Original Research Article

Risk factors associated with overweight and obesity among female students

Abstract:

Aim: The study was conducted to assess the risk factors of obesity among female students to adopt strategies to combat this problem and decrease the risk. ***Material and method*****:** A cross-sectional study method was conducted among 129 participants at the University community in 2017. Stratified proportional random sampling was an electronic structured questionnaire used for interviewing and observational checklist for body length and weight then calculated BMI for each participant after agreement and signature on structured consent. ***Results and discussion***: The data was analyzed using SPSS version 16. Descriptive statistics and the Chi-Square test are statistically significant. Both equal 24 %. Most of the obese participants were single with highly significantly (P-value 0.002,) and they have high income and are within the age group 22-25 years. In addition, they were strongly associated with many risk factors.

Conclusion**:** This study explored that both overweight and obesity were strongly associated with many risk factors among participants.

keywords: risk factors; overweight; obesity; female; students.

Background:

Obesity affects different communities, including race and ethnic group, poverty, lower education levels, genes, eating habits, physical inactivity, sleep patterns, medical conditions, medications, and lack of basic nutritional knowledge about healthy food and energy-dense foods. [1,2] A person whose weight is higher than what is considered as a normal weight adjusted for height is

described as overweight or having obesity.[3] Data from the CDC indicates that approximately 78.6 million adults (34.9%) are clinically obese. Primary prevention of obesity and overweight among adults can be achieved through early screening and health education for associated risk factors, and health [4,5] BMI is most used as the tool to estimate and screen for overweight and obesity in adults and children. It is a simple index of a person's weight in kilograms divided by the square of his height in meters (kg/m^2). Body Mass Index (BMI) was classified according to WHO international classification of adult BMI as follows: Underweight (<18.50 kg/m^2), Normal range (18.50–24.99 kg/m^2), Overweight (25.00–29.99 kg/m^2), and Obese (≥30 kg/m^2).[6,3] WHO recognizes the critical importance of reducing unhealthy diet and physical inactivity and adopt the WHO Global Strategy for prevention [3,7].

Material and Method:

Research Aim and Type

A cross-sectional community-based study design. It was conducted in November 2017 at nursing college that the students graduated with a bachelor's degree. The aim of the study is to assess the risk factors of overweight and obesity among participants.

Research questions

- ✓ Do study populations suffer from the risk factors of overweight and obesity?
- ✓ What are the common risk factors among the study populations?

Research population and sample

The studied sample of the study were students who graduated with a bachelor's degree from three classes at nursing colleges.

Sampling technique and sample size: A probability sampling technique will be followed to select sample size using stratified proportional random sampling. Use the stratified sample formula (Sample size of the strata = size of entire sample/population size * layer size) to calculate the proportion of people from each class[8,9] fulfilling inclusion criteria.

Sample size: Used the equation below for the calculation of the total study sample from all three classes' students; then selected randomly the proportion from each class.

Equations and Formula: This is an equation used for determining the sample size of participants.

Equations: n = N/ 1+N (D2) etc. n is the desired sample size, N: is the population size, D: is the degree of accuracy desired or the accepted margin of error and is usually set to 0.05).

Step 1: Determine the total population at three classes; used the academic list and calculated the number of students for each class at nursing college

Step 2: Calculated sample size using above equation; n = N/ 1+N (D2).

Step3: Determine stratified proportion randomly

Constructing probability (representative) samples random and stratified Use the stratified sample formula (Sample size of the strata = size of entire sample/population size) to calculate the proportion of people from each class: Then calculated the proportion of sample for each class and selected randomly as following.

Data collection tools

The research data were collected using these tools electronic structured questionnaire and measurement checklist. The electronic structured questionnaire consisted of two sections demographic data (sex, age, level of education, marital status, economic status inactivity,

unhealthy diet, and sleeping disturbing patterns). The questionnaire was tested twice prior to conducting the study on four to ten samples then any correction was done and reviewed by experts to assure its validity, reliability, and clarity.

Data analysis: Data was collected using both interviewing and observational techniques[10, 11]. Data were analyzed using the Statistical Package for Social Sciences (SPSS, Version 20. The). Data were collected, cleaned, and entered the program SPSS for analysis. The result will be presented in figures and tables.

Ethical consideration: Approval for conducting the study was obtained from the office of the Advisor for Academic Affairs committee at Umm-Al Qura University. Permission was taken from managers of the nursing college; the head of the nursing practice department and written consent and agreement of participation were taken[12].

