Lifestyle factors and dietary intake of Iranian postgraduate students in Universiti Putra Malaysia (UPM)

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Abstract:
Background: A student's lifestyle can change notably in a foreign country. The objective of this study was to determine factors associated with the body weight status of Iranian postgraduate students in Universiti Putra Malaysia (UPM) 2009.
Methods: A self-administered questionnaire was administered to 210 Iranian postgraduate students at UPM. Anthropometric factors also were measured using standard procedures. Body mass index (BMI) and waist-to-hip ratio (WHR) also were calculated. The chi-squared test, Spearman's rho, and the Pearson product-moment correlation coefficient were used to determine the associations between the variables that were studied. Multiple linear regression analysis was used to measure the amount of influence a predictor variable had on a outcome variable.
Results: There was no significant correlation between nutritional knowledge ($P > 0.05$), weight-management knowledge ($P > 0.05$), and smoking ($P > 0.05$) and BMI. There were statistically significant correlations between gender ($P < 0.01$), physical activity ($P < 0.05$), protein ($P < 0.01$), carbohydrate ($P < 0.01$), fat ($P < 0.01$), fiber ($P < 0.01$), vitamin C ($P < 0.05$), calcium ($P < 0.01$), and iron ($P < 0.01$) and BMI. There were also relationships between body fat ($P < 0.01$), waist circumference ($P < 0.01$), hip circumference ($P < 0.01$) and WHR ($P < 0.01$) and BMI.
Conclusion: Our findings showed the need for a nutrition promotion program for the Iranian students to help them change their negative food habits and improve their lifestyles.

Keywords: Body weight; Life style; Dietary intake; Iran; Malaysia

1. Introduction

Nutrition is an input to and an important basis for good health and appropriate development. Good nutrition with a balanced diet and regular physical activity are the foundations of good health. Good nutrition contributes to the development of a strong immune system, less illness, and better health (1). The prevalence of overweight individuals has increased dramatically across age groups worldwide. Recent estimates suggest that a body mass index (BMI) that exceeds 25 kg/m2 is responsible for 64% and 77% of cases type 2 diabetes mellitus worldwide among men and women, respectively (2). They reported that the incidence of obesity is doubling every 5 to 10 years in numerous parts of the world, and it is a major additional burden on existing healthcare systems. It is anticipated that, in the future, half of the people in the world could have chronic, non-communicable diseases, the majority of which have a direct relationship to diet (3).

The epidemic of obesity among people worldwide poses a great stress and burden on the health-service sector and also inflicts significant negative consequences on individuals, societies, and entire countries. Many college students have unhealthful lifestyles, which places them at risk for significant increases in serious health problems (4, 5). When students leave home to attend college, they must assume exclusive responsibility for their own nutrition and physical activity. As students become independent of their parents' guidance, they rarely seek any advice or guidance from adults concerning health concerns or dietary choices (6). Their independence also is accompanied by decreased consumption of milk products and fruit and by increased consumption of alcohol and sweetened beverages (7). The consumption of nutritional meals and regular exercise do not appear to be very high on the priority list among university students. Study requirements and social demands leave many university students making food choices that are based primarily on taste, convenience, or peer influence. Also, as academic demands increase, less time is spent in physical activities and exercise (8).

A student's lifestyle can change notably when he or she goes to a foreign country. Research has found that dietary patterns change dramatically following the arrival of students in a foreign country, and students are at risk of developing unhealthy eating habits, especially during their first year of residence (9). In the past, poor dietary habits and health behaviors among university students have been reported in different countries, including Armenia and the United States (10, 11). Several important factors contribute to the poor dietary practices of foreign students when they enter a university. The roots of these changes appear to be associated with stress, lack of availability of familiar foods, sedentary lifestyles, peer pressure, limited finances, and inadequate food-preparation skills (12). Additional factors, such as skipping breakfast due to irregular class schedules and extra classes, disrupt normal eating patterns, leading to unhealthy habits that may have further adverse effects on the students' health (13).

