International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2015): 6.391

Assessment of Obesity among Female Students using Ashwell Shape Chart & Body Mass Index In (Colleges of Public and Environmental Health and Nursing Sciences at University of Bahri) May 2016

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Abstract: ***Overweight and obesity are among the most frequently encountered multi-factorial disorders in most populations of the world. Globally, there is rising in prevalence of overweight and obesity in both developing and developed countries. Many studies among university students in developing countries showed high prevalence of overweight and obesity. Ashwell shape Chart is an anthropometric measurement uses waist to height ratio to predict health &nutritional risks of obesity. Cross –sectional descriptive study was conducted in Colleges of Public and Environmental Health and Nursing Sciences to assess the prevalence of obesity among female students using Ashwell shape Chart and Body Mass Index, during the period from February to may 2016. The study included 255 students their age range between (17-26) years old, data was collected by using questionnaire. The results of the study revealed that about 53.3 % of the students in the present study enjoyed healthy normal body weight (BMI = 18.5-24.9 kg/m²),17.6% were under weight (BMI=<18.5 kg/m²)),(9.8%) of the students were overweight(25_29.9 kg/m²),(9.4%) of the students had obesity class one (30_34.9.kg/m²),(7.5%) of the students had obesity class 2 (35_39 kg/m²),and (2.4%) of them had morbid obesity (≥40 kg/m²),regarding WHtR ,the study showed that (2.7%)of the students had waist to height ratio less than 0.4,(13.7%)had waist to height ratio between 0.4_<0.5, (56.5%) of the students fell between WHtR of 0.5_0.6 while (27.1%)of them had WHtR was more than >0.6, 30.6% of the female students had waist circumference less than 80cm,(32.9%) their waist circumference were between 80_<88cm ,while (36.5%)of them had waist circumference equal or more than 88cm. Significant relationship was found between BMI and waist circumference (P value= 0.00) , significant relationship was detected between BMI and WHtR , (P value= 0.00)and significant relationship was also found between waist to height ratio and the duration of sports (P value=0.029).The study concluded higher prevalence of waist and waist to higher ratio among the female students than the BMI .The study also recommended that General and central obesity indices should incorporate the use of simple indices {weight, Height, and waist circumference} into routine clinical examination or screening among students male and female in Sudanese universities.***

Keywords: Obesity, Students, Ashwell Chart ,Waist, WHtR, BMI

1. Introduction

Obesity has always been regarded as a global epidemic disease in light of its close association with a cluster of cardiovascular diseases, it considered as public health problem due to its high prevalence in different age groups, mainly in young adults (Barquera & Tolentino, 2010). Obesity and overweight are the fifth leading risk factors for global deaths and are major contributor to the leading killer diseases worldwide, including diabetes, heart disease, and some cancers (WHO,2014).

Worldwide, approximately one billion people over the age of 20 are overweight and that more than 300 million are obese. Additionally, it is estimated that in 2015, there will be approximately 1.5 billion overweight and 700 million obese adults. Substantial numbers of literatures have been emerged to show that overweight and obesity are major public health challenges to the developing nations causing morbidities and mortalities (WHO,2014). The rate of obesity has tripled in developing countries over the past 20 years as they rapidly become more urbanized, with increased consumption of high calorie foods and adoption of a more sedentary lifestyle (Popkin, et al.,2012).

Studies among university students in developing countries show high prevalence of overweight and obesity: Africa, Nigeria: 10%. (Nwachukwu, et al., 2010); Egypt: 25.3%–59.4% (Abolfotouh, et al., 2007); Asia : China: 2.9%–14.3% (Jingya , et al., 2013), Latin America: Colombia: 12.4%–16.7%, (Vargas, et al.,2008), the Middle and Near East: Jordan:(Ahmed, et al., 2009). Some studies observed that first year university students have significant weight gain (Vella-Zarb & Elgar ,2009), followed by ongoing slow but steady increase in weight (Gores ,2008). **Ashwell Chart** is an anthropometric measurement uses waist to height ratio to predict health and nutritional risks factors of obesity ,it is suitable for adult and children over 5 years .It has waist circumference measurement (cm) on X axis and height (cm)on the y axes. Reference to an apple shape is used when someone tends to carry too much or a disproportionate amount of fat and weight around their middle. Having an apple body shape increases the risk of both heart disease and diabetes. Likewise, the pear shape, this refers to people who carry a high proportion of fat and weight around their hips. An apple shaped body faces greater health risks than a pear shape, even if they are both overweight by the same amount. Ashwell chart will help in predicting waist to height ratio. The chart contains three boundary values for WHtR 0.4, 0.5,

0.6, originally set on pragmatic decisions. (Ashwel &Gibson , 2014).