Result:

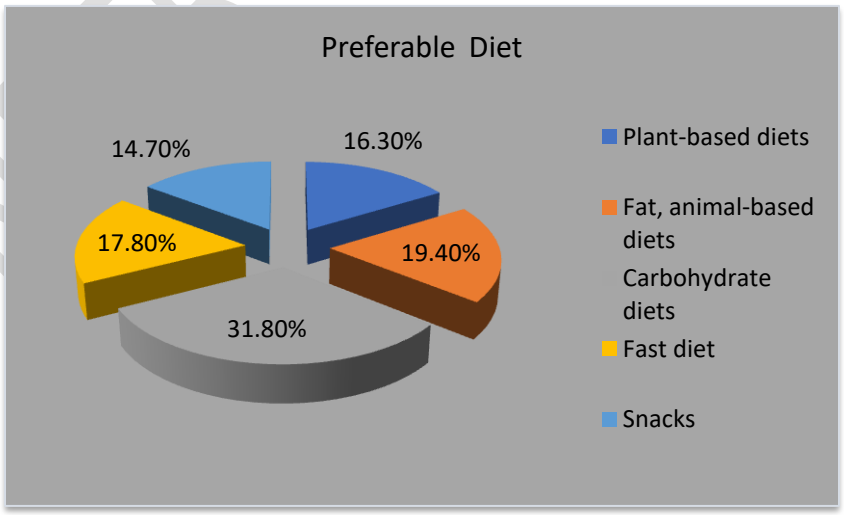

Figure (I): Participants' Preferable Diet (n=129).

Table 1: body mass index (BMI) * versus preferable types of diet among participants (n=129)

	Preferable types of diet.					Total
BMI Categories	Plant-based diets	Fat, animal-based diets	Carbohydrate diets	Fast diet	Snacks	
Underweight	14.3%	32.0%	17.1%	26.1%	21.1%	21.7%
Normal weight	57.1%	48.0%	70.7%	52.2%	63.2%	59.7%
Overweight	14.3%	12.0%	7.3%	8.7%	5.3%	9.3%
Obese	14.3%	8.0%	4.9%	13.0%	10.5%	9.3%
Total	21	25	41	23	19	129
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

P value = 0.846

This figure and table above reflected that 31.8% of participants consume carbohydrate diets,19.40 fast animal diet,17.8% fast diet,14.7% snacks only 16.3 consumed a plant-based diet. This indicated most of the participants consumed an unhealthy diet. And there was insignificant overweight and obesity among participants who consumed a plant-based diet, P-value = 0.846.

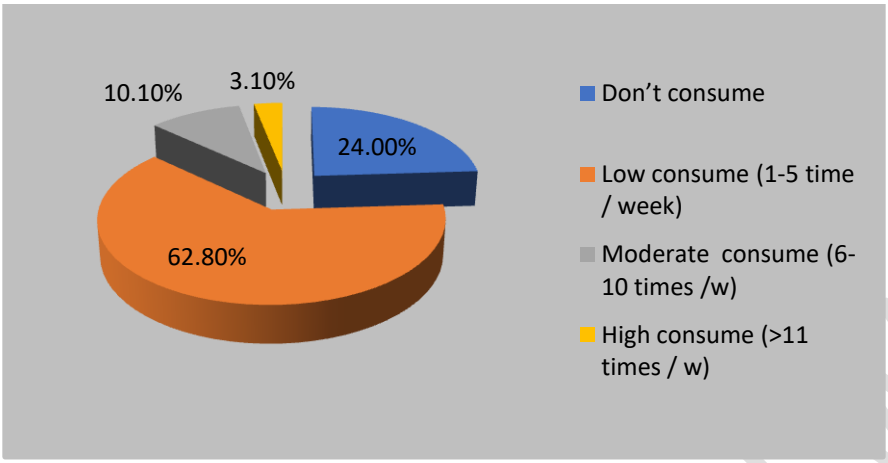

Figure (II): Number of Fruits consumed by Participants/week (n=129).

24% didn't consume fruits 62.8% consumed low fruits and 10.1 % consumed moderately only 3.1% consumed more than 11-time fruits/week this indicator of most of the participants neglected the benefits of the fruits.

