Original Article

Association of Menopausal Symptoms with Overweight and Obesity among Rural Middle Aged Women in North India: A Population Based Study

Komal Singhania, Meenakshi Kalhan, Priyanka Choudhary, Tarun Kumar

Department of Community Medicine, Pt. B.D Sharma PGIMS, Rohtak, Haryana, India

ABSTRACT

Background: Overweight and obesity are important determinant of increasing morbidity among all age groups, including menopausal women. The symptoms of menopause have a negative impact on the quality of life. **Objectives:** The aim of this study is to assess the prevalence of overweight and obesity in menopausal women and also to find its association with menopausal symptoms and sociodemographic variables. **Materials and Methods:** The study was conducted among middle-aged women (40–60 years) from April 2018 to March 2019. The Menopausal Rating Scale was used to assess the severity of menopausal symptoms in 400 women, and data were collected for sociodemographic factors, menstrual history in the past month, and personal history. **Results:** About 35.5% of menopausal women were overweight/obese (26% overweight and 9.5% obese) with average body mass index of 23.9 ± 4.84 and mean age of 53.65 ± 5.11 years Joint and muscular discomfort ($P = 0.001$), hypertension ($P = 0.014$), literacy level ($P = 0.009$), and socioeconomic status ($P = 0.01$) were significantly associated with overweight/obesity. With reference to women with no/little somatic and urogenital complaints, the odds of developing obesity was more (adjusted odds) in patients with mild (odds ratio [OR] - 2.8), moderate (OR - 2.1), and severe (2.19) somatic complaints and also higher risk in patients with mild (OR-3.2), moderate (OR - 1.1), and severe (OR - 1.74) urogenital symptoms. The age of menopause was significantly more among overweight than normal-weight women ($P = 0.033$). **Conclusion:** Overweight and obesity associated with menopause require increased attention and a multidisciplinary approach to women's health to prevent morbidity in this population group.

KEYWORDS: *Menopausal symptoms, middle-age women, obesity, overweight*

INTRODUCTION

*A*ging is a natural process of maturation. All aspects of aging are important to consider from a woman's health perspective. Menopause is a unique stage of the female reproductive life cycle, a transition from reproductive to nonreproductive stage.[1] Peri-menopause refers to the time from the onset of menopausal symptoms to the 1 year after the last menstrual cycle. This duration can last up to 5 or 6 years. Menopause is the last menstrual cycle. The postmenopausal period starts 1 year after the last menstrual cycle.

Women during their mid-life period experience physical and psychological symptoms influenced by aging, endocrine changes, demographics characteristics, psychosocial factors, environmental conditions, and changes in nutritional needs.[2,3] The symptoms of menopause have a negative impact on the quality of life, especially during transition.[4,5]

Address for correspondence: Dr. Priyanka Choudhary,
Department of Community Medicine, Pt. B. D. Sharma PGIMS,
Rohtak, Haryana, India.
E-mail: drmittalpriyanka@gmail.com

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Over the past three decades, the prevalence of obesity has increased substantially across all age groups.[6,7] Menopausal symptoms in obese women in comparison to nonobese may begin at an earlier age and remain for a longer duration.[2] Obese women have an increased concentration of follicle-stimulating hormones, associated with decreased estrogen levels.[8] Body mass index (BMI) is the most widely used indicator of obesity status, which indirectly measures adiposity.

There are limited studies that assessed the relationship between obesity and the severity of menopausal symptoms among middle-aged women. This study was done to assess the prevalence of overweight and obesity in menopausal women and to find its association with the menopausal symptoms and sociodemographic variables.

MATERIALS AND METHODS

A community based descriptive study with cross-sectional design was conducted from April 2018 to March 2019 in the rural block Lakhanmajara of District Rohtak, Haryana, India, which is the rural field practice area of Department of Community Medicine, Pt. B. D Sharma PGIMS, Rohtak. Middle-aged[9] women between the age of 40 and 60 years age comprised our study subjects. Inclusion criteria were women between the age of 40 and 60 years either in peri-menopausal phase or postmenopausal phase and those who were willing to give consent for participation in the study and residing in that area for >1 year. Exclusion criteria: (1) Women who had attained unnatural menopause as a result of a surgical hysterectomy, chemotherapy, or radiotherapy. (2) Women on medication such as anxiolytics, antidepressants, antipsychotic drugs and on any hormone replacement therapy (HRT). (3) Women who were known case of systemic diseases, thyroid disorders and/or any genital pathology. (4) Women with the missing periods in the last 12 months due to other physiological conditions other than menopause.

