DIETARY HABITS AND BODY MASS INDEX BETWEEN ATHLETES AND NONATHLETES OF UiTM

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Abstract

The aim of this study was to compare the dietary habits and Body Mass Index (BMI) between student-athletes and non-student athletes in UiTM (Universiti Teknologi MARA), as well as to study the relationship between their dietary habits and BMI. Dietary habits are the habitual decisions of the individual regarding what foods they eat, while BMI is one of the widely used tools to identify the nutritional status of the individual. An online questionnaire was used to collect data from the respondents. Respondents' body weight and height were self-measured, and respondents provide the data in the demographic section. Dietary habits questionnaire comprised of 18 questions, including the frequency of food intake from every section of the food pyramid, snack, fast food, vitamin and mineral supplements, breakfast, beverages intake and meal skipping. The result showed the mean dietary habits score of student-athletes were significantly ($p < 0.01$) higher than non-student athletes. This could indicate the awareness of the student-athlete to practice a good dietary habit for them to enhance their sports performance. Regarding BMI, majority of the respondents from both student-athletes (62%) and non-student athletes (70%) were in the normal weight BMI category, and no significant difference was found in both groups. In addition, present study found no significant relationship between dietary habits and BMI for both student-athletes (r-value = – 0.093, $p = 0.359$) and non-student athletes' (r-value = – 0.037, $p = 0.713$) groups, showing that dietary habits of the respondents does not correlate with their BMI. Although no significant association were found, normal BMI category and appropriate dietary habits are essential to be practised by everyone irrespective athletes or nonathletes, and this is to ensure a healthy lifestyle and reducing the risk of getting the non-communicable disease.

Keywords: Body mass index, dietary habits, student-athletes

Introduction

Dietary habits and lifestyle behaviours among individuals in developing countries have changed, which is making the people becoming overweight and more prone to develop non-communicable disease (Altowerqi, 2020). It has been reported that there is a significant association between unhealthy diet consumption and sedentary lifestyle (Khabaz et al., 2017). The transition to higher education involves a significant life change, including unfavourable changes in health-related behaviours and weight gain for many students (Deforche, Van Dyck, Deliens, & De Bourdeaudhuij, 2015). Therefore, practising good dietary habits is important not only among student-athletes but including the non-student athlete population. For athlete population proper diet is an integral part of the optimal physical development and achievements of optimal result (Kreider et al., 2010), meanwhile, for nonathlete population, proper diet and good dietary habits are more on maintaining and practising a healthy lifestyle.

Dietary habits are the habitual decisions of individuals or group of people regarding what foods they eat. Proper dietary choices require the consumption of vitamins, minerals, carbohydrates, proteins, and fats. Dietary habits and choices play a significant role in human health (Preedy & Watson, 2010). The fact that most athletes are well known that proper dietary habits are essential in their daily practice, however, a study by Baranauskas et al. (2015) found that the diet of highly trained endurance athletes does not fully meet their requirements and cannot ensure maximum adaptation to very intense and/or long-duration physical loads. According to Sedek and Yih (2014), dietary habits mean score of non-student athletes was significantly greater than student-athletes. Meanwhile, Cavadini, Decarli, Grin, Narring, and Michaud (2000) showed that athletic adults displayed healthier dietary habits than non-athletic adults with female student-athletes mean scores was greater than male student-athletes. However, there was no significant difference in the mean scores of dietary habits score of female student-athletes to be significantly greater than male student-athletes found in any study. One of the factors that might influence an athlete's food behaviour and dietary habits is their nutritional knowledge. Nutritional knowledge has been shown to play an important role in adopting optimal nutrition practice (Alaunyte, Perry, & Aubrey, 2015). An evaluation done by Argolo et al. (2018) found that the athletes that showed poor dietary habits have a low level of nutritional knowledge and use the low-quality nutritional information source. Meanwhile, Abbey, Wright, and Kirkpatrick (2017) showed collegiate athletes had dietary habits that may both mitigate and increase their risk of chronic diseases.