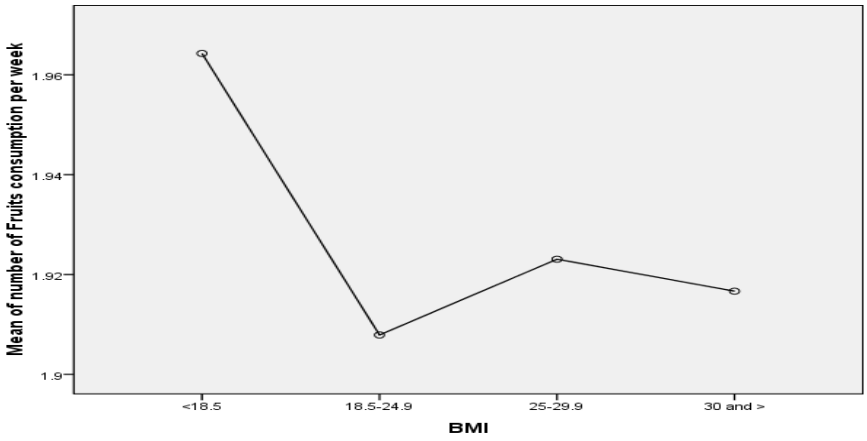

Figure (III): Mean of fruits consumption compared with BMI (n=129).

Low BMI among participants whose average of high consuming the /week.

Table 2: Body mass index (BMI) versus fruits consumed by participants

BMI Categories	Number of Fruits consumption per week				Total
	Don't consume	Low (1-5 times)	Moderate (6-10 times)	High (>11 times)	
Underweight	19.4%	23.5%	7.7%	50.0%	21.7%
Normal weight	64.5%	56.8%	69.2%	50.0%	59.7%
Overweight	6.5%	11.1%	7.7%	0.0%	9.3%
Obese	9.7%	8.6%	15.4%	0.0%	9.3%
Total	31	81	13	4	129
	100.0%	100.0%	100.0%	100.0%	100.0%

P value= 0.813

This table reflected that, participants who overweight highly low fruits consumers while the obese among the consumer of the moderate fruit /week and insignificant (p-value = 0.813).

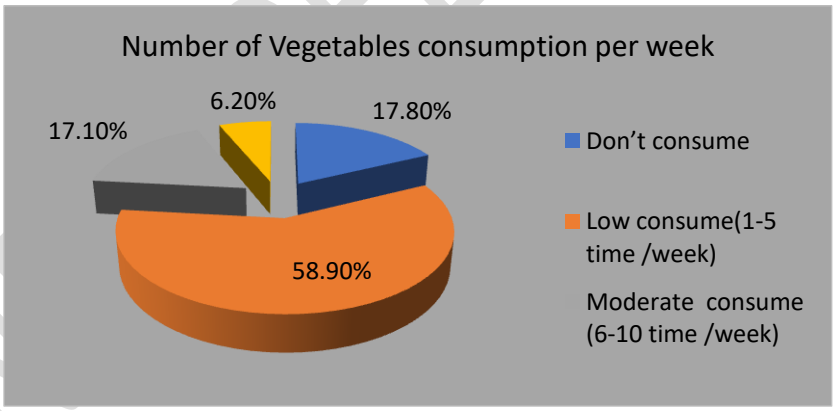

Figure (1V): Number of Vegetables consumed by Participants / week (n=129). Mean = 1.92

17.8% didn't consume fruits 58.9% consumed low Vegetables and 17.1 % consumed moderately only 6.2% consumed more than 11-time vegetables/week this indicator of most of the participants neglected the benefits of the vegetable but the degree of consumption was better than fruits.

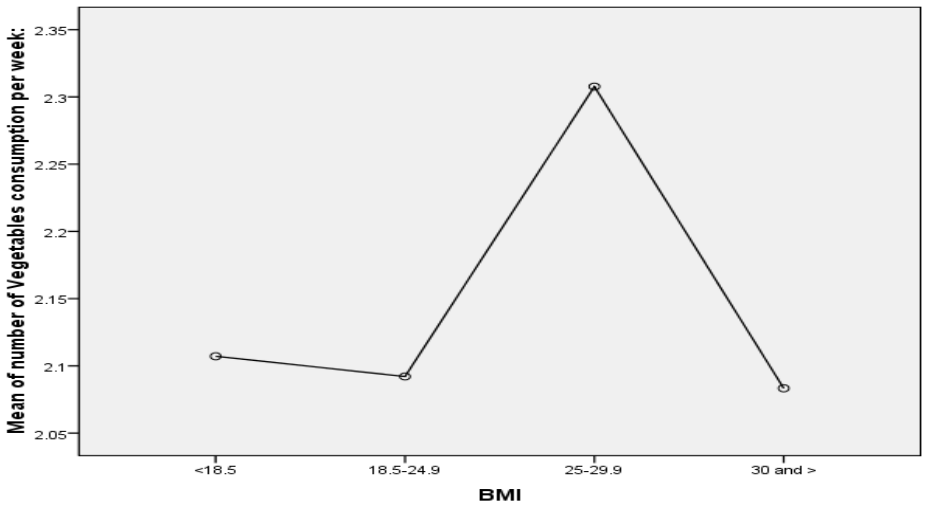

Figure (V): Mean of vegetable consumption compared with BMI (n=129).