When students pursue their education in a foreign country, the quality of their diets often hastily decline and they often gain weight. Accordingly, the level of physical and psychological health among students decreases (14). Smoking and physical inactivity are risk factors for several diseases. In most developed countries, the trends in many health behaviors are changing in an unhealthy direction. Preventing risk behaviors in adolescents is important because behaviors can be formed that can adversely affect their health later in life (15). It has been reported that foreign students modify their food intake and energy balance when they migrate from a country with a certain food-intake pattern to a country with a completely different food-intake pattern. Consequently, students are often unable to maintain stable energy and nutrient balances, which adversely affects their present health and creates the potential for developing health problems in the future (9). Migrant populations commonly move from one country to another looking for better opportunities. One section of the population that makes such moves is international students. This group moves from their countries of origin to seek higher education, which often is not accessible at home, or they may do so because of international exchange or integrating programs (17).

International students may face cultural adjustments, pressure, and discrimination in their new environment, and, therefore, they must define specific strategies to cope with their short-term and long-term stays abroad (18), and one such strategy should be a food procurement and purchasing strategy. The magnitudes of migrant populations, such as international students, remain unclear, and it is also unclear how they cope with the different food and dietary environments, how they observe dietary changes they make during their stay, and what leads to their modifying their dietary habits in their new environment (18). One article suggested that three months is a more than adequate time period to observe and compute changes in the dietary patterns and habits of immigrant students (9). The number of foreign students studying in Malaysia has increased dramatically since 2003. Currently, approximately 4000 foreign students are enrolled at UPM. However, the nutritional issues encountered by foreign students who are enrolled in various universities, such as in UPM, have never been investigated. The objective of this study was to assess the factors that affect body mass index (BMI) of Iranian postgraduate students enrolled at UPM in Malaysia.

2. Materials and Methods
2.1. Study population
The present study was a cross-sectional study conducted at Universiti Putra Malaysia (UPM) in Malaysia. UPM has enrolled a large number of international students, including Iranian students. According to the School of Graduate Studies (SGS) at UPM, there were 1458 Iranian graduate students enrolled at UPM in 2009. Data collection took two months (June and August 2009). Prior to use, the questionnaires were tested and modified according to the objectives of the study. We obtained lists of Iranian graduate students from 15 faculty members and seven institutes at UPM. Since this is a cross-sectional study the minimum sample size needed in this study was determined based

on the following formula: n= (1.96)2×0.124× (1-0.124)/ (0.05)2 =164. To avoid missing data and non-response of respondents, the sample size was increased by 30% (164 × 30% =210).

2.2. Measurement instrument
The instrument used in this study was a self-administered questionnaire that was divided into five major sections, as described below:
2.2.1. Socio-demographic factors
This section consisted of 10 questions to assess the gender, age, academic semester in college, program of study, faculty, marital status, employment status, living arrangement, location of residence, and ownership of transport vehicles.
2.2.2. Nutritional knowledge
This section, which consisted of 15 items, was adapted from (19) and modified to meet our objectives. Six questions were about food choices, three questions concerned the nutrient content of different foods, and six questions addressed food-group choices. One point was given for each correct answer and no points were given for an incorrect answer, and the results were used to calculate a score that indicated the level of the participant's knowledge about nutrition. The maximum score possible was 45 points, and the minimum score possible was zero. Participants s with a total score in the range of 0-64 were categorized as having a "low" level of nutritional knowledge, whereas those with scores in the range of 65-79 and 80-100 were categorized as having "moderate" and "high" levels of nutritional knowledge, respectively. The reliability of nutritional knowledge was measured by Cronbacḧ's alpha, which was 0.77.
2.2.3. Weight management knowledge
This section consisted of two parts, i.e., sources of information on weight management and knowledge about weight management. The participants were asked whether they had ever received any information on weight management, and they were asked to respond with either "Yes" or "No." If the answer was "Yes," the participants were instructed to proceed to the next part of the questionnaire concerning the main sources of their information about weight management. This part of the questionnaire consisted of 12 objective questions that were acquired form reference (20) and modified to fit our purposes. Each correct answer was awarded one point, and no points were given for incorrect answers. The maximum total score possible was 12 points, and the minimum score possible was zero. Based on a study by (21), participants with a total score in the range of 0 to 6 points were categorized as having a "low" level of weight management knowledge, 7 to 9 points were categorized as having a "moderate" level of weight management knowledge, and 10 to 12 points were categorized as having a "high" level of weight management knowledge.
2.2.4. Lifestyle factors
Lifestyle factors assessed in this study included questions on smoking and physical activity. The smoking section consisted of five questions that were adapted from the 2005 Youth Risk Behavior Survey (22) and modified to fit our purposes. The first question asked the participants whether they had ever smoked even one or two puffs. If the answer was "Yes," the participants were instructed to proceed to questions 2 through 6, which asked the age at which they first smoked, the number of cigarettes they smoked per day, how many days they had smoked cigarettes, and how they usually acquired their cigarettes. The short version of the International Physical Activity Questionnaire (IPAQ) was validated and used to measure the participants' physical activity in a typical week (23). The IPAQ was designed to be used for adults whose ages ranged from 18 to 65. The short version compares seven items related to three specific types of physical activity, i.e., walking, moderate-intensity physical activity, and vigorous physical activity in the past seven days. Vigorous physical activities refer to activities that take hard physical effort and make an individual breathe much harder than normal, such as heavy lifting, aerobics, and riding a bicycle at a high speed.

