

Assessment of Dietary Pattern for Medical Students in Benghazi University in Libya

Zahzahan A. Alsaeti^{1*}, Safa Abdul Salam¹, Shrook Omer¹, Marwa Alfarsi Muna Abdul Salam¹

¹University of Benghazi, Faculty of Public Health, Department of Nutrition Benghazi, Libya

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*Corresponding author: Zahzahan A. Alsaeti

Abstract

Original Research Article

Background: We assessed the dietary pattern of undergraduate medical students. Were transition of students to college may increase the opportunity for them to choose the type and the amount of food, because the collage a new society and find less food time during study, may results in a good or bad choice of food. If students are unaware of the nutritional needs to maintain a healthy body weight, this can cause under or over weight and other health problems. **Methods:** The study applied a cross-sectional, descriptive study design, sample size of 455 male and female students their ages (19-30), from four medical faculties including Medical, Dental, public health, pharmacy, and medical technology of Benghazi University in Libya, data were collected using a self-completed questionnaire, the height and weight were recorded, BMI and energy requirements was calculated accordingly. **Results:** The study presented the majority of students participating from various medical specialties, in fourth year of medical & public health collage, and their ages between 19-30 years and gender is 51% female and 49% male. The body mass index of 68.4% of students between 18.5-24.9 (normal), 22.9% had 25-29.9 (over weight) & 5% of students were 30 or more (obese), while 3.7% was BMI less than 18.5 (underweight). The Correlation between BMI and gender among medical students (N=455) were significantly associated 36% n163 of females & 33% n 148 of males were preferred to normal BMI (P=0.014). 61.3% of college students were sedentary physical activity. Gender were found to be significantly associated with physical activity level, sedentary & moderate active of physical activity more frequent in Females, 32.5% & 15.6% respectively, but extreme activity more in male n 27 (5.9%) compared by female n12 (2.6 %) (P= 0.032). 80% of students were F & V consumptions in less than 5 servings a day. BMI was not showed significantly associated with F & V consumption (p= 0.772). also their consumptions of total energy, carbohydrates and fats less than the recommended daily allowance (RDA), The correlation of energy and carbohydrate with physical activity is not significantly associated (p= 0.756) & (p=0.718) respectively. The energy and carbohydrate consumption are "less than requirements" in sedentary life style, 54.7% & 39.8% respectively; while the protein consumption more than RDA. The protein and fat are significantly associated with physical activity were (p=0.032) & (p=0.005) respectively, were the consumption "more than requirements" in sedentary life style 44% & 31% respectively. **Conclusions:** The study demonstrated that most medical students were sedentary lifestyle. Fruit and vegetables consumption were less than the RDA by WHO, and they were depended on proteins in their diet more than carbohydrates and fats. Medical students need intensive nutritional educational programs and they should be encouraged to promote healthy eating habits.

Keywords: Medical students; food intake; food pattern; BMI, eating habits.

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INTRODUCTION

University medical students should have nutritional knowledge of the important of food and healthy eating style for them, their transition to college may increase the opportunity for them to choose the type and the amount of food because, the collage a new society and find less food time during study, may results in a good or bad choice of food. There are also indications of eating large amounts of sweets and junk food and the low consumption of fruits and vegetables

[1]. If students are unaware of the nutritional need to maintain a healthy body weight, this can cause under or over weight and other health problems. Un healthy food causes of obesity that, it is role in development of other diseases like hypertension, type II DM and coronary artery disease [2]. Healthy food is very important for medical students, because they are budding doctors responsible for guiding others about healthy eating habits. Undergraduate can be considered a period of transition between adolescence and adulthood, where students become they are independent and free to

choose new healthy styles [3]. College students happen to the changes in nutritional options. The majority of college students eat in college with limited options of healthy food. Moreover, if students do not receive adequate nutrition daily, this leads to decrease in academic or physical performance. It is necessary to meet the student's daily nutritional needs, the body to function properly and maintain an individual's health to the optimum level most medical students must know aware to the nutritional values of food such as protein, energy, carbohydrates, fats, most vitamins and minerals can be obtained by food sources. All nutrients are playing important role in health, metabolism and proper body function [4]. However, students know about nutrition value it does not always lead to healthy food options & their choice of food according to comfort, taste, time and price instead of nutritional values. The previous studies have shown that most college students suffer from unhealthy eating behaviors, including eating large amounts of fast food, snacks, sweets, cakes, pies and soft drinks, as well as eating small amounts of fruits and vegetables [5]. Increased consumption of junk food can affect in health linked to a diet that is high in calories and saturated fat. Also, sugar and sodium, cause weight gain and obesity in the body, increased body mass index [6]. Additionally, decreased levels of physical activity and leisure are linked to increases in the prevalence of an overweight condition, obesity and diet related non-communicable diseases [7]. Some studies have even shown that, college is a critical period for young adults among food choices and their relationship with weight gain [8, 9]. According to the previous study university students tend to gain more weight than those who do not attend university [10]. As reported by the World Health Organization (WHO) [11], the adult disease burden is due to unhealthy life style that starts during adolescence such as unhealthy eating patterns. Some studies have excluded that college students suffer from bad nutritional status [12]. Because of many different factors that may contribute to the malnutrition epidemic, and related health problems (e.g., weight gain and other dietary disorders) in adulthood, unhealthy eating habits increased when young adults leave their home circumstances, such as lower consumption of healthy options (i.e., fruit and vegetables), irregular meals (e.g., breakfast skipping), and increasing intakes of unhealthy snacks and other "junk food" (e.g., fried food) [13].