This figure low BMI among the participants whose average of Vegetable consumption /week

Table 3: Body mass index (BMI) versus vegetables consumed by participants(n=129).

BMI Categories	**A mount of Vegetable consumption/week:**				**Total**
	Don't consume	Low 1-5 times	Moderate 6-10 times	High >11 times	

Underweight	13.0%	25.0%	27.3%	0.0%	21.7%
Normal	60.9%	60.5%	54.5%	62.5%	59.7%
Overweight	13.0%	6.6%	9.1%	25.0%	9.3%
Obese	13.0%	7.9%	9.1%	12.5%	9.3%
Total	23	76	22	8	129
	100.0%	100.0%	100.0%	100.0%	100.0%

P value = 0.635

This table reflected that participants were overweight among highly vegetable consumers while the obese among the consumers who are at the moderate fruit /week and insignificant (p-value = (0.635).

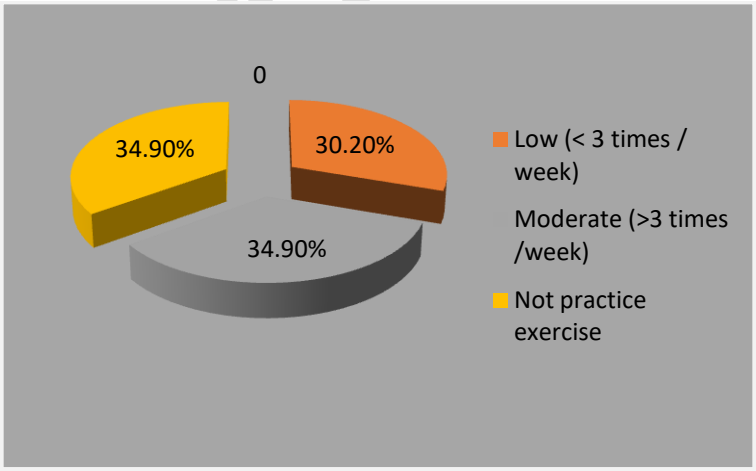

Figure (V): Quality Participants' exercise /week (n=129).

Mean = 2.05

Nearly 35% of participants didn't practice exercise and a similar number have moderate quality of exercise and 30% practice low-quality exercise etc. The quality of exercise among participants was poor these indicters of high-risk participants.

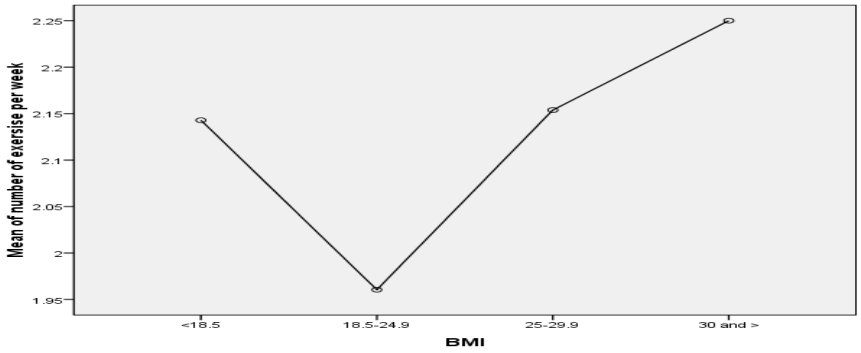

Figure (VI): Mean of Physical Activity compared with

BMI of participants (n=129)

Low average of physical activity among the participants with normal body index while it was high among whose BMI was high this inverse result and indicated the high risk.