Assuming the prevalence of menopausal symptoms as 50%[10-17] and allowable error 10% at level of significance of 95%, the sample size calculated was 400. The random sampling technique was employed for selecting the study participants. Out of the total 22 subcentres in CHC Chiri area, five sub-centers were selected randomly. A total of 80 study subjects were selected randomly from each of the selected sub-centers. The permission of the institutional Ethics Committee was obtained before the commencement of the study.

Data collection

The World Health Organization criteria for the classification of nutritional status of individual on the basis of BMI were used in this study. BMI ≥ 25 kg/m^2 was considered overweight and BMI ≥ 30 kg/m^2 was considered obese. A pretested semi-structured schedule was used for interviewing the study subjects to collect information on sociodemographic profile, relevant menstrual history in the past month, personal history. Menopause Rating Scale (MRS) is one of the widely used tool for assessing the prevalence and severity of menopausal symptoms. It consists of 11 items in three domains, i.e., psychological, somato-vegetative, and urogenital subscales. Somato-vegetative symptoms consist of 4 items, i.e., Hot flushes or sweating, heart discomfort, sleeping problems, joint or muscular discomfort. Psychological symptoms consist of 4 items, i.e., depressive mood, Irritability, Anxiety, and physical or mental exhaustion. Uro-genital symptoms consist of 3 items, i.e., sexual problems, bladder problems, and dryness of vagina). Depending on the severity, each symptom is scored from 0 to 4 on Likert's scale with 0 being none and 4 being extremely severe. Somato-vegetative domain has a total score ranging from 0 to 16; urogenital domain has total score from 0 to 12; psychological has total score ranging from 0 to 16. The overall score ranges from 0 to 44. The degree of severity of symptoms were based upon individual domain (dimension) score and total scores.[18]

Data analysis

The quantitative descriptive analysis was performed using univariate statistics to report means and standard deviations for the continuous variables and frequency distribution for the categorical variables. T-statistics was performed to compare differences in the continuous variables. Further Chi-square analysis and Fisher's exact test were performed to compare the frequency of categorical variables. We estimated odds ratio (OR), their respective 95% CI and *P* value using bivariate logistic regression. The variables with *P* < 0.05 were selected for regression to evaluate the association of independent variables with overweight and obesity. For calculating the adjusted odds, the stepwise backward procedure was used for each hierarchical level. All analyses were performed using SPSS version 20.

Table showing severity of each domain of Menopausal Rating Scale (MRS)

Domain score	Degree of severity			
	No/little	Mild	Moderate	Severe
Psychological (P score)	0-1	2-3	4-6	7+
Somato-vegetative (S- score)	0-2	3-4	5-8	9+
Uro-genital (U-score)	0	1	2-3	4+
Total score	0-4	5-8	9-16	17+

This total score determines severity of each domain in the form of no or little (score 0-4), mild (score 5-8), moderate (score 9-16), and severe (score 17-44)

RESULTS

Of the 400 eligible women, 56 (14%) were perimenopausal and 344 (86%) were postmenopausal. With regard to the 56 perimenopausal women, 7 (12.5%), 27 (48.2%), 14 (25%), and 8 (14.3%) were underweight, normal, overweight, and obese respectively. Among postmenopausal women, 44 (12.8%), 180 (52.3%), 90 (26.2%), and 30 (8.7%) were underweight, normal, overweight, and obese, respectively.

The mean age of women in perimenopause and postmenopause was 47.84 ± 4.06 and 54.6 ± 4.6 years, respectively. The overall mean age of study participants was found to be 53.65 ± 5.11 years and the average of BMI was 23.9 ± 4.84. This study showed the overall prevalence of overweight/obesity as 35.5%.

Among all menopausal symptoms, a statistical significant difference between the two groups was seen only for joint and muscular discomfort [Table 1].

The variables such as mean systolic blood pressure, mean diastolic blood pressure, the severity of somato-vegetative domain, severity of urogenital domain, and age of menopause were statistically significantly associated with overweight/obese [Table 2].

Table 3 shows the sociodemographic characteristics of the study participants. All were Hindu by religion. The association of overweight/obesity was statistically significant with literacy and socioeconomic status.

The logistic regression analysis (adjusted and nonadjusted odds) demonstrated that women with higher education, higher socioeconomic status, with history of dysmenorrhea were at higher risk of being overweight/obese than women with no formal education, lower socioeconomic status, and with no history of dysmenorrhea. With reference to women with no/little somatic and urogenital complaints, the odds of developing overweight/obesity was more in patients with mild, moderate, and severe somato-vegetative and urogenital symptoms [Table 4].