Aim of Study

Due to the conflict between researcher about whether the medical students followed healthy eating and good life activity or no, this study is to explore the dietary habits, body weight and physical activity levels of medical college students of Benghazi University. Considering the importance of student's health as young members of society, the present study was designed to assess the dietary Pattern of medical students. Also to, evaluate their life style and evaluate the physical

activity, also to study the relationships between socio-demographic factors, eating habits, and nutritional status among college students.

MATERIALS AND METHODS

Study design and study settings: The study applied a cross-sectional and descriptive study design. The study was conducted between January 1st 2020 to end of March 2020.

Study Population

Medical students who were enrolled in Benghazi University in Libya, Was conducted among 455 students including Medical, Dental, public health, pharmacy, and medical technology.

Study Procedure

Randomly selected from a sampling from all medical department of university (medicine, dental, pharmacy, public health and medical technique). Participle ages between 19-30 years. Here are sample sizes of 455 students (224 male and 231 female).

Data Collection Method

Data were collected using a structured dietary pattern questionnaire. Information was on demographic characteristic, feeding habit, dietary practices and physical activity. 24hr recall was obtained using administered questionnaires and analysis by food composition. Each questionnaire was coded with a unique number representing each respondent. Anthropometric measurements were obtained from the study subjects.

The Questionnaire

Was used to collect the following information:

Socio-demographic characteristics

This comprise information on age, gender, course of study & year of study and this provided background information of students recruited into the study.

Anthropometric measurements

Weight measurement: Anthropometric measurements were taken with the respondents wearing light clothes and no shoes. Using the mechanical bathroom scale, the scale was zeroed before the respondent stepped onto (kg) was measured to the nearest 0.5 kg.

Height measurement: was taken using a "drop down" tape measure fixed at about 2 m on a wall. The respondents were asked to remove their shoes prior to taking the measurement. Height (m) to the nearest 0.5 cm was recorded.

Body Mass Index (BMI) calculation: A corrected body mass index was subsequently calculated as corrected weight in kilograms over corrected height

squared (in square meter). According to the international classification of adult weight to height status. It was calculated using the formula $BMI = \text{Weight in (Kilograms)} / \text{Height in (meter)}^2$. The subjects were classified as underweight (<18.5), normal (18.5-24.9), pre-obese/overweight (25-29.9), obese (≥ 30). The WHO classification of BMI was used [14].

Procedure of calculation energy

The energy intake obtained from the main meals and snacks to calculate the total energy intake. The total energy intake of each student was then compared with age and gender specific WHO recommended dietary allowance (RDA) as being over or under the specified RDA. Used equation to calculate energy requirement daily intake by: total energy expenditure (TEE) method for overweight and obese and both are subtracted 500-1000 Kcal. Estimated energy requirement (EER) for normal & underweight and underweight is added 500 Kcal.

DATA ANALYSIS

Data was entered into Microsoft Excel 2010 spread sheet version 14.1.3 and analyzed using Statistical Package for Social Sciences (SPSS) version 21.0. Descriptive statistics were reported as frequencies (percentage) for demographic data. A Chi-Square test of significance was used for analysis of categorical variables. P value <0.005 were considered significant.

RESULTS

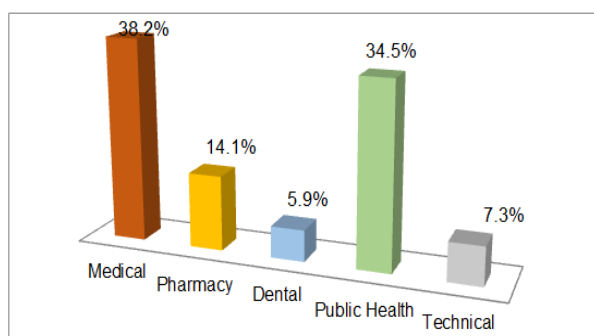


Fig-1: Students participated in various medical specialties

Shown, 38.2% of the students study medicine, 34.5% public health, 14.1% pharmacy, 7.3% medical technology and 5.9 % to dentistry.

