An Analysis of Co-relation between socio-economic status and obesity among Adult females in Peshawar

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Abstract

There is varied knowledge whether overweight and obesity is a problem with the people of high or low socioeconomic status. The present study is aimed to find the association of socio-economic status with obesity among females in Peshawar. About 100 females aged 22-60 years were randomly selected from different socioeconomic status. A self constructed questionnaire was designed to find socio-economic status and anthropometrics of the respondents. The results showed a significant negative association of obesity with income and education. According to World Health Organization (WHO) Body Mass Index (BMI) standards about 8.0% of the population was underweight, 50.0% normal weight, 26.0% overweight and 16.0% were obese, while according to Waist-to-hip ratio (WHR) 45.0% were normal and 55.0% were obese. It was concluded that females in Peshawar are at an increased risk of getting obese.

Keywords: BMI, central obesity, education, Income, overall obesity, WHR.

Introduction

Overweight is defined as the BMI of 25.0-29.9 kg/m^2 while obesity is equal to or more than 30kg/m^2 in adults (Eckel, 2003). Overweight is also defined as more body weight than is considered normal or healthy for one's age or build. The term "obese" is used for very overweight people who have a high percentage of body fat (Stern & Kazaks, 2009). Rossen, (2012) has documented a number of causes responsible for obesity; they include lack of sleep, what females eat during pregnancy, a person's physiology, medications, junk and fast food, inactive life style, psychological disturbances, financial problems, eating disorders, disordered eating, etc. While Stern & Alexander (2009) determined the main cause of obesity is our modern technologies. We have plenty of high sugar and high fat food and our life has become fully depended on technologies, in short we are getting extra pounds of weight due to these foods and sedentary life style.

Females with low socioeconomic status suffer more from obesity because they face more psychological stress, unhealthy lifestyle and reproductive history (Wamala et al, 1997). Obesity prevalence is higher among those male and females who have attended fewer years of education and have lower socioeconomic status and especially among those females who have low occupational status (Wardle et al, 2002). Females (35%-75%) are more obese than males (30%-60%) and the main reason behind this is low socioeconomic status, poor dietary habits and inactive lifestyle (Musaiger, A.O., 2004).

In contrast to above studies (Sabanayagam et al, 2009) investigated that low socioeconomic status i.e. less income and education is associated with high prevalence of obesity among females and less among males in Malay. (Monterio et al, 2001) stated that income is directly linked with obesity among males in Brazil. Education does not showed any association with obesity in less developed regions while it showed a strong relation in developed regions. In less developed areas women showed direct relation with income and inverse relation with education. But in more developed regions only the level of female education had impact on obesity. It has a strong and direct relation on obesity as in the case of less developed regions.

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WHO estimates the world wide prevalence of overweight and obesity among adults: a total of 1.6 billion were overweight and 400 million were obese by the year 2005. It is therefore predicted that by 2015 this level will raise up to 2.3 billion overweight and 700 million obese adults globally (Akabas et al, 2012). (Zahid et al, 2008) found that obesity is more common among women as compared to men in Pakistan.

Keeping in view the present situation, the researcher will find the association between socioeconomic status and obesity among females in Peshawar. This research will explore the level of relationship between obesity and socioeconomic status as well as will add updates to the present knowledge.

METHODOLOGY

Sample selection and Size: A sample of 100 females aged 22-60 years were randomly selected from different areas of Peshawar**.**

Data collection: Primary data collected using questionnaire method. A self constructed questionnaire was filled by the respondents concerning the socio demographics and anthropometrics of the respondents**.**

Demographics and socioeconomic data: The socio- demographic variables were age, job title, income, and level of education

Anthropometric data: The anthropometric measurements were taken by the WHO recommended procedures

Height: It was measured by the help of a measuring tape by using a height scale nearest to 0.01 cm. The subjects were asked to stand erect, without shoes.

Weight: It was found by the help of weighing machine with a scale nearest to 0.01 Kg. The females were asked to remove shoes and heavy clothing first. They were asked to stand erect without shoes on the weighing machine.

Body Mass Index (BMI): it was calculated by the following formula

Wt in pounds/ ht in inches^2 * 703

Waist measurement: It was measured by the help of measuring tape (non-flexible) after removing heavy clothing, just above the belly button after exhalation of breath in a straight and relaxed position.

Hip measurement: It was obtained by the help of measuring tape (non-flexible) after removing heavy clothing.

Waist to hip ratio (WHR): it was calculated by the following formula

Waist measurement/ hip measurements

Statistical Analysis: For the purpose of data analysis SPSS version 18 was used to find means, standard deviations, correlation and linear regression Females were categorized into underweight, normal, overweight and obese by applying the WHO body mass index, waist circumferences and waist to hip ratio standards.

