the location they stayed. Apart from preferences, weather, temperature, food sources and culture affect their intake of daily food routine. According to Passmore and Durnin individual who stayed in the country with tropical climate country has a lower energy requirement, either during rest or work compared to an individual stayed in mild temperature country. As mentioned by Kearney,²³ China and other East Asian countries are predominant in consuming diet based on rice in contrast with the country in Europe and North America in which the consumption of rice have historically been low. This shows that the preference in consuming food is different between countries consequently resulted to a variation in the intake of energy and macronutrients.

In the present study under the discussion, male respondents had a significantly ($p < 0.05$) higher mean values in terms of total energy and macronutrients intakes /day as compared to female respondents. The difference in terms of the intakes is due to the different amount of energy and macronutrients requirement and utilization between male and female body. As mentioned by Wu and O'Sullivan,²⁴ female body store the energy which they consumed rather than being used. This is contradiction with the metabolism of male body which is more efficient in utilizing the energy that they consume rather than storing the energy. In addition, female respondents tend to have lower energy intake to achieve and maintain lean body figure.²⁵ However, fat intake (expressed as % of total calorie intake) was significantly higher for female respondents than male respondents. This finding could reveal a difference in terms of the diet practices by male and female respondents. It could be possible that male respondents are prone to practice a healthier eating habit following a low-fat diet compared to female respondents. Low consumption of fat contributed from the high consumption of carbohydrate in their daily routine intake. As mentioned by Williams,²⁶ a balance between intake and expenditure of an athlete is achieved by taking high carbohydrate in their diet and this will lead to their body mass maintenance. Consumption of higher fat intake (expressed as % of the total energy intake) is strongly beneficial for the absorption and transportation of the fat-soluble vitamins such as Vitamin E which is important to the human body as an antioxidant. Utilization of oxygen by muscles in athlete body during performing physical activity will yield more reactive oxidative species (ROS). The presence of ROS in the athletes' body consequently affect the normal physiology of the body functions. Thus, by consuming antioxidant, such as Vitamin C and E will help to protect the body from the effect of ROS.

As mentioned earlier, the energy and macronutrients intakes among the hockey players were compared with the reference values from the RNIs for Malaysians (2005) and FIH (2007). The observed finding can be best related to the certain studies e.g Baranaukas et al.,¹⁹ the optimum supply of energy and carbohydrate is a key factor in the adaptation process to physical load in the athletes' body during the whole activity session. The requirements of nutrients for athletes are higher compared to non-athletes due to the higher intensity of physical activity performed by the athletes. In addition, hockey is a sport which requires endurance and strength at the same time. Inadequate intake of carbohydrate as the main source of energy can affect the performance among the hockey players as the demand for energy is high during training sessions. Fatigue is a common situation happened when the demand increased associated with depletion of glycogen stores in the body. Incident of fatigue can be prevented by consuming carbohydrate before and during the physical activity.²⁷

Adequate intake of protein is beneficial to the athletes as it plays an important function in the maintenance, repair, and growth of a tissue in the body. As stated by Rennie,²⁸ the effectiveness of protein is higher when the consumer participate in any training activity as the protein is fully utilize in response to muscle protein turnover. Training activity also beneficial for protein metabolism as it helps to prevent any premature fatigue. To have adequate consumption of carbohydrate also helps in the protein sparing effect. This is a condition in which the protein will be fully utilize in structural and metabolic functioning rather than being used as the energy source.

As for fat intake, Muoio²⁹ suggested that diet which high in fat might be beneficial to the athlete's performance. During exercise, an enzyme released called hormone-sensitive lipase (HSL) which stimulate the breakdown of triglycerides in the adipose tissue and release the fatty acids into the blood capillary. According to Glatz³⁰ exercise activates the activity of free fatty acid transporter to muscle cell. Thus, increased the uptake of free fatty acids by the muscle cells. Although fat can contribute as source of energy besides carbohydrate, by increasing the consumption of fat did not show any beneficial outcome in terms of the sport performance.²⁶ However, the intake should be observed as high consumption of fat might lead to other health problem such as cardiovascular disease.

In the present study, 44% of the respondents reported to include nutritional supplements in their daily food consumption. The highest preferences in consuming nutritional supplements among the respondents was by taking Vitamin-type supplements. This result agreed with Sousa⁹ that reported that nutritional supplement users were more preferred to consume vitamins supplements in their daily intake. Although vitamins are classified as micronutrients, their contribution to the human body is significant. Vitamins involved in almost every metabolic process in the human body and help in maintaining the normal physiology of the body. By consuming vitamins as a supplement apart from dietary intake, it can improve and maintains their sport performance.

It can observe that male respondents consumed supplements with the aim to enhance their performance in general. However, female respondents are much likely to consume nutritional supplements with concern to provide them with health benefits. This result is correlate with the study performed by Slater in general have higher health awareness as compared to the males.³¹ They tend to seek for more information that give benefit to their health and use the knowledge in their daily life. Not only during daily routine of food intake, but also during the consumption of nutritional supplements.

The result in the recent study is similar with another study conducted by Kiertscher & DiMarco³¹ in which the highest percentage of influence among the respondents who consumed nutritional supplements was themselves rather than other external source of influence. In addition, the group of healthcare professionals, which are pharmacist, doctor and dietitian obtained more percentage, with 68.2%, as the trusted source in getting the information related to the nutritional supplement consumption. This indicates that majority of the respondents do aware on which reliable source of information can they trusted when it comes to nutritional supplements. This result similar with the result of study performed by Kiertscher and DiMarco³¹ and Baylis.³² It is important to obtain correct information from reliable sources as nutrition supplements will be taken orally and consume by the body. Any harmful ingredients in the supplements can affect the body functions. Moreover, there are nutritional supplements sold without a proper observation by the authorities. Any incident of wrongly use and over intake of supplements can be prevented among the group of athletes, especially the hockey players.³³⁻³⁵

Conclusion

Compared to standard references i.e. Recommended Nutrient Intake (RNI) for Malaysia 2005, International Hockey Federation (FIH), there was significant difference between energy (kcal), macronutrients (g) and macronutrients (expressed as % of total calorie intake) to the recommended value. However, there was no difference between the energy intake by male respondents compared to the recommendation of RNI for Malaysian. There was nutritional supplements consumption among the respondents in their dietary intake. Majority of the nutritional supplement consumer obtained information from trusted source. Therefore, nutritional education related to supplements is necessary to prevent any health-related problem and overused of supplements.

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Conflict of interest

The authors declare that they have no competing interests.

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