Table 4: Body mass index (BMI) * versus physical activity among participants (n=129)

BMI Categories	Number of exercises/weeks			Total
	Low (< 3 times a week)	Moderate (≥ 3 times a week)	No. Exercise	
Underweight	20.5%	17.8%	26.7%	21.7%
Normal	69.2%	57.8%	53.3%	59.7%
Overweight	5.1%	13.3%	8.9%	9.3%
Obese	5.1%	11.1%	11.1%	9.3%

Total	39	45	45	129
	100.0%	100.0%	100.0%	100.0%

P value = 0.629

It is insignificant that the participants who are overweight with moderate physical exercise while the participants who obese among both moderate and who didn't practice exercise P-value = 0.629

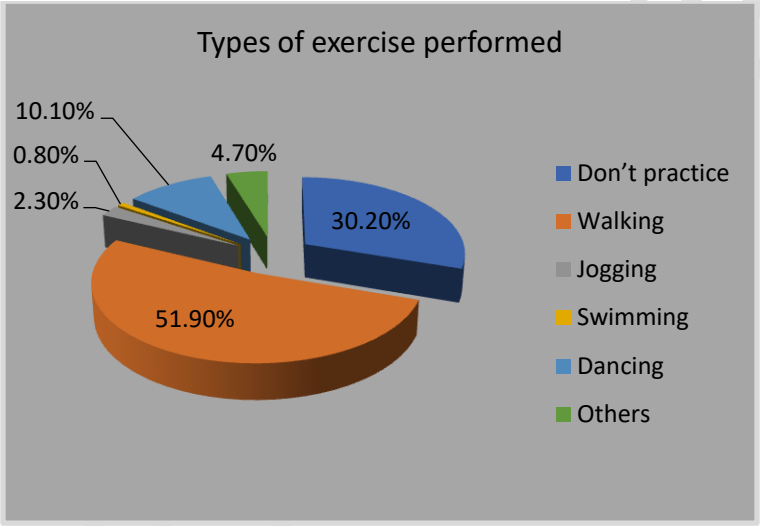

Figure (VII): Types of exercise performed by participants (n=129).

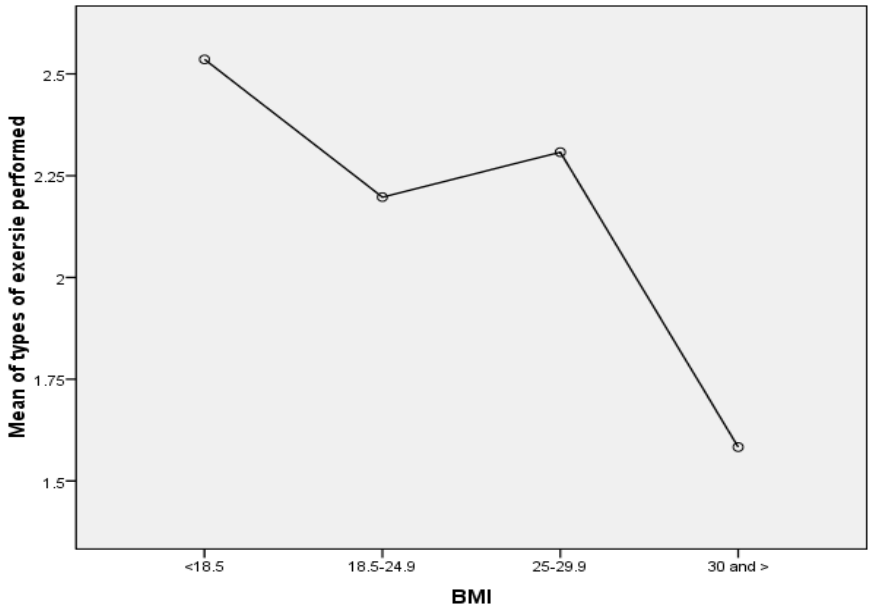

Figure (VIII): Mean of types of exercise compared with BMI of participants (n=129).

Table 5: body mass index (BMI) * versus types of exercise performed by participants (n=129)

Categories of BMI	Types of exercise performed						Total
	Don't practice	Walking	Jogging	Swimming	Dancing	Others	
Underweight	17.9%	20.9%	0.0%	0.0%	46.2%	16.7%	21.7%
Normal	64.1%	56.7%	100.0%	1.0%	53.8%	66.7%	59.7%
Overweight	0.0%	16.4%	0.0%	0.0%	0.0%	16.7%	9.3%
Obese	17.9%	6.0%	0.0%	0.0%	0.0%	0.0%	9.3%
Total	39	67	3	1	13	6	129
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

P value = 0.010

Most of the participants demonstrate walking exercise but it is significant that the obesity observed among nonexercised participants and overweight among the participants who demonstrated walking exercise ‘this indicator of the low quality of walking so the education program was needed to enhance quality and high benefit.