RESULTS AND DISCUSSION

Table 1: Socioeconomic characteristics of the respondents   N= 100

Age (years)	
Mean± S.D.	30.06±9.34
Marital status	**N (%)**
Married	42 (42.0%)
Unmarried	56 (56.0%)
Divorced	00 (0.0%)
Widow	2 (2.0%)
Education	**N (%)**
Uneducated	18 (18.0%)
Primary	02 (2.0%)
Matric	10 (10.0%)
Inter	05 (5.0%)
Bachelors	17 (17.0%)
Masters	46 (46.0%)
Scholars	02 (2.0%)
Job title	**N (%)**
Working	68 (68.0%)
Housewife	07 (7.0%)
Students	25 (25.0%)
Income/month	**N (%)**
PKR.1000-9000	4 (4.0%)
PKR.10, 000-19,000	11 (11.0%)
PKR.20, 000-29,000	11 (11.0%)
PKR. 30,000-39,000	21 (21.0%)
PKR. 40,000-49,000	18 (18.0%)
PKR. 50,000-59,000	13 (13.0%)
PKR. 60,000-69,000	05 (5.0%)
PKR.70, 000-79,000 above	17 (17.0%)

Table 1 shows the socioeconomic characteristics of the respondents. Their mean age was (30.06 ±9.43). Most of the samples were unmarried 56.0% followed by married 42.0%, none of them was divorced while 2.0% were widows. Almost half of the females 46% had completed their sixteen years of education, 18% were illiterate, and 17% were graduates. About 68% were working ladies, 24% students and only 7% were housewives. Monthly income of 21% of the females was PKR. 30-39,000/month, 18% was PKR. 40-49,000/month and 17% was PKR. 70-79,000 and above.

Table 2: Anthropometric data of the respondents   N=100

Height (cm)	Weight (Lbs)	BMI (kg/m^2)	Waist Circumferences (cm)	Hip Circumferences (cm)	Waist-to-hip ratio (WHR)
Mean+S.D.	Mean+S.D.	Mean+S.D.	Mean+S.D.	Mean+S.D.	Mean+S.D.
156.88+6.59	132.34+30.92	24.72+5.83	84.89+15.92	97.58+9.06	0.86+0.09

Table 2 shows the anthropometric measurements of the respondents (N=100). Body weight and height directly affected the BMI, mean value is 24.72 kg/m^2, its slightly above than the Average BMI of Pakistani females for the age group of 20-50 y which was found to be 21.20 kg/m(-2) (Akhter et al, 2001). Mean Waist to hip ratio (0.86 cm) is slightly above than the WHO standard ($\geq$0.85 cm) it shows that overall obesity among females in Peshawar is less prevalent than the central obesity. Central obesity is considered the root cause of cardiovascular diseases and diabetes. So it can be said that females in Peshawar can suffer from these diseases if they didn't reduced their waist and hip measurements.

Table 3: Anthropometrics data of the respondents by Education level

Education Level	Height (cm)	Weight (Lbs)	BMI (kg/m^2)	Waist Circumferences (cm)	Hip Circumferences (cm)	Waist-to-hip ratio (WHR)
	Mean+S.D.	Mean+S.D.	Mean+S.D.	Mean+S.D.	Mean+S.D.	Mean+S.D.
Uneducated	154.98+7.40	146.96+41.67	28.65+7.13	97.93+17.70	101.81+10.63	0.95+0.10
Primary	145.41+8.08	108.900+20.22	23.66+7.02	80.64+13.47	89.53+4.49	0.89+0.10
Matric	152.90+5.62	137.06+36.32	26.05+7.68	86.23+16.04	99.31+8.29	0.86+0.10
Inter	154.22+5.57	125.40+16.38	24.01+3.79	85.09+12.95	94.99+6.62	0.89+0.08
Bachelors	158.07+6.19	130.18+32.35	24.76+6.16	84.41+17.71	99.58+10.78	0.84+0.09
Masters	158.70+5.88	126.88+24.19	22.83+4.11	79.22+12.07	94.86+6.91	0.83+0.76
Scholars	160.02+3.59	161.70+10.88	28.58+0.68	99.06+3.59	111.12+9.87	0.89+0.04

Table 3 shows the affect of educational level on the anthropometrics of the respondents. It's being observed in the present study that BMI and WHR are highest among the two extremes of educational levels i.e. the uneducated and the scholars. The results are in agreement with the study of (Subramanian et al, 2009) who reported that overweight is more prevalent in the women with higher educational status, and (Wardle et al, 2001) who found that overweight and obesity is common in females with fewer years of education.