Unhealthy diets are a key modifiable behavioural risk factor for non-communicable diseases (Olatona, Onabanjo, Ugbaja, Nnoaham, & Adelekan, 2018). To identify the risk of non-communicable disease, body mass index (BMI) is one of the widely used tools (Snowdon, Malakellis, Millar, & Swinburn, 2014). As a measure of relative weight, BMI is easy to obtain, and it is an acceptable proxy for thinness and fatness and has been directly related to health risks and death rates in many populations (LANCET, 2004). Although BMI is less specific because it only gives the picture of total body weight instead of body composition, however, BMI is still relevant, and commonly used indicator for assessing nutritional status including malnutrition and 18.5-24.9 kg/m² is generally regarded optimal (Bahat et al., 2012). Unhealthy dietary habits are among the factors that can have adverse effects on weight status in young adulthood that includes the university students, and a common cause of unhealthy dietary habits was time constraints, unhealthy snacking, convenience high-calorie food, stress, high prices of healthy food, and easy access to junk food (Sogari, Velez-Argumedo, Gomez, & Mora, 2018). Whether there is an association between dietary habits and BMI is still a question. Al-Muammar et al. (2014) in his study found that dietary pattern is not associated with BMI, while Suliga et al. (2015) reported a healthy dietary pattern relates to lower risk of metabolic syndrome in individuals with normal BMI. College is a critical period when lifelong lifestyle habits are formed, which may have a lasting impact on developing chronic disease (Yahia, Wang, Rapley, & Dey, 2016). Lupi et al. (2015) reported university students met the considerable difficulties in conducting healthy lifestyle, doing little sporting activity and acquiring unfavourable dietary habits, and all these factors could lead to weight gain, higher BMI and other non-communicable diseases. Hence it is important to investigate the dietary habits and the BMI level among university students, especially in Malaysia since the scientific data on this matter is still limited. Thus, this study aims to determine the dietary habits and the BMI level among UiTM students that include athletes and nonathletes and to compare the dietary habits and the BMI level between these two groups of students.

Methodology

This was a cross-sectional study. The sampling technique used in this research was purposive sampling. The target populations were student-athletes and non-student athletes from UiTM. The inclusion criteria include male and female students age from 19 to 26 years old and study as full-time students. The student-athletes must at least participate for UiTM Students Sports Carnival (KARISMA) level. For the exclusion criteria, students less than 19 years old and above 26 years old, and students study in the part-time mode were excluded. In total, 200 participants were recruited in this study. One hundred participants were student-athletes, and the rest were non-student athletes. From the student-athlete group, 22 were male, and 78 were female, meanwhile, for the non-student athlete group 26 were male, and 74 were non-student athletes. The total number of respondents in this study was based on the previous study by Sedek and Yih (2014).

An online questionnaire was used to gather data from respondents for this study. Respondents' demographic information, including gender, age, academic background is critical to assessment. In addition, the questionnaire was also used to evaluate the sports types for student-athletes and previous nutrition education.

Dietary habits questionnaire was modified from Marino (2001), which comprised 18 questions, including the frequency of food intake from every section of the food pyramid, snack, fast food, vitamin and mineral supplements, breakfast, beverages intake and meal skipping. The answers for this section were 'always' (4), 'often' (3), 'sometimes' (2) and 'never' (1)—the greater the scores are given, the better the dietary habits of the respondents.

Weight (kg) and height (cm) were self-measured and given by the participants themselves. Based on the data given, the body mass index (BMI) by using the formula: weight (kg) / height (m^2). BMI of respondents were categorized based on World Health Organization (2000) underweight (less than 18.5 kg/m2), normal weight (18.5 – 24.9 kg/m2), overweight (25.0 – 29.9 kg/m2) and obese (greater than 30 kg/m2).

The Research Ethics Committee of UiTM has granted this study (Approval Ref No REC/02/2020 (UG/MR/38) dated 28th January 2020.