DISCUSSION

The prevalence of obesity has increased substantially across all age group and it has a major effect on morbidity and mortality among all individuals, including menopausal women.

This study showed that 35.5% of middle-aged menopausal women were overweight/obese (26% overweight and 9.5% obese) with an average BMI of 23.9 ± 4.84. The finding was similar to the study conducted in India by Sharanya Shre *et al.*[19] where 33% were obese and the mean age of the study participant was 59 ± 11 years with average BMI of 26 ± 5. The difference of this study with our study with respect to mean age and average BMI may be due to difference in inclusion criteria of study participants (only postmenopausal women). Gonclave *et al.*[20] in his study done at Brazil found that 30.8% of women were overweight and 35.2% were obese with total 66% of menopausal women to be overweight. In the study done at Brazil by Gravena *et al.*,[21] 72.6% menopausal women were overweight (BMI ≥25). Koo *et al.*[22] in his study from South Korea found that 48.65% of menopausal women were overweight. This

Table 1: Comparison of mean score of menopausal symptoms between two groups-normal/underweight and overweight/obese

Symptoms	Mean±SD		*t*	*P*
	Normal/underweight (*n*=258)	Overweight/obese (*n*=142)		
Hot flush, sweating	0.69±1.08	0.78±1.09	−0.81	0.42
Heart discomfort	1.01±1.09	0.96±1.03	+0.48	0.63
Sleep problem	1.58±1.57	1.6±1.39	−0.11	0.91
Joint and muscular discomfort	1.90±1.29	2.44±1.21	−4.06	0.001*
Somato-vegetative domain	5.17±3.3	5.73±3.06	−1.68	0.095
Depressive mood	1.03±1.23	0.94±1.14	0.69	0.49
Irritability	1.39±1.36	1.33±1.25	+0.44	0.66
Anxiety	2.06±1.29	1.92±1.26	+1.01	0.31
Physical and mental exhaustion	1.38±1.17	1.57±1.10	−1.63	0.11
Psychological domain	5.85±3.51	5.81±3.45	+0.107	0.92
Sexual problems	0.19±0.67	0.120±0.64	−0.21	0.84
Bladder problem	0.40±0.92	0.50±0.98	−1.02	0.31
Dryness of vagina	0.27±0.77	0.36±0.86	−1.1	0.27
Uro-genital domain	0.85±1.54	1.04±1.61	−1.12	0.27
Total domain score	11.88±6.36	12.59±5.98	−1.1	0.27

*Significant. SD: Standard deviation

Table 2: Association of the WHO body mass index category with other variables and severity of menopausal symptom domains

BMI category	Underweight/normal (BMI <25) (*n*=258)	Overweight/obese (BMI ≥25) (*n*=142)	Total (*n*=400)	χ^2 (*P*)
H/o smoking				
Smoker	37 (14.3)	15 (10.6)	52 (13)	1.156 (0.282)
Nonsmoker	221 (85.7)	127 (89.4)	348 (87)	
H/o regular or irregular cycles				
Regular	254 (98.4)	140 (98.6)	394 (98.5)	0.12 (0.91)
Irregular	4 (1.6)	2 (1.4)	6 (1.5)	
H/o hypertension				
Yes	28 (10.9)	28 (19.7)	56 (14)	5.98 (0.014*)
No	230 (89.1)	114 (80.3)	344 (86)	
Parity				
≤2 children	76 (29.5)	41 (28.9)	117 (29.3)	0.015 (0.90)
≥3 children	182 (70.5)	101 (71.1)	283 (70.7)	
H/o dysmenorrhea				
Present	32 (12.4)	28 (19.7)	60 (15)	3.84
Absent	226 (87.6)	114 (80.3)	340 (85)	0.05
Systolic BP	120.50±16.25	129.34±17.05	−0.511 (*t*)	0.001*
Diastolic BP	76.12±9.77	81.99±11.83	−0.532 (*t*)	0.001*
Age of menarche	15.41±1.40	15.2±1.43	+1.45 (*t*)	0.21
Age of menopause	47.18±4.73	48.19±4.10	−2.14 (*t*)	0.033*
Somato-vegetative domain				
No/little	65 (25.2)	19 (13.4)	84 (21)	8.99 (0.029*)
Mild	48 (18.6)	37 (26)	85 (21.3)	
Moderate	97 (37.6)	55 (38.7)	152 (38)	
Severe	48 (18.6)	31 (21.8)	79 (19.8)	
Psychological domain				
No/little	31 (12)	16 (11.3)	47 (11.8)	0.54 (0.91)
Mild	46 (17.8)	24 (17)	70 (17.5)	
Moderate	71 (27.5)	44 (31)	115 (28.8)	
Severe	110 (42.6)	58 (40.8)	168 (42)	
Uro-genital domain				
No/little	182 (70.5)	87 (61.3)	269 (67.3)	9.09 (0.028*)
Mild	9 (3.5)	14 (9.9)	23 (5.8)	
Moderate	49 (19)	26 (18.3)	75 (18.8)	
Severe	18 (7)	15 (10.6)	33 (8.3)	
Total domains score category				
No/little	37 (14.3)	12 (8.5)	49 (12.3)	3.47 (0.32)
Mild	45 (17.4)	25 (17.6)	70 (17.5)	
Moderate	107 (41.5)	68 (47.9)	175 (43.8)	
Severe	69 (26.7)	37 (26)	106 (26.5)	

