Original Research Article

Prevalence of Obesity among Pre-Menopausal and Post-Menopausal Females in Jammu

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ABSTRACT

Obesity is a leading preventable cause of death worldwide, with increasing rates in adults and children. It is one of the most serious problems of the 21st century. Obesity now days have become the biggest health problem, which not only affects a person physically but psychologically also and has become an epidemic in many parts of the world. Obesity can occur due to energy imbalance which results in gradual weight gain over a considerable period of time. Before menopause, majority of women tend to gain weight slowly whereas after menopause there appears to be an accelerated increase in body fat that too in the abdomen region of the body. The absence of estrogen may be an important triggering factor for increasing obesity in menopausal women. Thus, the present study has been planned to observe the prevalence of obesity among pre-menopausal and post-menopausal females in different localities of Jammu. Obesity has been identified by calculating BMI and waist height ratio for the selected females. It has concluded from the present study results that the prevalence of obesity is higher among pre-menopausal females while the mean BMI is higher among the post-menopausal females and there is statistically significant association between obesity and the menopausal status of the selected females.

Key Words: Obesity, Pre-menopausal, Post-menopausal, BMI, Waist height ratio

INTRODUCTION

Obesity is a common but complex multifactorial disorder which develops from the interactions of multiple genes and environment characterized by long term energy imbalance due to excessive calorie consumption, insufficient energy output due to inadequate physical activity or both. [1] Obesity can occur at any age and in either sex whereas women and older individuals are more likely to become obese. Obesity has become a global epidemic. Obesity is highly heritable and arises from the interactions of multiple genes, environmental factors and behavior thus, contributing to the increasing burden of type 2 diabetes, cardiovascular disease, stroke, some types of cancer, and premature death worldwide. Overweight and obesity are becoming more widespread with global projections of more than 2.16 billion overweight and 1.12 billion obese individuals by 2030. Obesity is stigmatized in much of the modern world (particularly in the Western world), though it was seen as a symbol of wealth and fertility at other times in history and still is in some parts of the world. World Health Organization (WHO) has reported that in 2014, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 600 million were obese. 39 per cent of adults aged 18 years and over (38% of men and 40% of women) have been found to be overweight. Overall,

about 13 per cent of the world's adult population (11 per cent of men and 15 per cent of women) was reported to be obese. [2] Many studies have suggested that the menopausal transition is associated with the unfavorable changes in the body composition, abdominal fat deposition and general health issues. Menopause is associated with decrease in estrogen levels which is responsible for heart disease, osteoporosis, diabetes, hypertension and obesity in menopausal women are important public health concerns. It causes an increase in tendency to gain weight. There are several changes in the deposition and distribution of body fat from a gynoid to android pattern. Reduction in ovarian hormones at the menopause leads to diverse functional and endocrinological disturbances resulting in decrease in basal metabolism and greater weight gain The prevalence of obesity increases significantly in American women after they reach 40; the prevalence reaches 65 per cent between 40 and 59 years and 73.8 per cent in women over age 60. The prevalence of obesity is growing most rapidly in post-menopausal women. [3]

SHBG (serum sex hormone binding globulin) in post-menopausal women are negatively correlated with visceral fat and an adverse adipokine profile. [4] The relationship between SHBG and insulin resistance in postmenopausal women is independent of both endogenous, estrogens and androgens. [5] Thus a high waist circumference indicating accumulation of excessive central abdominal fat and a low SHBG level are independent predictors of metabolic disease risk in post-menopausal women. A significant change in waist circumference in relation to final menstrual period has been observed and increases in central abdominal fat have been reported from longitudinal studies of Caucasian and Asians women. [6] Many studies of menopause transition and changes in body composition in Chinese women suggested that the menopause has an independent effect on the increase in fat mass as well as an increase in central adiposity. [7]

Results obtained for the pre and post-menopausal women clearly indicate a high prevalence of overweight and obesity in the post-menopausal women as compared to pre-menopausal women. However, reports pertaining to the relationship between increase in obesity at menopause and occurrence of obesity related morbidities like diabetes, hypertension and certain types of cancers. [8]

A lower estrogen level has been associated to higher incidence of cardiovascular diseases in post-menopausal women by some workers. Women are protected from ischemic heart disease (IHD) in comparison to men due to the anti-atherogenic effect of estrogen released from the ovaries while the regular menstruation is maintained. The risk of cardiovascular diseases increases with the onset of menopause. The metabolic syndromes, a cluster of risk factors including obesity, glucose intolerance and hypertension that increases the risk for cardiovascular diseases [9] and type 2 diabetes mellitus is more prevalent after menopause. [10]