Moderate activities refer to activities that take moderate physical effort and make an individual breathe somewhat harder than normal, i.e., activities such as carrying light loads, riding a bicycle at a regular pace, and playing tennis. Walking activities refer to activities that include work at home, walking from one location to another, and any other walking that might be done solely for recreation, sport, and exercise. Low or sedentary activity was deemed to be no physical activity. The participants were asked to recall their physical activity for the past seven days prior to the study, in terms of frequency (days per week) and duration (times per day) for each specific type of activity. This information was used to calculate their physical activity levels using the Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (23).
2.2.5. Dietary intake

Dietary intake and the dietary patterns of the participants were assessed by using the Food Frequency Questionnaire (FFQ), meal frequency, and 24-hour dietary recall interviews.

2.3. Data collection and analysis
This study was approved by the Medical Research Ethics Committee of the Faculty of Medicine and Health Sciences. Contact was made with the person in charge of the Iranian students from each of the faculties and institutes, and the Iranian students were identified. Also, the UPM Iranian website and notice boards were used to advertise the study and to invite students to participate. Testing of the questionnaire prior to its use was conducted among 20 Iranian students who were not included as participants in the study that began on June 1, 2009. Testing of the questionnaire prior to its use in the study was conducted in order to ensure that the content of the items and questions in the questionnaire could be understood. The researcher took about 15 minutes to explain the purpose of the study and then obtained the following measurements for all participants, i.e., weight, height, circumference at the hip, circumference at the waist, and body fat composition. Then, the participants took 40-50 minutes to complete the questionnaire. Testing of the questionnaire before it was used with the participants indicated that they would be able to understand most of the questions. Only a few questions, especially those related to nutritional knowledge, required further explanation. Therefore, the questionnaire was modified to provide the needed information. The reliability of the testing of the questionnaire prior to its use was measured by Cronbach's Alpha, which was 0.71. The data used in the study were collected from the questionnaires that were completed by the participants. The questionnaires were written in Persian. Also, weight and measurements of height, weight, hip and waist circumferences, body fat composition, and BMI were assessed by the researcher. Prior to completing the questionnaires, the participants were given a briefing and an information sheet about the purpose and the procedures of the study. The Statistical Package for the Social Sciences (SPSS version 17) was used to analyze the data.

3. Results
3.1. Socio-demographic background
A total of 210 Iranian graduate students consisting of 110 females (53.4%) and 100 males (47.6%) with a mean age of 30.6±5.57 years participated in this study. The mean ages of female and male participants were 30.5±5.7 and 30.8±5.4, respectively. About 109 of the participants (51.9%) were pursuing their Master's degrees, while 101 (48.1%) were pursuing their PhD degrees. In terms of occupation, about 15.7% of the participants were employed as businessmen (3.5%), English teachers (7.2), and clerks (5%). Moreover, (84.3%) of the participants were unemployed. A total of 48 (22.9%) participants lived on campus and 162 (77.1%) lived off campus. With regards to living arrangements, 69 (32.9%) of the participants lived alone, 77 (36.6%) lived with family, and 64 (30.5%) lived with friends. Seventy-nine of the participants (37.6%) owned vehicles.