The value in parentheses indicate percentage *P*<0.05 (significant). BMI: Body mass index, H/o: History of

difference from our study may be due to regional variation in terms of racial difference, ethnicity, genetic composition, lifestyle factors.

In our study as the age increased the BMI also increased. This finding is in concordance to study done at Brasil.[21] Aging may have a strong influence on developing obesity due to less of activity and a more sedentary lifestyle that decreases the amount of energy spent and thus helps in developing overweight/obesity.

In the present study, the severity of the somatic and urogenital symptoms increased significantly with increase BMI. The somatic complaints include the vasomotor symptoms also. This finding was similar to other studies also.[23-25] In the study by Koo *et al.*[22] at South Korea, obese women were significantly more likely to report vasomotor symptoms than normal and overweight women. Pastore *et al.*[26] found that odds of urogenital symptoms such as severe discharge (OR = 2.2), and irritation and itching (OR = 3.6) were more in obese

BMI category	Underweight/normal (BMI <25) (*n*=258)	Overweight/obese (BMI ≥25) (*n*=142)	Total (*n*=400)	χ^2 (*P*)
Age group				
40-49	52 (20.2)	24 (16.9)	76 (19)	0.63 (0.427)
50-59	206 (79.8)	118 (83.1)	324 (81)	
Marital status				
Married	181 (70.2)	97 (68.3)	278 (69.5)	0.15 (0.7)
Widow	77 (79.8)	45 (31.7)	122 (30.5)	
Type of family				
Nuclear	95 (36.8)	40 (28.1)	135 (100)	3.27 (0.195)
Joint	34 (13.1)	19 (13.4)	53 (13.3)	
Three generation	129 (50)	83 (58.5)	212 (53)	
Occupation				
Paid	141 (54.7)	69 (48.6)	210 (52.5)	1.35 (0.25)
Unpaid	117 (45.3)	73 (51.4)	190 (47.5)	
Educational status				
No formal education	189 (73.3)	86 (60.6)	275 (68.8)	9.37 (0.009*)
Primary	34 (13.2)	20 (14.1)	54 (13.5)	
More than primary	35 (13.6)	36 (25.4)	71 (17.8)	
Living arrangement				
With spouse	187 (72.5)	95 (67)	282 (64.5)	1.37 (0.24)
Without spouse	71 (27.5)	47 (33)	118 (29.5)	
Socioeconomic status				
Lower	24 (9.3)	9 (6.3)	33 (8.3)	13.19 (0.01*)
Lower middle	54 (20.9)	34 (23.9)	88 (22)	
Middle	75 (29)	28 (19.7)	103 (25.8)	
Upper middle	65 (25.2)	30 (21.1)	95 (23.8)	
Upper	40 (15.5)	41 (28.9)	81 (20.3)	

Table 3: Association of sociodemographic variables with WHO body mass index category

The value in parentheses indicate percentage. *P<0.05 (significant). BMI: Body mass index, H/o: History of

menopausal women. Obesity was the risk factor for severe menopausal symptoms by Fernández-Alonso *et al.* in their study.[27] Brazilian study revealed that there was a significant association between obesity and severity of MRS total score.[20]

The present study depicts that mean systolic and diastolic blood pressure was significantly more in the overweight/obese group than in the normal BMI group. Our finding was different from the finding of Sharanya Shre *et al.*,[19] where overweight was not associated significantly with systolic or diastolic BP among postmenopausal women. This difference may be due to variation in the inclusion criteria of the study participants where they have taken only postmenopausal women.