A high proportion of middle-aged women experience a great deal of menopausal symptoms due to changes in endogenous hormone levels. These can negatively affect women's health and wellbeing. The frequency and intensity of menopausal symptoms within a given population may vary and also depend on several factors such as age, menopausal status, smoking, chronic conditions and socio-demographic profile. [11] Obesity might also be an important risk factor for experiencing menopausal symptoms. [11,12] Obesity was associated with more severe menopausal symptoms among postmenopausal Spanish women. [12] Women with symptoms of sweats had a statistically significantly higher body mass index (BMI), waist hip ratio (WHR), low density lipoprotein (LDL) level, triglycerides level, and glucose level, systolic and diastolic blood pressure. [13]

The North America menopause society states that aging, lifestyles and behavioral factors such as lack of exercise and increases in food consumptions are closely associated with weight gain in the menopause. A reduction in ovarian hormone at the menopause leads to diverse functional and endocrinological disturbances, among them an increase in body weight and decrease in basal metabolism, which leads to greater weight gain. Thus, the present study has been planned to observe the prevalence of obesity among pre-menopausal and post-menopausal females in different localities of Jammu and to assess the association between obesity and menopausal status of the selected subjects.

MATERIALS AND METHODS

The present study has been conducted on 200 non- pregnant and non-lactating females aged between 30-60 years belonging to different cities of Jammu to look in to the association of obesity and their menopausal status. Simple random sampling technique has been used for selection of subjects for the present investigation. The obesity among the selected females has been determined by calculating BMI following WHO recommendations [14] and waist height ratio. [15] The required body measurements i.e., weight (kg) and height (m^2) were obtained following standard techniques given by Weiner and Lourie [16] and calculation of BMI has been done using the formula ;

BMI = weight (kg)/ height (m^2)

The information regarding menopausal history of the selected females was collected from each subject and recorded on the pre-printed questionnaire.

RESULTS AND DISCUSSION

Table 1: Distribution of Subjects according to their Menopausal Status

Total	No. of Pre-menopausal females	No. of Post-menopausal females
200	123 (61.50)	77 (38.50)
Chi-square value = 8	p<0.001	Significant

Table 1 depicts that majority (61.50 per cent) of the subjects selected for the present study were pre- menopausal while 38.50 per cent of Females had already attained their menopause. The distribution of selected pre-menopausal and post-menopausal females has been found to be statistically significant.

Table 2: Distribution of Subjects According to their Age at Menopause

Age at Menopause (yrs) Mean age at menopause (53.90 years)	No. of Post-Menopausal Females
30-35	1 (1.30)
35-40	5 (6.49)
40-45	40 (51.95)
45-50	25 (32.47)
50-60	6 (7.79)
Total	77 (100.00)

It is depicted from the Table 2 that the mean age at menopause among the post-menopausal females selected for the present study is 53.90 yrs. Majority (51.95 per cent) of the females had attained their menopause between the age of 40-45 yrs followed by 32.47 per cent females who had attained menopause between 45-50 yrs, 7.79 per cent of females had attained their menopause during 50-60 yrs of age while 6.49 per cent had attained their menopause between the age of 30-35 yrs. Thus, it is shown from the present study results that majority of the females had attained their menopause between 40-45 years of age and the mean age at menopause has been found to be 53.90 yrs. Another study reported that majority of the females had attained their menopause between 40.00 – 49.00 years of age and the mean age at menopause is 45.40 years. [14] Findings of other investigators reveal 52.00 years to be the mean age at menopause. [17] However, it was found that the mean age at menopause is 47.50 years among Indian females. [18]

Table 3 depicts that majority (47.00 per cent) of the females were in the age group of 30-40 yrs. followed by 34.00 per cent of the females who were aged between 50-60 yrs while 19.00 per cent of the females were in the age group of 40-50 yrs.

Among the pre-menopausal females, the majority 75.61 per cent were from 30-40 yrs of age followed by 22.77 per cent of them belonging to 40-50 yrs of age and the rest I.e. 1.62 per cent were aged between 50-60 yrs. Among the post-menopausal females, the majority (85.71 per cent) were from 50- 60 yrs of age followed by 12.99 per cent of them belonging to 40-50 yrs of age and rest 1.30 per cent were aged between 30-40 yrs. The (r) value for age has been found to be statistically non-significant among pre-menopausal and post-menopausal females.