The results of the chi-squared test for the association between BMI categories and gender showed that there was a significant positive association between BMI categories and gender (χ^2 = 12.200, P < 0.01). The Pearson's correlation test showed that there was no significant correlation between BMI and age (r = 0.062, P > 0.05). Also, no association was found between BMI categories and location of residence (χ^2 = 4.029, P > 0.05). There was no significant association between BMI categories and employment status (χ^2 = 3.387, P > 0.05).

3.2. Nutritional knowledge
More than 70% of the participants understood that nuts, red meat, and eggs had high fat contents, whereas bread, baked beans, honey, and pasta (without sauce) were categorized as containing low fat. More than 60% of the participants were aware that chicken, baked beans, and cheese had high protein. More than 80% of the participants knew that pasta, porridge, and rice had high carbohydrate content. However, only around 63% understood that nuts, butter, and cheese are low in carbohydrates. More than 76% of the participants recognized that cheese, smoked fish, and sausage had high salt content, while between 10.0% and 53.8% of the participants understood that frozen vegetables, red meat, and pasta had low salt content. Only 56.7% of the participants answered that a glass of unsweetened fruit juice counts as a serving of fruit, and only 52.9% of the participants correctly answered that there was more calcium in a cup of whole milk than in a cup of skim milk.

Concerning whether polyunsaturated margarine contains less fat than butter, only 40% of the participants answered correctly. Concerning whether there is more protein in a glass of whole milk than in a glass of skim milk, only 33.8% answered correctly. Concerning whether brown sugar is a healthy alternative to white sugar, only 23.3% answered correctly. Only 20.0% of the participants knew that the type of fat mainly found in dairy products is

saturated fat and that butter and regular margarine contained the most calories per unit mass. There was no positive correlation between BMI and nutritional knowledge.

3.3. Knowledge of weight management
One hundred and sixty-five participants (78.6%) obtained their weight management information or knowledge from various sources. A total 61 (37.0%) obtained information from TV, radio, and the Internet, and more than one-third of the participants (35.8%) obtained their weight management knowledge from clinics and hospitals. About 19 (11.5%) of the participants obtained their weight management knowledge or information from books, newspapers, and magazines, whereas about 14 (8.5%) and 12 (7.2%) obtained information from family members and friends, respectively. About 45 (21.4%) did not obtain any information about weight management. About 85% of the participants knew that the best way to begin a weight-loss diet was to increase physical activity and consume less fatty food. According to Spearman's rho test, there were no significant relationships between BMI and nutritional knowledge (rho = -0.032, P > 0.05) and weight management knowledge (rho = 0.085, P > 0.05).

3.4. Lifestyle factors
3.4.1. Smoking
Out of the 210 respondents, 64 (30.5%) respondents comprising of 46 (46.0%) males and 18 (16.4%) females have tried smoking. There were 146 (69.5%) respondents who were non-smokers. In the other hand about 46 (21.9%) respondents comprising 31 (31.0%) males and 15 (13.6%) females have smoked cigarette in the last 30 days.
3.4.2. Physical activity
Table 1 shows the physical activity of the participants in the seven days preceding their completing the questionnaire. The mean MET-min/week of the participants combined was 828.9±764.8, while the means of the MET-min/week values for male and female participants were 869.1±703.2 and 793.1±618.2 MET-min/week, respectively. The Pearson's correlation test showed that there was a significant relationship between BMI and physical activity.

Table 1. Distribution of respondents based on IPAQ-determined physical activity (n = 210)

Physical activity MET- min/week	Male (n=100)	Female (n=110)	Total (n=210)
Vigorous intensity	327.2±255.2	249.8±159.4	286.7±143.5
Moderate intensity	266.7±199.1	248.4±150.4	258±175.9
Walking	293.5±163.8	275.8±166.6	284.2±165.1
Total MET- min/week	869.1±703.2	793.1±618.2	828.9±764.8
Days of activity per week			
Vigorous intensity	2.2±0.8	2.2±0.7	2.2±0.8
Moderate intensity	2.1±0.8	2.1±0.8	2.1±0.8
Walking	2.1±0.7	2.3±0.7	2.1 ±0.7
Time spent during			
Activity (per day)			
Vigorous intensity	65.8±22.8	56.3±10.5	57.4±16.8
Moderate intensity	67.2±31.8	61.4±31.1	64.4±31.2
Walking	40.5±19.1	39.2±19.6	39.9±20.1
Spent sitting (min/ day)	442.5± 290.2	435.4±268.7	438.8±279.1