Justification
Obesity is increasing and considers the main cause of many chronic diseases and can also lead to deaths. Rate of obesity in Sudan goes parallel to under nutrition ,studies had shown that obesity was more prevalent among the students in Rabat University in Sudan (Abdulla ,& Mohamed 2008), few studies on obesity were found among the students in Sudanese universities, and might used the routinely anthropometric measures to assess obesity. These tools have many limitations particularly in assessing central obesity. Ashwell shape Chart is newly assessment tool discovered by Dr. Margret Ashwell, (2014) to solve problems observed in the other tools, moreover no published data was found using Ashwell shape chart to determine central obesity among the female students in Sudanese Universities, this drew the researcher attention to carry out this research to explain the role of this chart in the assessment of health &nutritional risks of obesity .

General objective of the study:
To identify prevalence of obesity among students in both colleges of Nursing and Public &Environmental Health at University of Bahri using Ashwell Shape Chart & Body Mass Index.

Specific objectives:
1) To identify prevalence of general and central obesity among female students in both colleges of Nursing and Public &Environmental Health at University of Bahri
2) To assess waist circumference among the female students in both colleges of Nursing Sciences and Public &Environmental Health at University of Bahri.
3) To assess waist to height ratio using Ashwell shape Chart among the female students in both colleges of Nursing Sciences and Public &Environmental Health at University of Bahri.
4) To assess body mass index among the female students in both colleges of nursing sciences and public &environmental health at University of Bahri.

2. Methods and Materials

Research design
This study was descriptive cross-sectional study, aim to identify the Prevalence of obesity among Female Students at University of Bahri in Colleges of Public Health and Environmental Health and Nursing Sciences .

Sample size:
The sample size was determined by using the following formula:
Confidence level=95%
Confidence interval= 5%
$n= N/1+N\times e^2$
Where: n= sample size
N = total No of students
e = level of precision = 0.05
$n = N/1+N \times e^2$
Where:
N=705
$e^2 = 0.05 \times 0.05=0.0025$
The sample size =705/1+705×0.0025 = 255

Sample Selection Technique: The sample was distributed proportionally among both colleges. Simple random sample technique was used to show the distribution of the sample in each college level. A self-administered questionnaire was used to collect the following information: Demographic data, diseases among the female students, type, duration and period of sports.

Anthropometric measurement:
Body mass index was calculated by the following equation: Weight in kg / (height in meters ^{2})**.** Waist to height ratio was calculated using the following equation:
Waist cm / height cm.

Data analysis: Data were analyzed by using SPSS version 20, and Chi-squared test with 95% confidence level is used to show the relationship between the different variables.

3. Results

Table 1: Body mass index among the female students:

BMI		*Frequency*	*%*
<18.5	under weight	45	17.6%
18.5-24.9	normal range	136	53.3%
25-29.9	over weight	25	9.8%
30-34.9	obese class 1	24	9.4%
35-39.9	obese class 2	19	7.5%
≥40	obese class 3(morbid obesity)	6	2.4%
Total		255	100.0%

Table (1) demonstrates that , (17.6%)of the students were under weight (<18.5),(53.3%) were at normal healthy weight (18.5_24.9 kg/m²),(9.8%) of the students were overweight (25_29.9kg/m²), (9.4%) of the students had obesity class one (30_34.9 kg/m²),(7.5%) of the students had obesity class 2 (35_39.9 kg/m²),and (2.4%) of them had morbid obesity (≥40 kg/m²).

Table 2: Waist circumference among the female students:

Waist circumferences	*Frequency*	*%*
<80	78	30.6%
80-<88	84	32.9%
≥88	93	36.5%
Total	255	100.0%

Table (2) shows that (30.6%) of the students had waist circumference less than 80cm, (32.9%) of the students had waist circumference between 80-<88cm, while (36.5%) of them had waist circumference equal or more than 88cm.