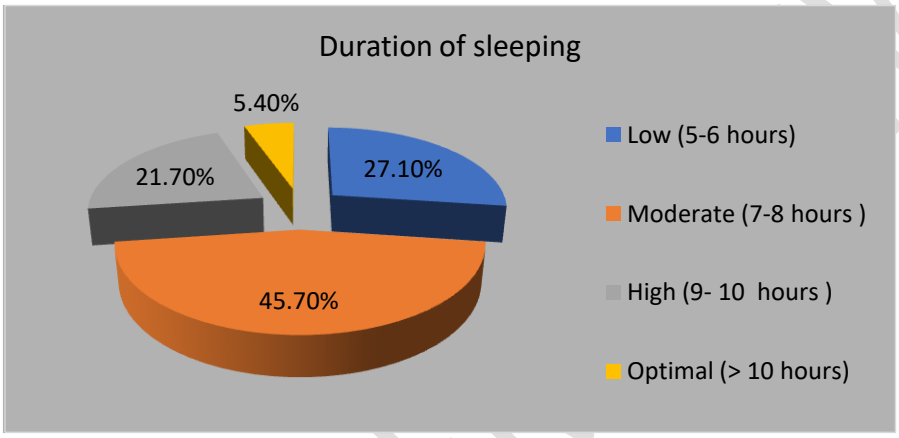

Figure (1X): Duration of sleeping among participants (n=129).

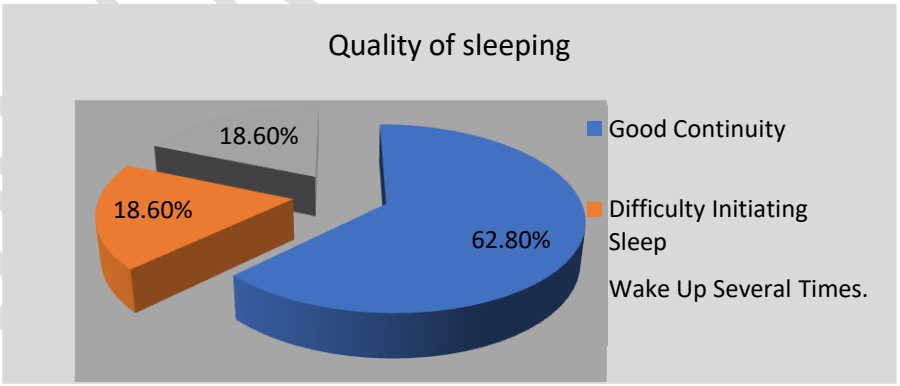

Figure (X): Quality of sleeping among participants (n=129).

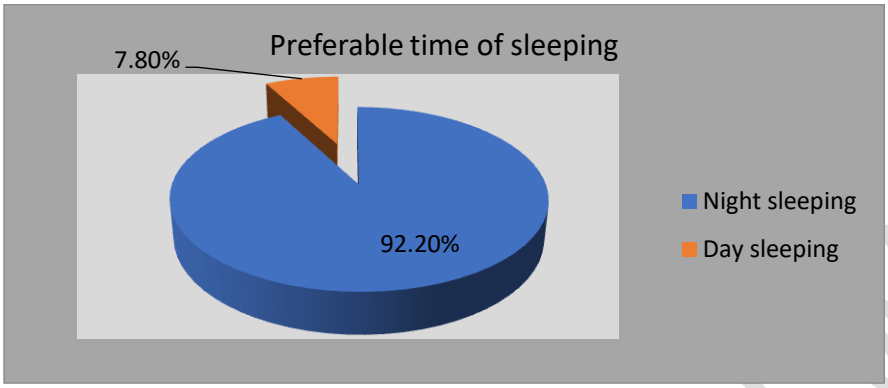

Figure (XI): Preferable time of sleeping among participants

(n=129).

Table 6: body mass index (BMI) * Versus Duration of sleeping among Participants(n:129)

Categories of BMI	Duration of sleeping				Total
	Low (5-6 hrs)	Moderate (7-8 hrs)	High (9- 10 hrs)	Optimal (> 10 hrs)	
Underweight	11.4%	25.4%	25.0%	28.6%	21.7%
Normal	71.4%	55.9%	53.6%	57.1%	59.7%
Overweight	11.4%	8.5%	10.7%	.0%	9.3%
Obese	5.7%	10.2%	10.7%	14.3%	9.3%
Total	35	59	28	7	129
	100.0%	100.0%	100.0%	100.0%	100.0%

(P-value = 0.816)

Insignificant that the normal body mass index among participants with moderate to high quality sleeping; P-value = 0.816. Also, the figure below reflected that most of the participants have good continuity sleeping patterns at night duration.