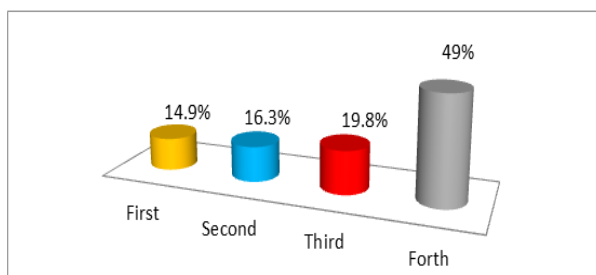


Fig-2: Study year for students in medical specialties

Shown, 49% of the students were in fourth study year, (19.8%) students were in the third year, and (16.3%) were in the second year and (14.9%) in the first year.

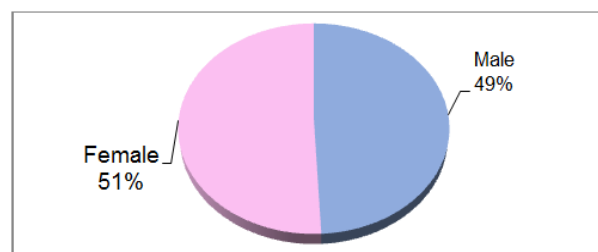


Fig-3: Gender of students participated in the study

Shown, 455 total students, n 224 (49%) were male and n 231 (51%) were female.

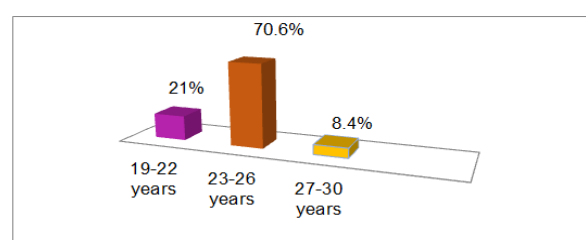


Fig-4: Ages of the students participated in the study

In our study population, (70,6%) were aged 23-26 years old, (21%) of them between 19-22 years old, and (8.4%) were aged 27-30. The minimum number of students was at age 27-30 years and the maximum age was at 23-26 years.

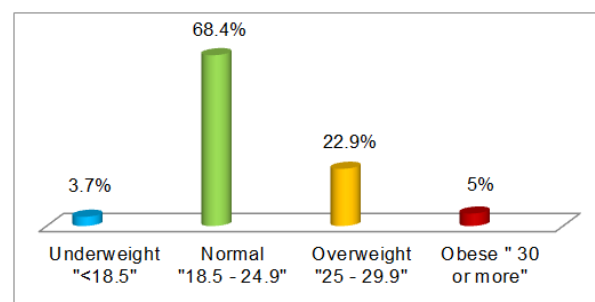


Fig-5: Body mass index Classification of students

Out of 455 medical students, (68.4%) had normal body mass index (BMI), (22,9%) were overweight, (5%) were obese and (3.7%) were underweight.

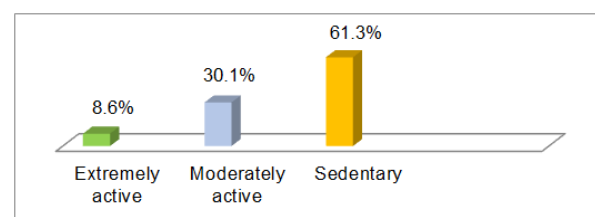


Fig-6: Physical activity of students participated in study

Figure shows the practice of non-exercise physical activities and exercise physical activities. In non-exercise physical activities, (61, 3%) was for sedentary life style, the physical activity levels of students (30.1%) were "Moderately active" and ((8.6%) of students were "extremely active".

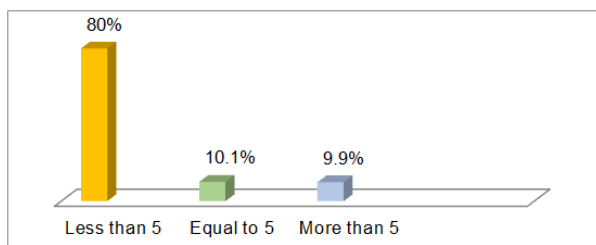


Fig-7: Number of fruits and vegetables servings consumed by students

80% of students were consuming "less than 5 servings", (10.1%) of them were consuming "equal to 5 servings" and (9.9 %) were "more than 5 servings". The percentage of students consumes 5 or more servings of fruits and vegetables were about (20 %) out of total students.

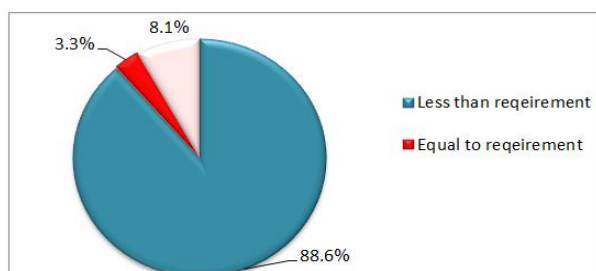


Fig-8: Daily energy intake of students

Shown, (88.6%) of students consumed "less than the daily requirement", (3.3%) were consumed "equal to requirement" and (8.1%) were consumed "More than requirement".