Table 3: Distribution of Subjects According to their Age

Age groups (in yrs)	Total	No. of Pre-Menopausal females	No. of Post-Menopausal females
30-40	94 (47.00)	93 (75.61)	1 (1.30)
40-50	38 (19.00)	28 (22.77)	10 (12.99)
50-60	68 (34.00)	2 (1.62)	66 (85.71)
Total	200 (100.00)	123 (100.00)	77 (100.00)
(r-value) = 0.135861		Non-Significant	

Table 4: Mean Age between Pre-Menopausal and Post-Menopausal females

Variable	Pre-Menopausal		Post-Menopausal		Differences	p-Value
	Mean	SD	Mean	SD		
Age	36.00	5.00	53.87	4.93	17.87	<0.001

Table 4 depicts that the mean value for the age of pre-menopausal females has been found to be 36.00 ± 5.00 years while that among post-menopausal females has been found to be 53.87 ± 4.93 yrs. This difference between the age of pre-menopausal and post-menopausal females selected for the present study has been found to be statistically significant. Thus, it is revealed from the present study results that majority of the pre-menopausal females selected for the study were belonging to the 30-40 yrs of age while majority of the post-menopausal females were falling in the 50-60 yrs of age.

Table 5: Distribution of Subjects According to the Prevalence of Obesity

Pre-Menopausal females			Post-Menopausal females			Grand Total	
obese	Non obese	Total	Obese	Non-Obese	Total	Total obese	Total non-obese
101	22	123	62	15	77	163	37
(82.11)	(17.89)	(100.00)	(80.52)	(19.48)	(100.00)	200 (100.00)	
Chi-square value = 6.55		p<0.05		Significant			

It is shown from the Table 5 that the prevalence of obesity among the subjects selected for the present study. Majority i.e. 82.11 per cent of pre-menopausal females were found to be obese according to the calculated values of their BMI while 17.89 per cent of them were non obese. Among post-menopausal females, also majority (80.52 per cent) were obese and the rest 19.48 per cent were non obese. The comparison of prevalence of obesity among pre-menopausal and post-menopausal females using chi square value revealed significant association of prevalence of obesity with menopausal status.

Table 6: Distribution of Subjects on the Basis of their Calculated Values of BMI (As per WHO, 2000 classification)

Classification of BMI (as per WHO, 2000)	Total	%	No. of Pre-Menopausal females	%	No. of Post-Menopausal females	%
Underweight	4	2.00	0	0.00	4	5.19
Normal	33	16.50	22	17.89	11	14.29
Pre-obese	13	6.50	8	6.50	5	6.50
Obese -I	89	44.50	59	47.97	30	38.96
Obese -II	61	30.50	34	27.64	27	35.06
Total	200	100.00	123		100.00 77	100.00
Chi-square value = 8.31	p<0.05		Significant			
(r-value) = 0.103737			Non-Significant			

It has been shown from Table 6 that majority (44.50 per cent) of the females selected for the present study had their BMI between the range of 25-29.9 and were classified as obese class I followed by 30.50 per cent of females who had their BMI greater than 30 and were classified as obese class II. 16.50 per cent of females were belonging to the normal category having BMI in between 18.5-22 while (6.50) per cent of females were pre obese who had their BMI in between 23-24.9 and remaining (2.00) per cent of females were underweight having BMI less than 18.5. Among pre-menopausal females, majority (47.97) per cent were falling in the category of obese class I followed by (27.64) per cent who were belonging to the obese class II category. (17.89) per cent of them were normal while (6.50) per cent were pre obese and none of the pre-menopausal females were belonging to underweight category. Among the post-menopausal females, majority (38.96) per cent were belonging to obese class I followed by (35.06) per cent were fall in the obese class II category. (14.29) per cent of them were pre obese and remaining (5.19) per cent were falling in the underweight category. The chi square value shows the statistically significant differences between the BMI of pre-menopausal and the post-menopausal females. However it is revealed from the r-value (0.103) that there was statistically non-significant association between the BMI of pre-menopausal and post-menopausal females.

It has been shown from Table 7 that the mean BMI for pre-menopausal females has been found to be 27.20 ± 4.34 while that among post-menopausal females it was found to be 27.71 ±4. This difference between the BMI of pre-menopausal and post-menopausal females selected for the present study have been found to be statistically significant.