Table 4: Anthropometrics data of the respondents by Income level

Income Level (rupees)	Height (cm)	Weight (Lbs)	BMI (kg/m^2)	Waist Circumferences (cm)	Hip Circumferences (cm)	Waist-to-hip ratio (WHR)
	Mean+S.D.	Mean+S.D.	Mean+S.D.	Mean+S.D.	Mean+S.D.	Mean+S.D.
1000-9,000	150.75+3.82	149.60+40.88	29.72+7.14	100.33+25.14	103.50+13.05	0.95+0.13
10-19,000	151.52+6.29	142.00+30.75	28.09+6.70	95.94+12.98	99.17+9.46	0.96+0.06
20-29,000	154.63+7.58	126.29+34.44	25.34+5.21	87.28+16.84	98.71+9.38	0.87+0.11
30-39,000	158.35+5.42	135.03+33.04	24.49+5.92	81.94+15.07	97.54+8.65	0.83+0.10
40-49,000	157.83+5.33	126.13+22.67	23.10+4.85	81.23+14.34	97.22+10.19	0.83+0.70
50-59,000	157.48+6.72	130.64+40.13	25.17+6.89	85.96+17.56	97.79+9.94	0.87+0.10
60-69,000	161.59+8.43	130.68+30.18	22.63+4.55	79.50+14.52	94.74+6.57	0.83+0.09
70-79,000	158.60+6.34	130.96+26.49	23.23+4.98	80.83+13.37	95.54+7.62	0.84+0.08

Table 4 shows the affect of income on the anthropometrics of the females. It's clearly observed from the BMI (mean 29.72) and WHR (mean 0.95) that females from the lowest income group have highest rate of overweight and obesity. The results are in strong concurrence with the findings of (Wardle et al, 2001) who reported that obesity and overweight is more common in the poorer economic circumstances. The present study strongly disagree with the findings of (Subramanian et al, 2011) who concluded that overweight and obesity are highly concentrated in the higher socioeconomic group.

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Table 5: Prevalence of Obesity as per BMI, Waist circumferences and Waist-to-hip ratio

Body Mass Index (BMI)		Waist circumferences >88 cm		Waist-to-hip ratio (WHR) >0.85	
Underweight	08 (8.0%)	Normal	61 (61.0%)	Normal	45 (45.0%)
Normal	50 (50.0%)				
Overweight	26 (26.0%)	Obese	39 (39%)	Obese	55 (55.0%)
Obese	16 (16.0%)				

Table 5 shows the prevalence of obesity as per BMI, waist circumferences and waist-to-hip ratio. Half of the participants were normal weight when their BMI was calculated, about 26.0% were overweight and 16.0% were obese. More than half of the females were normal weight when their waist circumferences were measured (61.0%) but after calculating their waist-to hip ratio it was evident that more than half of the females were obese (55.0%). It could be an alarming sign because increased waist to hip ratio can increase the chances of cardiovascular problems among females. Similar findings were also of (Kaur & Walia, 2007) study that overall obesity is less prevalent in females as compared to the central obesity.

Table 6: Correlation analysis of Education and Income with BMI and WHR

		education	Income	BMI	WHR
education	Pearson Correlation	1	.550[**]	-.330[**]	-.436[**]
	Sig. (2-tailed)		.000	.001	.000
	N	100	100	100	100
Income	Pearson Correlation	.550[**]	1	-.247[*]	-.293[**]
	Sig. (2-tailed)	.000		.013	.003
	N	100	100	100	100
BMI	Pearson Correlation	-.330[**]	-.247[*]	1	.750[**]
	Sig. (2-tailed)	.001	.013		.000
	N	100	100	100	100
WHR	Pearson Correlation	-.436[**]	-.293[**]	.750[**]	1
	Sig. (2-tailed)	.000	.003	.000	
	N	100	100	100	100

Table 6 shows the correlation analysis of age, education, Income with BMI and WHR. There is a significant positive correlation between age and BMI, r= (98) = .523, p=.000. A significant positive relationship between age and WHR, r= (98) = .624, p=.000. Education has a negative significant relationship with BMI, r= (98) = -.330, p=.001 and also with WHR, r= (98) = -.436, p= .000. Income is also negatively correlated with BMI, r = (98) = -.247, p= .013 and WHR, r = (98) = -.293, p= .003. The results of the present study are strongly concurrent with (Sabanayagam et al, 2009) work who reported that overweight/obesity increase in women with lower level of education and income.