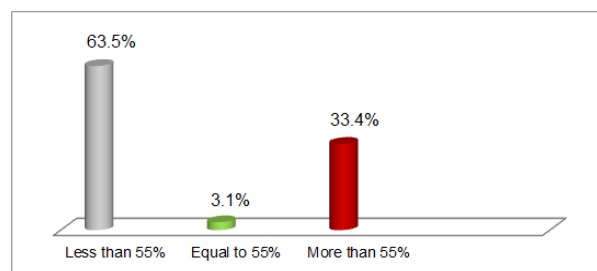


Fig-9: Daily carbohydrate intake by students

Shown, (63.5%) of students consumed "less than 55%" of daily carbohydrate requirements, (33.4%) of them consumed "more than (55 %)" and (3.1%) were consumed "equal to 55%".

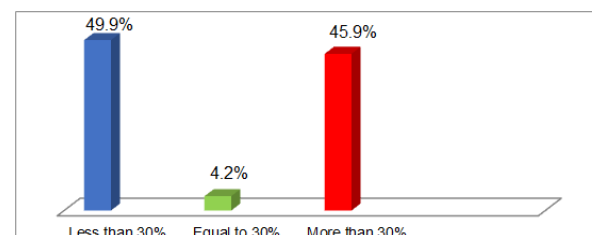


Fig-10: Daily fat intake by students

Shown, (49.9%) of students consumed "less than 30%" of fat requirements, (45.9%) were consumed "more than 30%" and (4.2%) were consumed "equal to 30% of fat requirements".

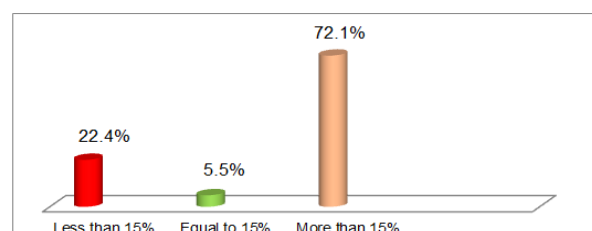


Fig-11: Daily protein intake by students

Shown, (72.1%) of students were consumed "more than 15%" of protein requirements, (22.4%) of students were consumed "less than 15%" and (5.5%) were protein consumed "equal to 15%".

Table-1: Correlation of physical activity with gender among Medical students (N=455)

Gender categories		Physical activity levels			Total	P value
		Extreme	Moderate	Sedentary		
Male	N%	275.9	6614.5	13128.8	22449.2	0.032
Female	N%	122.6	7115.6	14832.5		
Total	N%	398.6	13730.1	27961.3		

Significant with P value < 0.05 by chi square

Gender were found to be significantly associated with physical activity level, sedentary and moderate active of physical activity more frequent in

Females, 32.5% and 15.6% respectively, but extreme activity more in male n 27 (5.9%) compared by female n12 (2.6 %) (P= 0.032) (as in table1).

Table-2: Correlation of BMI with gender among medical students (N=455)

Gender		BMI				Total	P value
		Underweight "<18.5"	Normal "18.5–24.9"	Overweight "25 - 29.9"	Obese "30 or more"		
Male	N%	30.7	14832.5	6013.2	132.9	22449.2	0.014
Female	N%	143.1	16335.8	449.7	102.2	23150.8	
Total	N%	173.7	31168.4	10422.9	235.1	455100	

Significant with P value < 0.05 by chi square

Table-3: Correlation of BMI with physical activity among medical students (N=455)

Physical activity levels		BMI				Total	P value
		Underweig ht "<18.5"	Normal "18.5–24.9"	Overweight "25 - 29.9"	Obese "30 or more"		
Extreme	N%	10.2	306.6	61.3	20.4	398.6	0.11
Moderate	N%	102.2	7917.4	439.5	51.1	13730.1	
Sedentary	N %	61.3	20244.4	5512.1	163.5	27961.3	
Total	N%	173.7	31168.4	10422.9	235.1	455100	

Significant with P value < 0.05 by chi square

The Correlation between BMI and gender among medical students (N=455) were significantly associated (36%) n163 of females and (33%) n 148 of males were preferred to normal BMI (P=0.014).The

normal BMI classification were more common in sedentary and moderate active of physical activity, n 202 (44.4%) and n79 (17.4%) respectively, (P=0.011) (as in table 2, 3).