Data Analysis

All data collection was analyzed using SPSS version 20.0. Descriptive statistical analysis was used to determine the mean, standard deviation, frequency, and percentage. Independent t-test was used to measure the differences in the mean of anthropometric measurements, and the mean score of dietary habits between student-athletes and non-student athletes. Meanwhile, the Pearson correlation test was used to determine the relationship between BMI and dietary habits of the student-athletes and non-student athletes. The statistical significance was assigned at $p<0.05$.

Results

Table 1: Demographic characteristics of the respondents

Demographic profile	No of respondents	Percentage (%)
Gender		
Male	48	24.0
Female	152	76.0
Age (Years)		
19	21	10.5
20	7	3.5
21	14	7.0
22	35	17.5
23	61	30.5
24	49	24.5
25	23	6.5
Participants Category (n=200)		
Male Student Athletes	22	11.0
Male Non-Student Athletes	26	13.0
Female Student Athletes	78	39.0
Female Non-Student Athletes	74	37.0
Sports Category (n=100)		
Skill sport (archery, tenpin bowling, lawn bowls, golf)	10	10.0
Team sport (basketball, netball, handball, futsal, hockey,	59	59.0

football, rugby, speak takraw, volleyball)		
Racket sport (badminton, tennis, squash, table tennis)	6	6.0
Athletics sport (track and field)	4	4.0
Combat sport (taekwondo, silat, fencing)	19	19.0
Cycling	2	2.0

Table 1 shows the demographic characteristics of the respondents. Male respondents were 24.0% while female was 76.0%. The respondent's age was between 19 – 25 years old. The 100 respondents of the student-athlete group came from various type of sports and sports category. Majority of the student-athletes were from team sports category that was 59%, followed by 19% from combat sport, 10% from skill sports category, 6% from racket sport, 4% from combat sport and only 2% from cycling.

Table 2: Physical characteristic of student-athletes and non-student athletes according to gender

	Student athletes (n = 100)		Non-Student Athletes (n = 100)	
Anthropometric Measurement	Male (n = 22) Mean ± SD	Female (n = 78) Mean ± SD	Male (n = 26) Mean ± SD	Female (n = 74) Mean ± SD
Weight (kg)	69.08 ± 16.28	57.69 ± 9.30	72.46 ± 15.24	53.59 ± 9.54
Height (cm)	172.93 ± 8.30	161.26 ± 5.30	170.79 ± 5.56	159.57 ± 6.67
Body Mass Index (kg/m2)	22.91 ± 3.97	22.16 ± 3.29	24.71 ± 4.27	21.03 ± 3.40

*Significant difference between groups, p <.05

Table 2 shows physical characteristic student-athletes and non-student athletes according to gender. According to the table, the mean body weight of male non-student athletes was slightly higher (72.46±15.24) than male student-athletes (69.08±16.28). However, the mean height of male and female student-athletes was higher than male and female non-student athletes. Body mass index for male student-athletes was lower 22.91±3.97 and male non-student athletes 24.71±4.27, while the mean BMI female student-athletes (24.71 ± 4.27) was higher than non-student athletes (21.03 ± 3.40). There was no significant difference found in weight, height and BMI of student-athletes and non-student athlete.

Table 3: Classification of BMI for student-athlete and non-student athlete

	Student athletes (n = 100)						Non-student Athletes (n = 100)					
Classification of BMI (kg/m2)	Male (n = 22)		Female (n = 78)		Total		Male (n = 26)		Female (n =74)		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Underweight (<18.5)	-	-	13	16.7	13	13.0	1	3.8	12	16.2	13	13.0

Normal Weight (18.5-24.9)	16	72.7	46	59.0	62	62.0	15	57.7	55	74.3	70	70.0
Overweight (25.0-29.9)	4	18.2	18	23.1	22	22.0	6	23.1	3	4.1	9	9.0
Obese (>30.0)	2	9.1	1	1.3	3	3.0	4	15.4	4	5.4	8	8.0

Table 3 shows the distribution of respondents based on the classification of BMI by student-athletes and non-student athletes. Majority of respondents from both groups were in the normal weight category. None from the male student-athlete group was underweight, only 16.7% female from the student-athlete group was underweight. In the non-student athlete group, 46.2% female and 3.8% male were in the underweight category. Total of 3% student-athletes and 8.0% of non-student athletes were in the obese category.