Table 3: Waist to height ratio among female students

WHtR		*Frequency*	*%*
<0.4	take care	7	2.7%
0.4 - <0.5	Ok	35	13.7%
0.5-0.6	consider action	144	56.5%
>0.6	take action	69	27.1%
Total		255	100.0%

Table (3) shows that (2.7%) of the students had waist to height ratio < 0.4, (13.7%)of the students had WHtR between 0.4-<0.5, (56.5%) of the students had WHtR

between 0.5-0.6 while (27.1%)of them had WHtR more than >0.6.

Table 4: Relationship between duration of sports and Waist to Height ratio among the female students:

variables	<0.4	0.4-<0.5	0.5-0.6	> 0.6	Total	%
Don't play sport	1 1.0%	8 8.1%	64 64.6%	26 26.3%	99 100%	38.8%
30 minutes	4 3.6%	16 14.5%	60 54.5%	30 27.3%	110 100%	43.7%
Hour	0 0.0%	14 56.0%	7 28.0%	4 16.0%	25 100.0%	9.8%
> hour	1 5.0%	12 57.0%	4 19%	4 19.0%	21 100%	7.8%
Total	7 2.7%	35 13.7%	144 56.5%	69 27.1%	255 100%	100.0%

(P=0.029).

Significant relationship was detected between waist to height ratio and the duration of sports (P=0.029).

Table 5: Relationship between body mass index and types of diseases among female students

Variables	*< 18.5*	*18.5 -24.9*	*25-29.9*	*30-34.9*	*35-39.9 2*	*≥40*	*Total*
Did not have disease	37 19.3%	105 54.6%	16 8.3%	16 8.3%	13 6.8%	5 2.6%	192 100%
Hypertension	0 0.0%	2 33.3%	1 16.7%	2 33.3%	1 16.7%	0 0.0%	6 100%
Diabetes	0 0.0%	2 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 100%
Heart disease	0 0.0%	2 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 100%
Other	8 15.1%	25 47.2%	8 15.1%	6 11.3%	5 9.4%	1 1.9%	53 100%
Total	45 17.6%	136 53.3%	25 9.8%	24 9.4%	19 7.5%	6 2.4%	255 100%

No significant relationship was detected between Body mass index and diseases (P=0.63).

Table 6: Relationship between BMI and waist circumference:

Variables	<80	80-<88	≥88	Total
<18.5	25 56%	15 33 %	5 11%	45 100.0%
18.5-24.9	44 32.4%	57 41.9%	35 25.7%	136 100.0%
25-29.9	3 12.0%	4 16.0%	18 72.0%	25 100.0%
30-34.9	0 0.0%	5 20.8%	19 79.2%	24 100.0%
35-39.9	0 0.0%	2 10.5%	17 89.5%	19 100.0%
≥40	1 16.7%	1 16.7%	4 66.6%	6 100.0%
Total	78 30.6%	84 32.9%	93 36.5%	255 100.0%

Significant relationship was found between BMI and waist circumference (P= 0.00)

Table 7: Relationship between BMI and WHtR

Variable	<0.4	0.4-<0.5	0.5-0.6	>0.6	Total
<18.5	2 4.4%	15 33.3%	25 55.6%	3 6.7%	45 100.0%
18.5-24.9	1 0.7%	19 %14	88 64.7%	28 20.6%	136 100.0%
25-29.9	0 0.0%	0 0.0%	15 60.0%	10 40.0%	25 100.0%
30-34.9	1 4.1 %	0 0.0%	10 41.7%	13 54.2%	24 100.0%
35-39.9	0 0.0%	0 0.0%	5 26.3%	14 73.7%	19 100.0%
≥40	3 50.0%	0 0.0%	1 16.7%	2 33.3%	6 100.0%
Total	7 2.7%	35 13.7%	144 56.5%	69 27.1%	255 100.0%

Significant relationship was detected between BMI and WHtR(P= 0.00).

4. Discussion

This study was designed to identify the prevalence of obesity in colleges of Nursing Sciences & Public and Environmental Health at University of Bahri , some interesting findings was detected in this study.

The students in the present study were at the age group range from 17 to 26, regarding marital status,1.2% of students were divorced , (91.8 %) of students were single and (7.1%) of them were married. .few students had chronic diseases comparing to the other diseases, no significant relationship was found between BMI and type of diseases (P=0.63).