Table-4: Correlation of BMI with fruits and vegetables consumption of students

BMI		Fruit & Vegetable			Total	P value
		Less than 5	Equal to 5	More than 5		
Underweight "<18.5"	N %	153.3	10.2	10.2	173.7	0.772
Normal "18.5 - 24.9"	N%	25155.2	286.2	327.0	31168.4	
Overweight "25-29.9"	N%	7917.4	153.3	102.2	10422.9	
Obese "30 or more"	N%	194.2	20.4	20.4	235.1	
Total	N%	36480.0	4610.1	459.9	455100	

Significant with P value < 0.05 by chi square

Table-5: Correlation of Physical activity with fruits and vegetables consumption of students

Physical activity levels		Fruit & Vegetable			Total	P value
		Less than 5	Equal to 5	More than 5		
Extreme	N %	275.9	61.3	61.3	398.6	0.020
Moderate	N %	10022.0	173.7	204.4	13730.1	
Sedentary	N %	23752.1	235.1	194.2	27961.3	
Total	N %	36480.0	4610.1	459.9	455100	

Significant with P value < 0.05 by chi square

BMI was not showed significantly associated with F and V consumption (p= 0.772). While, sedentary active were significantly associated with lower intake of

fruit and vegetables more than other categories about 52.1% (P=0.020) (as in table 4, 5).

Table-6: Correlation of student's energy consumption with gender

Energy consumption		Gender		Total	P value
		Male	Female		
Less than requirement	N%	19442.6	20945.9	40388.6	0.398
Equal to requirement	N%	81.8	71.5	153.3	
More than requirement	N%	224.8	153.3	378.1	
Total	N%	22449.2	23150.8	455100	

Significant with P value < 0.05 by chi square

The energy intake not significantly different either less, equal or more the daily recommended between and with gender ($p=0.398$) this energy "less

than requirement" in female more than male 45.9% & 42.6% respectively. (as in table 6)

Table-7: Correlation of energy consumption with physical activity of students

Energy Consumption		Physical activity levels			Total	P value
		Extreme	Moderate	Sedentary		
Less than requirement	N%	357.7	11926.2	24954.7	40388.6	0.756
Equal to requirement	N%	10.2	71.5	71.5	153.3	
More than requirement	N%	30.7	112.4	235.1	378.1	
Total	N%	398.6	13730.1	27961.3	455100	

Significant with P value < 0.05 by chi square

Table-8: Correlation of carbohydrate consumption with physical activity of students

Carbohydrate Consumption		Physical Activity levels			Total	PValue
		Extreme	Moderate	Sedentary		
Less than 55%	N%	265.7	8218.0	18139.8	28963.5	0.718
Equal to 55%	N%	20.4	51.1	71.5	143.1	
More than 55%	N%	112.4	5011	9120	15233.4	
Total	N%	398.6	13730.1	27961.3	455100	

Significant with P value < 0.05 by chi square

Table-9: Correlation of protein consumption with physical activity of students

Protein Consumption		Physical Activity levels			Total	P Value
		Extreme	Moderate	Sedentary		
Less than 15%	N%	61.3	357.7	6113.4	10222.4	0.032
Equal to 15%	N%	51.1	20.4	184	255.5	
More than 15%	N%	286.2	10022	20044	32872.1	
Total	N%	398.6	13730.1	27961.3	455100	

Significant with P value < 0.05 by chi square

Table-10: Correlation of fat consumption with physical activity of students

Fat consumption		Physical Activity levels			Total	P Value
		Extreme	Moderate	Sedentary		
Less than 30%	N%	204.4	8418.5	12327.0	22749.9	0.005
Equal to 30%	N%	0.0	40.9	153.3	194.2	
More than 30%	N%	194.2	4910.8	14131.0	20945.9	
Total	N%	398.6	13730.1	27961.3	455100	

Significant with P value < 0.05 by chi square

The correlation of energy and carbohydrate consumption with physical activity is not significantly associated ($p=0.756$) & ($p=0.718$) respectively. The energy and carbohydrate consumption are "less than requirements" in sedentary life style, (54.7%) and (39.8%) respectively. While, the protein and fat are significantly associated with physical activity were ($p=0.032$) and ($p=0.005$) respectively, were the consumption "more than requirements" in sedentary life style (44%) and (31%) respectively (as in table 7, 8, 9, 10).

DISCUSSION

A good nutrition and healthy life pattern are an essential for attaining healthy physicians of tomorrow, they will able to advice their patients regarding good nutrition and healthy lifestyle practice. In the present study there were 455 students comprising of 224 (49%) males and 231 (51%) were female. hence had nearly the

same higher proportion of female subjects when compared to another study conducted on dietary patterns among students of health sciences and its association with morbidity in a private medical university of coastal Karnataka included 175 students comprising of 75 (43%) males and 100 (57%) females [15]. Similarly a study by Saranya *et al.* about dietary habits and physical activity among medical students of a teaching hospital in South India included 438 undergraduate medical students, among whom 187 (42.7%) were males and 251 (57.3%) were female. [16]. In the current work included medical students from different four faculties, there ages between 19-30 years old. Our finding excluded that a significant association between gender and physical activity levels. Sedentary & moderately active of physical activity were more frequent in Females, 32.5% & 15.6% respectively. While, extreme activity more in male n 27 (5.9%) compared by female n 12 (2.6 %) ($P=0.032$). Thus,