Table 7: Body mass index (BMI)* versus quality of sleeping among participants (n=129)

Categories of BMI	Quality of sleeping			Total
	Good continuity	Difficulty initiating sleep	Wake up several times.	
Underweight	23.5%	8.3%	29.2%	21.7%
Normal	59.3%	75.0%	45.8%	59.7%
Overweight	7.4%	12.5%	12.5%	9.3%
Obese	9.9%	4.2%	12.5%	9.3%
Total	81	24	24	129
	100.0%	100.0%	100.0%	100.0%

P value =0.397

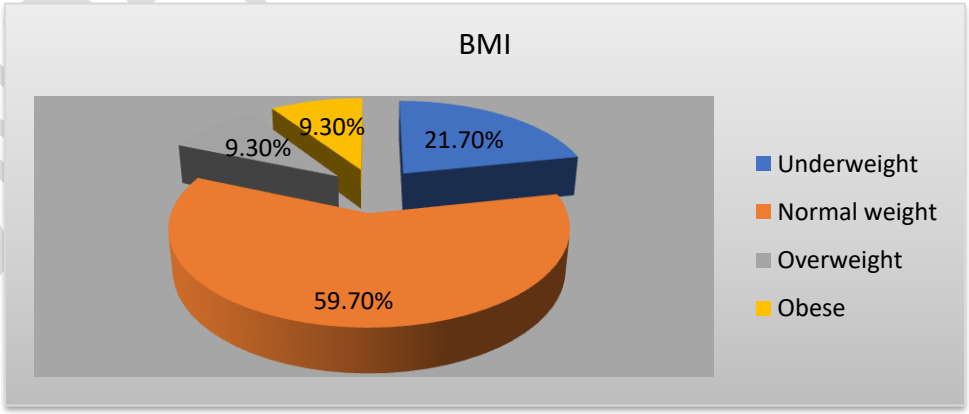

Figure (XII): Body Mass Index (BMI) among participants (n=129). Mean of BMI 21.964

Discussion

Overweight and obesity are increasing in KSA, especially in females, and they have known causes of coronary artery disease (CAD) and other non-communicable diseases.

This study was carried out in KSA in female students in nursing college at Umm Al-Qura University at Makah Al –Makaramma in 2017. The selection of participants fulfilled the inclusion criteria.

The studied subject's ages range from 18≥25yers (mean 1.51 + 2SD .517), most of them were single (93%), and has moderate economic status. in the other hand when we compare the mean of BMI we found that the Mean BMI of this study was 21.964 less than the mean of body mass index Comparative with a standardized case-control study on the association of obesity and myocardial infarction in 52 countries. They reported that the mean BMI was lowest in South Asia (24.9), intermediate in central and Eastern Europe (26.7), and highest in North America (27.7)[13]

Also, our study reflected that there was underweight among studied subjects with (20.1%) but less hazard than overweight and obesity according to the most of WHO studies for population among world's countries there were overweight, and obesity kills more people than underweight[14'15].

The interrelationships between the different characteristics of socio-demographic data and the body mass index (BMI) of participants showed the percentages in four groups (underweight, normal, overweight, and obesity).

The important risk factors among the participants; most of them consumed more carbohydrates (31.8%), fatty diet (19.4%), and fast diet (17.8%) rather than. A plant-based diet (16.3%) addition most of them consumed an inadequate amount of fruits and vegetables so about 62.8%

of participants consumed a low amount of fruits and 24% don't consume and near 60% of participants with low consumed and 18% of participants did not consume vegetables.

this result agreed with the World Health Organization and the American College of Sports Medicine study in Arab countries found that high blood cholesterol levels; inadequate intake of fruit, vegetables; physical inactivity, and smoking [7,9] Also when you look at regression distribution and between fruit consumption relation to BMI it overweight among low fruits consumers and obesity among moderate one is insignificant and the regression with abnormal or inverse this indicator of fluctuated of fruits consumption [5] Also, the relation between vegetable consumption and BMI, we found that is insignificantly obesity among unconsumed vegetables and the regression with abnormal slope at overweight within high average consumers this need more search for types and ways of preparation of vegetables [6]

this study agrees with this study Only 5.5% of Australian adults had an adequate daily intake of 2 fruit and 5 vegetable servings in this study.