Table 4: Total dietary habits score of respondents

Dietary Habits	Student athletes (%)	Non-Student athletes (%)	t	df	p value
Mean ± SD	51.04 ± 4.13	49.32 ± 3.58	3.145	198	0.002*
Category					
Low (0-35)	0	0			
Moderate (36-53)	75	89			
High (54-72)	25	11			

the significant difference between groups, p <.05

Table 4 showed the mean score for student-athletes was 51.04±4.13 while for non-student athletes was 49.32±3.58. The mean dietary score for student-athletes was higher than non-student athletes, and there is a significant difference in total dietary habit score between the two groups of student-athletes and non-student athletes at 0.05 level of significant, t(198) = -3.145, p = 0.002. Most of the respondents in both groups were in the moderate category. There were 25% in high category for student-athletes and 11% for non-student athletes.

Table 5: Relationship between dietary habits and BMI of student-athletes and non-student athletes

	Parameters		BMI (kg/m2)
Student-athletes	Dietary Habits	1.000	-0.093
	BMI		1.000
Non-student athletes	Dietary Habits	1.000	0.037
	BMI		1.000

Table 5 shows the relationship between dietary habits and BMI of student-athletes and non-student athletes. The Pearson correlation statistics analysis showed, for the relationship between dietary habits and BMI of student-athletes, the r-value is – 0.093, and the sig-r is 0.359. Meanwhile, for the dietary habits and BMI of non-student athletes, the r-value is – 0.037, and the sig-r is 0.713. Since both sig-r are > 0.05, the null hypothesis is accepted showing that dietary habits of student-athletes and non-student athletes did not have any significant relationship with their BMI.

Discussion

The purpose of this study was to investigate and to compare the dietary habits and BMI level among UiTM students, specifically between the group of student-athletes and non-student athletes. As predicted, the body weight and BMI level of male non-student athletes were higher compared to the male student-athletes. This might be due to the reason that they did not actively involved in sports and do less physical activity. Deforche

et al. (2015) reported on average university students gained weight during their university years, and this relates to the decreased in sports participation, while some sedentary behaviours (watching TV/DVD, playing computer games) decreased, and others (internet use, studying) increased. For female students, both groups showed healthy body weight range and this finding were similar to the study done by (Yahia et al., 2016) where a majority of the university students particularly females were within the healthy body weight range.

Although BMI is less reliable to be used in athletes population for assessing nutritional status, it is still one of the available assessment that the simplicity of usage and low cost of implementation make these assessment one of the usable choice for population-based evaluation (Das et al., 2020). The mean BMI for male student-athletes was lower than non-student athletes. This could be due to the athlete group were actively playing sports and consciously looking after their body weight. Meanwhile, for female students, the athlete group, the mean BMI was higher compared to the nonathlete group. However, no significant difference was found in both groups. This result differed from those of Ode, Pivarnik, Reeves, and Knous (2007), who stated that male and female student-athletes had higher body weight, height, and BMI than male and female non-student athletes. Meanwhile, Andreas et al. (2012) revealed that there is no statistically significant difference in BMI between athletes and nonathletes.