agreement with previous study that found the levels types and preferences of physical activity differed substantially by gender. Levels of physical activity decreased progressively in female [17]. The previous studies, in a population-based sample of Brazilian adults explored the physical activity level of male and female, suggested that male are more active than female in terms of vigorous-intensity and total leisure-time physical activity practice [18]. In our study the physical activity of (61.32%) students were "sedentary", 30.1% of them were "moderately active" and 8.57% of students were "vigorous active". Consistent with there are generally low moderate physical activity, and vigorous physical activity levels in university students [19, 20]. Male were more active than female, for overall male were more active than female. Where, the magnitudes of the gender differences were modest [21]. Additionally, research up to date has showed that male is more active than female [22]. For BMI, in the current sample we found at 3.7 % of subjects were underweight, 68.4% of subjects had a normal BMI, 22.9 % were overweight and 5% of were obese. Thus in our study majority of the students had normal BMI. Out of 68.4% (32.5% of males and 35.8% of females) were normal weights. The body weight of male more than females either overweight or obese, 13.2 % overweight & 2.9 % obese. These levels are the same results conducted in 2014, BMI in male more than in female. In contrast study of nine faculties in Egypt (study was in 2013) different to the levels of students enrolled at, where more females than males were either overweight or obese [23]. The prevalence of overweight was n 104 (22.9%) and the prevalence of obesity was n 23 (5.1%), this was similar to a study conducted by Tiwari *et al.* [24]. We found very few of the students following WHO recommendations for F & V intake female 5.9%, male 4.2%. Our findings are in parallel with similar studies conducted in the University of Dammam in Kingdom of Saudi Arabia in 2015 [25] were consumption of F & V was not at par with the WHO recommended consumption level of 84.47%. Similarly, our results 80% of students not consume the recommended of WHO "less than 5 serving of fruits and vegetables per day". A study in Al-Hasa, Kingdom of Saudi Arabia found that only 22% of female university students consumed the recommended daily intake of F&V [26] Musaiger *et al.* [27] showed that around a quarter of Bahraini students consumed the recommended daily amount of F&V while in another study n 28(11%) of Kuwaiti adults were reported to have the recommended intake of F&V per day. Developed countries such as US, 29 Britain, n 30 and German n 31 also reported similar observations among university students ranging from 5% to 35% of students meeting WHO recommendation of F&V intake. A US study reported that less than 30% of students consumed the recommended amount of fruits and vegetables [28]. The same pattern was observed in senior students [29]. According to El Ansari *et al.*, less than 50% of university students in 4 European countries reported

frequent (¼ several times a day/daily) consumption of fruits, whereas only n 15 (32%) of students reported eating vegetables frequently [30]. Silliman *et al.* reported from F&V consumption study on the US students that 58% of these students ate vegetables less than once a day and 64% of them ate fruit less than once a day. Only 14% of the participants in that study ate vegetables 2 to 3 times per day, 25% of female and 11% of male students ate fruit 2 to 3 times a day (31). In our study the relation between recommended consumption of F&V and PA is not significantly ($p = 0.020$). In contrast with study resulting high or moderate consumers of F&V are those living without family, those aware of WHO recommendations for F&V consumption, those planning daily menu by themselves, and those fitness conscious and regularly exercising [25]. We presented 88.6% of students consumed "less than the daily requirement, when compared between energy intake in male and female in our study, we excluded there are no large different in energy intake between tow gender, the percentage of less caloric intake is more in female students n= 209 (45.9%) as compared to male students n= 194 (42.6%). These findings may be due to female students more concern about their attractive and slim body physic. Gender of the student and caloric intake shows not statistical significance ($p=0.38$). This similarly with previous study in 2016 were founding the energy consumption was lower than the recommended values in women and higher in men [32]. And another do not compatible with our study this founding sex of the student and caloric intake shows statistical significance [33]. In our study finding, the carbohydrates intake not significant associated with gender ($p=0.361$) this is less than 55% male and female 32.5% & 31.0% respectively. This is agreements with study in 2007 founding, in both groups, the percentage of energy obtained from carbohydrates was low and did not reach a minimum of 55 % of energy [34]. 72.1% of students were consumed "more than 15%" of protein, when compared between both gender in their protein intake we found was equal 36 % no significant difference correlation in protein consumption and gender ($p=0.540$). On contrast study, reported gender differences, were noted in dietary habits, as more in male students consumed a high amount of animal protein, compared to female students [35]. Also depending of many students on dairy products as protein sources [36, 37]. More than 45% of students reported having high fat consumption. Thus, apparently medical students tend to eat more fat-enriched food. Whereas in other study, around 75% of students reported daily intake of high fat diet more than the requirements [38]. fat intake is not significantly associated with gender ($p=0.545$) less than 30%, 25.3% male and 24.6% female. In this study, we observed an the most of the student the lower intake of RDA carbohydrates have sedentary life style n =181 (39.8%). This it does not correspond to the study that was found interesting relationship between physical activity and

consumption of carbohydrates in the highest level of physical activity consumed lower levels of carbohydrates ($p < 0.05$) compared to students with lower level of physical activity [32]. In our study, finding the source of energy from protein and fat equal and more than RDA for students had sedentary life style.