Table 7: Mean BMI between Pre-Menopausal and Post-Menopausal Females

Variable	Pre-Menopausal		Post-Menopausal		Difference	p-value
	Mean	SD	Mean	SD		
BMI	27.20	4.34	27.71	4.74	0.51	<0.05

It is shown from the present study that majority of the selected females are belonging to the higher categories of obesity i.e. obese class I and obese class II and statistically significant differences have been observed among the BMI of pre-menopausal and post-menopausal females as per the chi-square value. The mean BMI for pre-menopausal females has been found to be 27.20 while that among post-menopausal females it was found to be 27.71. However, it was reported that the overall 47.50 per cent of the females were overweight/obese and those who were obese, 10.30 per cent met the criteria for various higher categories of obesity. [19] Other investigators reported that on the basis of BMI, 12.33 per cent were within the normal range while 87.00 per cent were overweight or obese and those who were obese, 52.27 per cent were belonging to the higher classes of obesity. [20]

Table 8: Distribution of Obese Subjects According to the Age at Occurrence of Obesity

Age at occurrence of obesity (in yrs.)	Total	%	No. of Pre -Menopausal females	%	No. of Post-Menopausal females	%
0-10	8	4.91	6	5.94	2	3.23
10-20	26	15.95	23	22.77	3	4.83
20-30	88	53.99	53	52.48	35	56.45
30-40	34	20.86	14	13.86	20	32.26
40-50	7	4.29	5	4.95	2	3.22
50-60	0	0	0	0	0	0
Total	163	100.00	101	100.00	62	100.00
Chi-square value = 7.29			p<0.05		Significant	

Table 8 reveals that the majority (53.99 per cent) of the females suffered from obesity in the age group of 20-30 yrs

followed by 20.86 per cent of females who suffered from obesity in the age group of 30-40 yrs. 15.95 per cent of females who

suffered in between the age group of 10-20 yrs while 4.91 per cent of the females were suffered in the age group of 40-50 yrs and none of the females were suffered in the age group of 40-50 yrs and none of the females were suffered in the age group of 50-60 yrs. Among the pre-menopausal females, majority (52.48 per cent) were suffered from obesity during the age group of 20-30 yrs followed by 22.77 per cent of them were suffered in the age group 10-20 yrs. 13.86 per cent of females were suffered in the age group of 30-40 yrs while 5.94 per cent of them were suffered during 0-10 yrs of age. 4.95 per cent of them were suffered from 40-50 yrs of age and none of the pre-menopausal females were suffered in the age group of 50-60 yrs. Among the post-menopausal females, the majority (56.45 per cent) were suffered from obesity in the age group of 20-30 yrs followed by 32.26 per cent of them were suffered in the age group of 30-40 yrs. 4.83 per cent of them were suffered in the age group of 10-20 yrs while 3.22 per cent of them were suffered in the age group of 0-10 yrs and another 3.22 per cent of them were suffered in the age group of 40-50 yrs. None of the post-menopausal females were suffered in the age of group of 50-60 yrs of age and the association between the age at occurrence of obesity among the pre-menopausal and the post-menopausal females was found to be statistically significant. It is thus shown from the present study results that majority 74.85 per cent of the females had developed obesity between the age group of 20-40 yrs. It was also observed that overall 47.50 per cent of the females were either overweight or obese between 20-44 yrs of age. [21]

CONCLUSIONS

The majority (61.50 per cent) of the selected females were at pre-menopausal stage while 38.50 per cent of them were post-menopausal females. The mean age at menopause among the post-menopausal females has been observed to be 53.9 yrs. The majority (75.61 per cent) of the pre-menopausal females were belonging to 30-40 yrs of age while 85.71 per cent of the post-menopausal females were belonging to 50-60 yrs of age. The mean age at menopause among the post-menopausal females has been observed to be 53.9 yrs.

Occurrence of obesity has been found to be 81.50 per cent among the pre-menopausal and post-menopausal females. Moreover, 75.00 per cent of them were belonging to the higher classes of obesity i.e. obese class I (BMI=25-29.9) and obese class II (BMI=>30) as per their calculated values of BMI. Age at occurrence of obesity has been found to be 20-40 yrs among both pre-menopausal and post-menopausal females. The pre-menopausal females assumed that they suffered from obesity due to their unhealthy dietary habits while post-menopausal females were of the perception that the hormonal therapy may be the cause of obesity among them.

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