The need to consider strategies to increase fruit and vegetable consumption [16]. In 2010 Global Burden of Disease Study estimates 16,140 deaths per year and morbidity attributed to low fruit and vegetable intakes in Australia. Vegetables should be consumed in a nutrient-dense form, with limited additions such as salt, butter, or creamy [17]

One cup of 100% fruit juice counts as 1 cup of fruit. Although fruit juice can be part of healthy eating patterns, it is lower than whole fruit in dietary fiber and when consumed in excess can contribute extra calories. Therefore, at least half of the recommended number of fruits should come from whole fruits. When juices are consumed, they should be 100% juice, without added sugars. Also, when selecting canned fruit, choose options that are lowest in added sugars. One-half cup of dried fruit counts as one cup-equivalent of fruit Similar to juice, when consumed in

excess, dried fruits can contribute extra calories[17.] Fruits with small amounts of added sugars can be accommodated in the diet if calories from added sugars do not exceed 10 percent per day and total calorie intake remains within the limits of [17]

Also, their other risk was inactivity most of so 34.9% cannot perform any type of exercise while 30% demonstrate with the low level this leads to a rise in the percentage of prevalence of obesity.

When you look at the regression relation were inverse. There was significant obesity high among inactive participants who didn't perform any exercise were and overweight among participants who perform walking exercises (P-value = 0.010). Also, when we look at quality, duration, and time of sleeping among participants were adequate. this finding was agreed with the study. Almost half (48.9%) are obese or overweight, the quality of the diet, severe pain, and severe dysfunction are significantly associated with physical inactivity in adults with knee Osteoarthritis Exercises [18]. Also agree with this study conducted at Omani population in 2012 the main factors associated with overweight and obesity among the study participants; physical inactivity and lack of basic nutritional knowledge about healthy foods and energy-dense foods[7.]

This study reveals that most of the participants sleep at night rather than in the daytime, they have high quality and more than 7 hours period daily sleeping. This disagrees with our findings. The majority found a significant association between short sleep (generally <6 h per night) and increased obesity risk A meta-analysis of 18 studies in 604 509 adults demonstrated a pooled obesity odds ratio (OR) of 1.55 (1.43–1.68; $P < 0.0001$) for less than 5 h of sleep and a dose-effect of sleep duration such that for each additional hour of sleep BMI decreased by 0.35 kg/m^2 [19.]

Many studies have seen a high BMI in people who do not get enough sleep. Some studies have seen a relationship between sleep and the way our bodies use nutrients for energy and how lack of sleep can affect hormones that control hunger urges[20].

Several factors contribute to increasing overweight and obesity among women in low-income settings and sub-Saharan Africa (SSA), and these include environmental and lifestyle factors, genetics, and diseases. Additionally, high socioeconomic status, increasing age, parity, and marital status. Physical inactivity and poor dietary patterns are characterized by a high intake of calorie-rich, processed, and however, little is known about the role of physical activity and nutrient intake among [21].

A similar study conducted among women in Jordan to assess risk factors for developing chronic diseases was significantly associated with obesity and elementary education. For chronic conditions, the percentages of hypertension, diabetes, hypertriglyceridemia, osteoporosis, and rheumatoid arthritis were significantly correlated with increased BMI in Jordanian women.[22]

Conclusion:

This study explored that the prevalence of overweight and obesity among nursing students at Um-Al- Qura University were similar while confirming that both were strongly associated with many factors which increase risk among participants such as inactivity, inadequate consuming fruits, and vegetables however this risk if they do not control as soon as can lead to more elevation of BMI in near future. So, adaptation education program and further interventional research for those participants about technique and frequency of exercise, consuming vegetables and fruits snack interventions to provide healthier foods and beverage and limit access to less healthy of both as well as follow the evidence-based of the current research which conducted for overweight and obesity reduction.

Recommendations:

To construct teaching program for health promotion, follow international and global strategies on a diet, physical activity, and health to enhance awareness regarding physical activity, health behaviors of eating, fruits and vegetable consumption for maintenance of a healthy weight could be important in the prevention of obesity complications and to have a good healthy life. Also, facilitate and encourage people to regularly assessment of their weight and calculate BMI. Also, participation of sectors of society, policymakers, employers, and health care leaders can support the prevention of obesity and its risk and develop several resources for providing healthier food and beverage options in workplaces.

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