CONCLUSION

The study revealed, most of the university students were sedentary life style, especially; female and, the majority of students with low fruit and vegetable consumption were less than the five a day recommended by the WHO, especially; those with sedentary life style. The majority of college students consumed less than the daily energy requirement, the students mostly, dependent on protein in their diet as a source of energy more than carbohydrates and fat. Also the consumption of protein and fat are more than requirements in sedentary life style. Medical students need to have strategic intensive university and college-based plans and counseling that are one of the important factors of assessments of the healthy nutritional status among medical students. Nutritional educational programs among students should be encouraged to promote healthy eating habits, there is a need to more attention physical activity in medical students, so that as physicians of tomorrow, they will be able to advise their patients regarding healthy lifestyle practice.

REFERENCE

1. Devine P, Lloyd K, Gray AM. University student food attitudes and behavior survey. Belfast: University of Ulster; 2006.
2. Berenson GS, Bogalusa Heart Study Group. Health consequences of obesity. *Pediatric Blood Cancer* 2012;58(1):117-21
3. Nelson MC, Story M, Larson NI, Neumark-Sztainer D, Lytle LA. Emerging adulthood and college aged youth: An overlooked age for weight-related behavior change. *Obesity*. 2008;16(10):2205-11.
4. Brown ON, O'Connor LE, Savaiano D. Mobile MyPlate: a pilot study using text messaging to provide nutrition education and promote better dietary choices in college students. *Journal of American College Health*. 2014 Jul 4;62(5):320-7.
5. Dingman DA, Schulz MR, Wyrick DL, Bibeau DL, Gupta SN. Factors related to the number of fast food meals obtained by college meal plan students. *Journal of American College Health*. 2014 Nov 17;62(8):562-9.
6. Bernardo GL, Jomori MM, Fernandes AC, Proença RP. Food intake of university students. *Revista de Nutrição*. 2017 Dec;30(6):847-65.
7. Du S, Lu B, Zhai F, Popkin BM. A new stage of the nutrition transition in China. *Public health nutrition*. 2002 Feb;5(1a):169-74
8. Crombie AP, Ilich JZ, Dutton GR, Panton LB, Aboud DA. The freshman weight gain phenomenon revisited. *Nutrition reviews*. 2009 Feb 1;67(2):83-94.
9. Racette SB, Deusinger SS, Strube MJ, Highstein GR, Deusinger RH. Changes in weight and health behaviors from freshman through senior year of college. *Journal of nutrition education and behavior*. 2008 Jan 1;40(1):39-42.
10. Mokdad AH, Serdula MK, Dietz WH, Bowman BA, Marks JS, Koplan JP. The spread of the obesity epidemic in the United States. 1991;1998:1519-22.
11. World Health Organization. Young people: Health risks and solutions (Fact sheet No. 345). Young people: health risks and solutions WHO Fact sheet N. 2011;345.
12. Serdula MK, Dietz WH, Bowman BA, Marks JS, Koplan JP. The spread of the obesity epidemic in the United States, 1991-1998. *Jama*. 1999 Oct 27;282(16):1519-22.
13. Plotnikoff RC, Costigan SA, Williams RL, Hutchesson MJ, Kennedy SG, Robards SL, Allen J, Collins CE, Callister R, Germov J. Effectiveness of interventions targeting physical activity, nutrition and healthy weight for university and college students: a systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*. 2015 Dec 1;12(1):45.
14. Almeida GAN, Loureiro SR, Santos JE. A imagem corporal de mulheres morbidamente obesas avaliada através do desenho da figura humana. *Psicologia: reflexao e critica*. 2002; 15(2):283-92
15. Badiger S, Kini S, Kumar N. Dietary patterns among students of health sciences and its association with morbidity in a private medical university of coastal Karnataka: a cross-sectional study. *Int J Community Med Public Health* 2017;4:2870-4.
16. Saranya SV, Rao CR, Kumar SC, Kamath V, Kamath A. Dietary habits and physical activity among medical students of a teaching hospital in South India: A descriptive analysis. *Trop J Med Res*. 2016;19:172-7.
17. Li W, Procter-Gray E, Churchill L, Crouter SE, Kane K, Cheng J, Rui F, Tian J, Franklin PD, Ockene JK, Gurwitz J. Gender and age differences in levels, types and locations of physical activity among older adults living in car-dependent neighborhoods. *The Journal of frailty & aging*. 2017;6(3):129.
18. Monteiro CA, Conde WL, Matsudo SM, Matsudo VR, Bonseñor IM, Lotufo PA. A descriptive epidemiology of leisure-time physical activity in Brazil, 1996-1997. *Revista Panamericana de Salud Publica*. 2003;14:246-54.
19. Musharrafieh U, Tamim HM, Rahi AC, El-Hajj MA, Al-Sahab B, El-Asmar K, Tamim HM. Determinants of university students physical exercise: a study from Lebanon. *International Journal of Public Health*. 2008 Aug 1;53(4):208-13.