According to the WHO (2004) classification for body mass index (BMI), about (53.3 %) of the students in the present study enjoyed healthy normal body weight (BMI = 18.5-24.9 kg/m²),(17.6%) were under weight (BMI=<18.5 kg/m²),(9.8%) of the students were overweight(25_29.9 kg/m²), (9.4%) of the students had obesity degree class one (30_34.9 kg/m²),(7.5%) of the students had obesity class 2 (35_39 kg/m²),and (2.4%) of them had morbid obesity (≥40 kg/m²), similar study in National Ribat University in Sudan revealed that prevalence rate of obesity 26.2% (classified as overweight 16.8%, obese 9.4%)which was higher than the prevalence of overweight and lower than the prevalence of obesity among the students in the present study (Abdalla &Mohamed , 2008). Another study on obesity conducted among students at university of Jordan, showed that the prevalence rates of overweight and obesity were 28.5% and 10.2%, respectively, which was also higher than the prevalence of overweight and lower than the prevalence of obesity among the students in the present study,(Ahmed, et al., 2009).

Regarding abdominal obesity, (30.6%) of the students had waist circumference less than 80cm, (32.9%) of the students had waist circumference range between 80-<88cm, while (36.5%) of them had waist circumference equal or more than 88cm, Many studies stated that waist circumference alone may be a better indicator of abdominal fat and a predictor of ill health than the other anthropometric and strongly associated with visceral fats (Carretero, et al., 2010).

As for waist to height ratio, (56.5%) of the female students had waist to height ratio range between (0.5-0.6). As stated by Ashwell (2014)waist to height ratio is an accurate measure to predict health and nutritional risks factors of obesity ,it is suitable for adult and children over 5 years as well ,WHtR between 0.5and 0.6 means the person has a pear-apple' shape which classified as Amber area. Because this is bordering on an apple body shape, so it is advised not to put on any more weight, especially if the measurements come near the upper end of the yellow area , the person may feel healthier if lose a little weight (Ashwell &Gibson , 2014).The result also demonstrated that (27.1%)of the female students, had waist to height ratio more than > 0.6 . Ashwell, & Gibson (2014), reported that an 'apple' shape, where excess fat is stored deep below the skin in the stomach area increases the risk of serious chronic diseases e.g. heart disease, raised blood pressure, Type II diabetes and some types of cancer, which classified as Red' Action' Area. A pear shape may not be the favorite shape, but it is a healthy shape in which WHtR fall between0.4 and< 0.5. With this kind of body shape, extra fat is stored round the butt, hips and thighs, which is healthier than having an apple shape. Significant relationship was detected between waist to height ratio and the duration of sports (0.029), It was observed that waist to height ratio that fell between 0.5 and more than 0.6 more prevalent among the female students who did not play sports and play only for 30 minutes, this indicated that practicing physical activity and its period contribute in reducing waist to height ratio to the normal range. Significant relationship was detected of BMI with waist circumference and WHtR (P value=0.00). Despite that students' waist circumference and waist to height ratio were higher among those who had higher body mass index, however students who classified as underweight and at the normal healthy weight had also high waist circumference and WHtR (Table 6,7). Therefore, it was clear that central obesity is an effective and important measure to determine the degree of severity of obesity more than the general obesity.

5. Conclusion and Recommendation:

The results concluded that, high prevalence of waist and waist to higher ratio among the students than BMI.

Few chronic diseases were detected among the female students.

Significant relationship was detected between waist to height ratio and the duration of sports (P value=0.029). Significant relationship was detected of BMI with waist and WHtR (P value =0.00), which revealed that waist and WHtR were an effective and important measure to determine the degree of severity of obesity among the female students more than the BMI.

The study recommended that anthropometric measurement should be used as screening tool to identify at risk obesity-related illness due to the total fat and abdominal fat distribution, and to alert individuals of potential risk.
Health professionals should incorporate the use of Ashwell shape chart into routine clinical examination or screening among the Sudanese students male and female.

General and central obesity indices in this study were measured according to the WHO recommendations and Ashwell Chart. The use of this landmark may have resulted in lower indices values or higher value s than what was expected.

However, it is felt that if we have our own criteria for these indices, it will give acceptance and better measurement for BMI and waist circumference So, it would be useful to consider future studies for the development of national anthropometric measures and cut-off point of total fat and fat distribution in relation to the health risk factors among the Sudanese population.

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