The association of parity, age of menarche, marriage, and living with spouse were statistically nonsignificant with overweight/obesity in this study. In the study by Sharanya Shre *et al.*[19] overweight/obesity was significantly higher in married than in widows. Gonçalves *et al.*[20] found that the age of menarche was significantly associated with obesity (*P* = 0.012). There was a significant association of obesity with parity in study by Gravena *et al.*[21] Theodoro *et al.*[28] found that early menarche and parity were strong predictors of obesity. Association of obesity with living with partner was nonsignificant in other studies also.[20,21]

The present study depicted that education and socioeconomic status had statistical significant association with overweight/obesity. Similar association of education with obesity/overweight was found in other studies also.[19,21] Social class was not significantly associated with obesity in study by Gravena *et al.*[21]

The association of occupation and smoking with BMI categories was found to be statistically insignificant in the present study. Gonçalves *et al.*[20] found significant association between obesity and occupation (*P* = 0.01). The association of smoking and tobacco use was nonsignificant in other studies also.[20,21]

CONCLUSION

The study indicated that more than one-third of menopausal women were overweight/obese and prevalence increased with age. Joint/muscular discomfort, hypertension, severity of somato-vegetative and urogenital complaints increased with overweight/obesity. Here, menopause was significantly

Table 4: Percent distribution of overweight/obesity, odds ratio (unadjusted and adjusted), *P* value and 95% confidence interval according to education, socioeconomic, history of hypertension, with history of dysmenorrhea and menopause symptoms

Variables	Total number (*n*)	Overweight/ obese (*n*=142)	Unadjusted prevalence ratio (95% CI)	*P*	Adjusted prevalence ratio (95% CI)	*P*
Education						
No formal education	275	86 (31.3)	Reference	-	Reference	-
Primary	54	20 (37)	1.293 (0.704-2.375)	0.41	1.23 (0.64-2.39)	0.54
More than primary	71	36 (50.7)	2.26 (1.33-3.84)	0.003*	2.27 (1.24-4.17)	0.008*
Socioeconomic class*						
Lower	31	9 (27.3)	Reference	-	Reference	-
Lower-middle	88	34 (38.6)	1.679 (0.698-4.04)	0.25	2.05 (0.79-5.32)	0.14
Middle	103	28 (27.2)	0.996 (0.413-2.401)	0.99	1.203 (0.462-3.14)	0.71
Upper-middle	95	30 (31.6)	1.231 (0.511-2.967)	0.64	1.41 (0.54-3.68)	0.49
Upper	81	41 (50.6)	2.733 (1.132-6.598)	0.025*	3.2 (1.2-8.52)	0.020*
H/o hypertension						
Present	56	28 (50)	2.018 (1.14-3.57)	0.016*	2.31 (1.25-4.29)	0.008*
H/o dysmenorrhea						
Present	60	28 (46.7)	1.74 (0.99-3.02)	0.05*	1.83 (1.0-3.33)	0.049*
Somato-vegetative domain						
No/little	84	19 (22.6)	Reference	-	Reference	-
Mild	85	37 (43.5)	2.637 (1.35-5.14)	0.004*	2.83 (1.31-5.8)	0.004*
Moderate	152	55 (36.2)	1.94 (1.06-3.57)	0.033*	2.16 (1.12-4.16)	0.021*
Severe	79	31 (39.2)	2.21 (1.12-4.37)	0.023*	2.19 (1.04-4.63)	0.040*
Uro-genital domain						
No/little	269	87 (32.3)	Reference	-	Reference	-
Mild	23	14 (60.9)	3.25 (1.36-7.81)	0.008*	3.95 (1.53-10.17)	0.004*
Moderate	75	26 (34.7)	1.11 (0.647-1.904)	0.71	0.99 (0.55-1.77)	0.97
Severe	33	15 (45.5)	1.74 (0.84-3.6)	0.14	1.66 (0.76-3.62)	0.20*

*$P<0.05$ (significant). CI: Confidence interval, H/o: History of

delayed among overweight/obese women. Awareness generation activity should be undertaken about the need of a healthy diet and physical activity to prevent obesity and hypertension, especially in educated and upper-class women. This will, in turn, lower down the menopausal symptoms and joint/muscular problems. Screening of these women for hypertension should also be undertaken. The results also indicate a number of important sociodemographic and clinical factors that should be further investigated in new studies.

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Conflicts of interest

There are no conflicts of interest.

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