Table 7: Regression Analysis of BMI based on Education
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.330[a]	.109	.100	5.53676

a. Predictors: (Constant), education

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	366.042	1	366.042	11.940	.001[a]
1	Residual	3004.255	98	30.656		
	Total	3370.297	99			

a. Predictors: (Constant), education
b. Dependent Variable: BMI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	29.126	1.390		20.956	.000	26.368	31.884
	education	-.985	.285	-.330	-3.455	.001	-1.551	-.420

a. Dependent Variable: BMI

A simple linear regression was calculated to predict BMI based on Education. A significant regression equation was found ($F_{(1, 98)} = 11.90$, $p < .001$), with an R^2 of 0.109. Participants predicted BMI is equal to 29.126-0.985 (BMI) kg/m^2 when education is measured in years. BMI decreases to -0.985 kg/m^2 for each year of education.

Table 8: Simple linear Regression of WHR based on Education
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.436[a]	.190	.182	.08974

a. Predictors: (Constant), education

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.185	1	.185	22.987	.000[a]
1	Residual	.789	98	.008		
	Total	.974	99			

a. Predictors: (Constant), education
b. Dependent Variable: WHR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.964	.023		42.781	.000	.919	1.008
	education	-.022	.005	-.436	-4.794	.000	-.031	-.013

a. Dependent Variable: WHR

Simple linear regression was planned to foresee WHR based on education. A significant regression equation was found (F (1, 98) = 22.98, < .000), with an R^2 of .190. Participants predicted WHR is equal to .964 - .022 (WHR) when education is measured in years. WHR decreases to - .022 for each year of education.

Table 9: Regression Analysis of BMI based on Income
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.247[a]	.061	.051	5.68297

a. Predictors: (Constant), Income

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	205.277	1	205.277	6.356	.013[a]
	Residual	3165.020	98	32.296		
	Total	3370.297	99			

a. Predictors: (Constant), Income
b. Dependent Variable: BMI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	28.129	1.466		19.185	.000	25.219	31.038
	Income	-.707	.280	-.247	-2.521	.013	-1.263	-.150

a. Dependent Variable: BMI

The tables above shows the Simple linear regression of BMI based on Income. A significant regression equation was found (F (1, 98) = 6.356, p < .013), with an R^2 of .061. Participant predicted BMI is equal to 28.12 - .707 (BMI) kg/m^2 when income is measured in PKR. BMI decreases to -.707 for each 10,000 PKR.

Table 10: Regression Analysis of WHR based on Income

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.293[a]	.086	.076	.09535

   a. Predictors: (Constant), Income

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.083	1	.083	9.176	.003[a]
	Residual	.891	98	.009		
	Total	.974	99			

a. Predictors: (Constant), Income
b. Dependent Variable: WHR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.933	.025		37.943	.000	.885	.982
	Income	-.014	.005	-.293	-3.029	.003	-.024	-.005

a. Dependent Variable: WHR

Simple linear regression was calculated to predict WHR based on income. A significant regression equation was found (F (1, 98) = 9.176, p< .003), with an R^2 of 0.109. Participant's forecasted WHR is equal to .933- .014 (WHR) when income is measured in PKR. WHR decreases to - .014 for each 10,000 PKR.

SUMMARY AND CONCLUSION

The present study was designed to find the Association of obesity with socioeconomic status among adult females in Peshawar city. The sample of 100 females was randomly selected from different socioeconomic background. A self constructed questionnaire was designed to collect information about the Socioeconomic and anthropometric measurements of the participants.

The results show that the average BMI of females in the present study is slightly below than the overweight category but it is greater than the average BMI of adult females in Pakistan. Their Mean waist measurement was slightly below obesity scale but their mean waist to hip ratio was more than the recommended scale. Hence, proved that females in Peshawar are currently facing the problem of central obesity than overall obesity. While testing the affect of education on the body weight of females it was observed that obesity is common in the two extreme levels of education i.e. illiterate and the scholar level. On the other hand, opposite results were observed for income and age. BMI and WHR

both increased with increasing age and increased with decreasing income. BMI and WHR are positively correlated with age but negatively correlated with education and income. Half of the females were normal weight, only eight were underweight and the rest of them were overweight 26.0% and 16.0% obese.

It was concluded that females in Peshawar have a high risk of getting overweight or obese, income and education are strongly linked with obesity. With decreasing income people start having cheap empty calorie food to get rid of hunger and fulfill their family needs instead of nutrient dense foods which are quite expensive. Education is also an important factor which determines food choices of people. The more they are educated the more they can differentiate between good and bad food. Along with formal education there is also extreme need of providing nutrition education free of cost to the general public by seminars, workshops, lectures and conferences so that they can get better understanding about nutrients and their food sources. Female's body weight is at a transitional phase and they are moving very rapidly towards overweight and obesity, specially central obesity than overall obesity. There is an intense need to modify their socioeconomic status. If it's not prevented at the current stage then there are more chances that females will be having more Cardiovascular problems, Hypertension, Strokes, Kidney problems, Diabetes type 2, Cancer, Osteoarthritis and Sleep Apnea in the near future.

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