20. Muttappallymyalil J, Mathew E, Sreedharan J, Al Sharbatii S, Shaikh RB, Basha SA. Self-reported physical activity among University Students in Ajman, UAE. *Pakistan Journal of Medical Sciences*. 2010 Oct 1;26(4).
21. Trost SG, Pate RR, Sallis JF, Freedson PS, Taylor WC, Dowda M, Sirard J. Age and gender differences in objectively measured physical activity in youth. *Medicine and science in sports and exercise*. 2002 Feb 1;34(2):350-5.
22. Santos P, Guerra S, Ribeiro JC, Duarte JA, Mota J. Age and gender-related physical activity. *Journal of Sports Medicine and Physical Fitness*. 2003 Mar 1;43(1):85-9.
23. El Ansari W, Labeeb S, Moseley L, Kotb S, El-Houfy A. Physical and psychological well-being of university students: Survey of eleven faculties in Egypt. *International journal of preventive medicine*. 2013 Mar;4(3):293.
24. Shukla NK, Ahmad S, Singh JV, Shukla M, Soni S, Shukla R. A study on overweight and obesity among schoolgoing adolescent girls in a district of Northern India. *International Journal of Medical Science and Public Health*. 2018 Jun 1;7(6):474-81.
25. Alsunni AA, Badar A. Fruit and vegetable consumption and its determinants among Saudi university students. *Journal of Taibah University Medical Sciences*. 2015 Jun 1;10(2):201-7.
26. Al-Otaibi HH. The pattern of fruit and vegetable consumption among Saudi university students. *Global journal of health science*. 2014 Mar;6(2):155.
27. Musaiyer A, Bader Z, Al-Roomi K, D'Souza R. Dietary and lifestyle habits amongst adolescents in Bahrain. *Food & nutrition research*. 2011 Jan 1;55(1):7122.
28. Racette SB, Deusinger SS, Strube MJ, Highstein GR, Deusinger RH. Changes in weight and health behaviors from freshman through senior year of college. *Journal of nutrition education and behavior*. 2008 Jan 1;40(1):39-42.
29. Alkazemi D. Gender differences in weight status, dietary habits, and health attitudes among college students in Kuwait: A cross-sectional study. *Nutrition and health*. 2019 Jun;25(2):75-84.
30. El Ansari W, Stock C, Mikolajczyk RT. Relationships between food consumption and living arrangements among university students in four European countries-a cross-sectional study. *Nutrition journal*. 2012 Dec;11(1):1-7.
31. Silliman K, Rodas-Fortier K, Neyman M. Survey of dietary and exercise habits and perceived barriers to following a healthy lifestyle in a college population. *Californian journal of health promotion*. 2004 Jun 1;2(2):10-9.
32. Grygiel-Górniak B, Tomczak A, Krulikowska N, Przysławski J, Seraszek-Jaros A, Kaczmarek E. Physical activity, nutritional status, and dietary habits of students of a medical university. *Sport sciences for health*. 2016 Aug 1;12(2):261-7. 29.
33. Azemir, Imeria, Murtishid, Telas, DautihA, Kolarif. Correlation between nutritional patterns and body mass index values of students at the medical faculty in Tetovo *International Journal of Education, Science, Technology, Innovation, Health and Environment* decem. 2014; 1(1): 1857-9450.
34. WHO Diet, nutrition Protein and Amino Acid Requirements in Human Nutrition. In: Report of a Joint WHO/FAO/UNU Expert; 2007.
35. Johnson-Down Louise MSc RD, Ritter Heidi MSc RD, RD F. Primary Food Sources of Nutrients in the Diet of Canadian Adults. *Canadian Journal of Dietetic Practice and Research*. 2007 Feb 12.
36. Heaney RP, Nordin BE. Calcium effects on phosphorus absorption: implications for the prevention and co-therapy of osteoporosis. *Journal of the American College of Nutrition*. 2002 Jun 1;21(3):239-44.
37. Zhao J, Sun J, Su C. Gender differences in the relationship between dietary energy and macronutrients intake and body weight outcomes in Chinese adults. *Nutrition Journal*. 2020 Dec;19:1-9.
38. Ibrahim NK, Mahnashi M, Al-Dhaheri A, Al-Zahrani B, Al-Wadie E, Aljabri M, Al-Shanketi R, Al-Shehri R, Al-Sayes FM, Bashawri J. Risk factors of coronary heart disease among medical students in King Abdulaziz University, Jeddah, Saudi Arabia. *BMC public health*. 2014 Dec 1;14(1):411.