3.5. Dietary intake
Spearman's rho test indicated that there were significant relationships between the intakes of protein, carbohydrates, fats, fiber, vitamin C, calcium, and iron and BMI.
3.5.1 Food frequency questionnaire
3.5.1.1. Sweets and oils

A total of 15.7% of the participants consumed sugar at least once per day. Most of the participants consumed cooking oil 2-3 times per day. Moreover, 43.8% and 14.8% of participants drank tea and coffee, respectively, one time per day. About 11.4% consumed beer 1-3 times per month and 85.2% had never consumed beer.

3.5.1.2. Milk and dairy products group
About 4.8% consumed milk on a daily basis. Over 12.4% drank milk less than once a week, and 43.8% never drank milk. About 22.4% of participants consumed cheese one time per day. About 12.9% of participants consumed yogurt once per week.
3.5.1.3. Meat and legumes group
Most of the participants consumed meat and eggs 2-4 times per week. About 41.1% of the participants consumed chicken 2-4 times per week. More than one-third of the participants consumed hamburger and fish 1 to 3 times per month.
3.5.1.4. Fruits group
Fruits include local, imported, or dried fruits. Most participants consumed fruits at least one time per week. A total of 15.2% of the participants consumed an apple one time per day, and 12.4% of the participants consumed an orange one time per day. Moreover, 11.9% of the participants consumed Rambutan, and 18.1% of the participants consumed watermelon once per week.
3.5.1.5. Vegetables group
A total of 14.8% of the participants consumed cabbage, and 17.6% of the participants consumed tomatoes one time per day. Moreover, 11.9% of the participants consumed carrots once per day. Most of the participants consumed vegetables at least 2-4 times per week.
3.5.1.6. Cereals and bread group
Cereals include cooked corn, cake, sandwich, noodle, pizza, cooked potato, pasta, Iranian bread, white bread, bran bread, and cooked rice. About 44.8% of the participants consumed cooked rice one time per day. Moreover, 49.5% and 34.8% of the participants consumed white bread and bran bread, respectively, one time per day. About 31.4%, 23.3% and 35.2% of the participants consumed pasta, Iranian bread, and noodles, respectively, 2-4 times in a week.

3.6. Anthropometric factors
Spearman's rho test was used to determine the relationship between body fat, waist and hip circumferences, and waist-to-hip ratio (WHR) and BMI. According to our findings, there were significant relationships between waist circumference (rho = 0.725, P < 0.01), hip circumference (rho = 0.721, P < 0.01), WHR (rho = 0.245, P < 0.01), and body fat (rho = 0.235, P < 0.01) with BMI, respectively.

4. Discussion
4.1. Socio-demographic background
Many studies have shown that socio-demographic factors, such as socio-economic factors, education, income, living arrangement, and marital status, were related to BMI (24, 25). Contrary to expectations, this study did not find any significant relationship between socio-demographic factors and BMI, except for gender, which was positively correlated with BMI. Among all the socio-demographic factors studied, only gender was associated with BMI categories. The prevalence of overweight and obese participants were 35.0% and 4.0%, respectively, in male participants, and they were 14.5% and 3.6%, respectively, for the female participants. One of the reasons that more of the male participants were overweight and obese than the female participants might be that most the female participants lived alone (37.3%) or with friends (31.8%), while 43% of the male participants lived off campus with their wives and children. The mean BMI of females was lower than that of the males (22.8 vs. 23.9). This difference could be explained by the fact that the energy intake of females was lower than that of males; another factor could be that the females had greater knowledge about nutrition and weight management. This finding was in agreement with a study of 585 participants conducted by (26) in which it was shown that men tend to be more overweight or obese than women based on BMI. In our study, there was no correlation between age and BMI. In contrast, (27) reported that age was considerably related with BMI. In addition, we found no association between marital status and BMI. In contrast, (27) reported that marital status was considerably related with BMI, i.e., married participants had a higher BMI than the single participants. In the present study, there was no association between location of residences and BMI. Similarly, (28) found that there was no significant association between BMI and place of residence. Furthermore, (28) showed that students living on campus had lower health risks than off-campus students who were more overweight and obese and had higher BMI levels. In this study, there was no association between ownership of transportation and BMI. The use of public transportation to commute to work was associated with an average reduction in BMI and decreased risk of becoming obese over time. It could be due to different sample sizes