Based on the classification of BMI, results indicated that majority of students from both groups were within the healthy weight that was in the normal category of BMI and overall, only 25% from the student-athletes and 15% from the non-student athletes were overweight and obese. This rate is much lower than the rates of overweight/obese from the study by (Yahia et al., 2016) where the percent of students that were overweight obese for male and female were 48% and 22% respectively. Our findings showed similar pattern on the rates of overweight/obese among male and female student as the study by Yahia et al. (2016) whereby the male students rate were higher compared to female students rate, where our results were 33% overweight/obese among male students, while the rate among the female students were only 17%. Both numbers were much lower as compared to that study. This difference may be due to the method used to determine BMI. In the study done by Yahia et al. (2016), BMI was determined based on measured weight and height. In our study, BMI was determined based in self-reported weight and height, and this was due to the situation of COVID-19, where there was a restriction on conducting the face to face data collection hence the best way to collect the data was via the online questionnaire.

Our findings showed that from the athletes' group, there were 22% of students in overweight and 3% were in the obese category. This is one of the important findings from this study that need further investigation as athletes were not supposed to be in that BMI category. The situation may be due to the fact that the student-athletes' body weight was higher compared to the non-student athletes because of the proportion of their body composition, whereby the muscle mass of student-athletes is more compared to the fat mass. Future research should use body composition assessment as a preferable method because BMI only measure the total body weight of a person and neglected the body composition. Compared to BMI levels, subcutaneous fat patterns are a more accurate way of discriminating between athletes and nonathletes (Ode et al., 2007). Hence body composition assessment is more reliable and accurate to be used for athletes population. Evaluation of body composition is an important part of assessing nutritional status and provides useful data and can be used to monitor the effects of nutrition-related disease (Madden & Smith, 2016).

From this study, overall students' dietary habits were satisfactory. Majority students from both groups were under the moderate level of practising good dietary habits while 18% of the total respondents scored high on practising good dietary habits. This was a good sign as the students of UiTM were aware of the importance of good dietary habits. Contrary to our findings, a study done by Argolo et al. (2018) stated the athletes showed poor dietary habits and similarly Alaunyte et al. (2015) reported majority of athletes were not aware of current carbohydrate recommendation that translated into practising non-satisfactory dietary habits. Those studies were in contrast to our study that found a majority of student-athletes were practising good dietary habits as the mean score of dietary habits was significantly higher among the student-athletes group compared to the non-student athletes' group. This may be due to the awareness of the student-athlete to practice a good dietary habit for them to enhance their sports performance. However, Andreas et al. (2012) found that eating habits did not differ between athletes and nonathletes, and a percentage of 83% in that study did not meet the international recommendations for a healthy diet, regardless they are an athlete or not.

Findings from this study showed that the dietary habits of the respondents regardless they were athletes or not, have no substantial connection with their BMI. The Pearson correlation statistics study found no relationship between dietary habits and BMI of both student-athletes and non-student athletes. This indicated whether the student's dietary habits were satisfactory or not; it does not affect their body weight, specifically BMI. Among the non-student athletes, the same findings as the Sedek and Yih (2014) journal were shown that non-student athlete BMI does not have any significant nutritional awareness and dietary habits. The current study finding was similar to the study by Al-Muammar et al. (2014) that found there was no significant difference between dietary pattern and BMI category of the studied population.

Although BMI is a valid tool to be used in assessing the respondents nutritional status, it is suggested for future research to use a more precise instrument that is body composition assessment and to include the energy balance (energy intake and energy expenditure) variable to assess the athlete's population and non-athletes population nutritional status in more thorough.

Conclusion

In brief, this study provides preliminary data on the nutrition-related factors that can influence the UiTM students' health in general and could influence the sports performance of the student-athletes group in specific. Despite the overall satisfactory dietary habits and the low prevalence of overweight and obesity among our sample of UiTM students, the results show that there is a need of nutrition education intervention or program that could help the students especially the athlete's group to focus on translating theoretical nutritional knowledge into practising excellent dietary habits that could help them in strategizing the nutrition component in their sports performance. For the nonathlete group, the nutrition education program may benefit from increasing their awareness on practising healthy dietary habits. Nevertheless, being in normal BMI category and appropriate dietary habits are essential to be practised by everyone irrespective athletes or nonathletes, this is to ensure a healthy lifestyle, reducing the risk of getting the non-communicable disease and to prolong one's lifespan.

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