(836 vs. 210) or to the fact that participants who used the bus at UPM lived near the bus stations and did not have to walk very far. We found no association between employment status and BMI, but in (29) it was shown that there is an association between higher BMI and overweight in women with lower occupational levels.

4.2. Nutritional knowledge
The results of this study gave a clear and detailed picture of a broad range of nutritional knowledge in Iranian graduate students in Malaysia. In this study, there was no difference between the genders in nutritional knowledge. In Iran, (30) found that nutritional knowledge among both groups (females and males) was moderate and also that both groups of students indicated a lack of interest in nutrition. In another study by (31), it was concluded that, as a result of nutritional knowledge and its application to their diets, those who wanted to lose weight decreased their intake of sweet foods and eggs. These results revealed that people should be provided with better nutritional education, beginning in childhood (32).

4.3. Knowledge of weight management
There was no significant correlation between BMI and weight-management knowledge in this study. One of the reasons for this result could be that the participants were from different faculties with different knowledge about weight management. A research indicated that the high rate of incorrect responses given by most adolescents concerning knowledge related to healthy weight loss, the concept of calories, energy balances, and the relative caloric content of foods, had a strong, positive association with their lack of weight-management knowledge and inappropriate weight loss behaviors (33). In contrast, it has been reported that weight management knowledge, the effects of quick weight loss, the effects of "yo-yo" dieting, and the concept of calorie functions comprised the highest number of incorrect responses, and, as well, there was no significant relationship between weight-management knowledge levels and body-weight status of female adolescents (34).

4.4. Lifestyle factors
According to WHO (2005), "a smoker is someone who smokes any tobacco product, either daily or occasionally. A daily smoker is someone who smokes any tobacco product at least once a day and also an occasional smoker is someone who smokes, but not every day". In the present study, there was no significant difference in physical activity between genders. This shows that participants with higher BMI were involved with less physical activity. One explanation for this finding could be the way in which physical activity was categorized or the errors that were included in the self-assessment of physical activity. Another reason for physical inactivity might be the result of the development of technology in the university, which was cited as one expected reason for weight gain in most populations.

4.5. Dietary intake
In this study, the main sources of carbohydrates were rice, white bread, and bran bread. Rice was the staple food and provided the major amount of energy for participants, and, also, bread was eaten regularly at breakfast and sometimes at dinner. This phenomenon may indicate, on one hand, that the participants may have chosen some specific messages from the local recommendations, or that they, as most rational elites in new countries, already might have been provided public messages about healthy dietary habits in their home countries. The reason most participants in our study did not consume as much as low-fat milk and dairy products, including yogurt, could be the high prices of these products and the fact that Iranian yogurt tastes different from Malaysian yogurt. Calcium and/or dairy foods play an important role against various diseases, such as osteoporosis, hypertension, certain cancers, insulin resistance syndrome, and obesity. Calcium and total dairy intake have been related with reduced body fat and amplified dietary diversity, and this may be one important adaptable factor in a person's diet that may decrease her or his risk of developing obesity later in life (36).

Fish, milk, and eggs provide complete proteins, and they contain all of the nine essential amino acids in sufficient quantity and ratio required to meet the body's needs. Furthermore, the most important sources of calories in the diets of the participants were cooking oil, rice and bread. The main sources of protein were chicken and other meat. The participants rarely consumed vegetables. Vegetables provide fiber and vitamins, particularly carotenes, vitamin C, and trace minerals, thus these students may be at risk of insufficient nutrient intake. In a recent study by (37), it was reported that international students made dietary changes since their arrival in Belgium, but they did not get any information on healthy eating in their new living environment. Fruits and local vegetables are, however, cheap in Malaysia, but students consumed less fruits and vegetables. This paradox may indicate that the participants may

have a limited budget for food, convenience, taste, lack of availability of the foods with familiar taste. The results also showed that the participants rarely ate fish.

The present study also showed that the majority of students regularly ate three times per day. Participants who ate breakfast regularly had more than enough micronutrient intake and better dietary quality than those who did not (38). Similarly, they showed that most students ate breakfast while they were studying, and lunch was the main meal of the participants (39). They reported that habitual consumption of breakfast may manage body weight due to the reduction in the consumption of fats in the diet because of the role it plays in minimizing the intake of high energy snacks. The result showed that about two-thirds of the participants sometimes ate fast food (40).

4.6. Anthropometric factors
Many studies have shown that the prevalence of youths and adults who are overweight and obese has increased to epidemic proportions, and healthcare costs related with these conditions have risen considerably (39-41). The prevalence of participants who were overweight and obese suggested that a high priority for intervention efforts should be considered to decrease obesity. The prevalence of those who were overweight or obese were 35.0% and 4.0%, respectively, in male participants, whereas they were 14.5% and 3.6%, respectively, among the female participants. The reasons for more people being overweight were not readily obvious. It has long been held that weight depends on an energy balance, i.e., the association between energy production and energy expenditure. This suggested that the average energy consumption had risen or that weight gain was associated with a decreased level of physical activity.

The present study indicated that there was an association between BMI and the circumference of the waist. Mean circumferences for male and female participants were 86.1±9.5 and 74.1±11.5 cm, respectively. These values were higher than the means in an earlier study, which reported 80.79±10.90 and 75.41±7.54 cm, respectively (42). In this study, about 1.0% of males and 5.5% of females were at high risk of abdominal obesity. Another research found that the circumference of the waist was a better indicator of the distribution of adipose tissue in the abdominal region in men (43). Many studies have shown that the circumference of the waist is the best indicator for cardiovascular risk factors (44, 45). Increased weight and increased circumference of the waist have been shown to be strongly associated with the risk factors for cardiovascular disease, such as diabetes and hypertension in many populations (46). This study indicated that there was an association between BMI and waist-to-hip ratio. Mean waist-to-hip ratio for male and female participants was 0.86±0.1 and 0.80 ± 0.6 cm, respectively. There was no difference in WHR between the two genders (t = 0.9, P > 0.05). In addition, these values were the same as the mean waist-to-hip ratio in the study (0.85±0.05 cm for males and 0.80±0.05 cm for females) (42).

4.7. Limitations of the study
The study has limitations that should be addressed in future studies. First, this study was cross-sectional in design, which did not provide direct evidence of causality. The sample size for the study was small and a purposive sampling technique was used for collecting data. The food-frequency questionnaire and 24-hour dietary recall were used to assess dietary intake. The accuracy of this information depended on the ability of participants to recall information and to estimate the sizes of the portions they had eaten. . Underreporting energy intake was associated with 24-hour dietary recall, and it occurred more commonly among the males and among overweight individuals of both genders. To overcome these problems, face-to-face interviews were conducted by the researcher. To assist the students in recalling the foods they had consumed, the study utilized food photo albums with standard portion sizes, such as cups and jars.

5. Conclusion
The results of this study indicated that there were significant associations between BMI and gender, physical activity, dietary intake, body fat, waist and hip circumferences, and WHR. However, physical activity was the factor most significant for predicting the body weight status of the Iranian graduate students who participated in the study. The findings of this study provide baseline data for designing nutritional programs for the prevention and control of obesity among Iranian graduate students in UPM. The researcher suggests that these programs focus on the factors identified by this study as being significantly associated with obesity among the Iranian graduate students at UPM during their graduate study time. The cultural values and attitudes of foreign students might also play an important role in the development of their dietary behaviors and eating disorders. The university authorities, especially the international office, should make a policy intended to ensure involvement of UPM students in general in physical

activities, such as moderate and high-intensity walking, for example. The University's restaurants will be the next most likely targets of nutrition-intervention plans.

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Conflict of Interest:
There is no conflict of interest to be declared.

Authors' contributions:
All of authors contributed to this project and article equally. All authors read and approved the final manuscript.

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