Obesity and Its Risk Factors in Urban and Rural Females of Pune

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Abstract:
Background of the study: *Obesity is becoming a alarming metabolic disorders in global scenario. Its prevalence is increasing day by day even in developing countries. Urban population is more vulnerable to this epidemic specially females. Objectives of this study was to compare obesity and its risk factors in urban and rural females.*
Methodology: *In this cross sectional study, total 1063 females (545 rural and 518 urban) were analyzed. Height, weight, waist Circumference, Hip circumference, W:H ratio, Educational status, Socioeconomic status, Skinfold were measured. Body mass Index (BMI), Percentage of body fat were calculated using the formula. BMI classification, Cut off for Waist Circumference were considered as per guidelines given for Asian Indian Adults. Statistical significance was considered at 95 % Confidence Interval.*
Result: *Out Of 1063 women randomly selected, 16.41 % of urban and 10.83% of rural females were classified as overweight and 40.54 % of urban and 22.75% of rural females were obese. Weight, BMI, Percentage of Body fat, Waist Circumference and Waist:Hip Ratio (WHR) was significantly higher (p,0.001) in Urban females as compare to Rural females.*
Conclusions: *The higher prevalence of overweight and obesity was found in Urban women as compared to Rural women. Urban females were more central obese than Rural females.*
Key Words: *Obesity, BMI, Body fat percentage, Urban and Rural Females.*

I.   Introduction:

Obesity is a chronic, multifactorial disease with complex psychological, environmental (social and cultural), genetic, physiologic, metabolic and behavioral causes and consequence   (American Obesity Association). Obesity has reached at an alarming rate (Flegal et al. 2002, Hedley et al. 2004) [1, 2] and prevalent among all the groups of adults especially in women in both developed and developing countries (Wang and Hoy, 2004; Flegal, 2005).[3,4] Environmental and behavioral changes brought about by economic development, modernization and urbanization have been linked to the rise in global obesity[5]. Obesity epidemic has important public health consequences because obesity is associated with numerous disease and disability (Visscher and Seidell, 2001)[6] and shorter life expectancy (Olshansky et al 2005) [7].

Females experience one or several life changing experiences that makes them vulnerable to weight gain. Pregnancy and post delivery period leads to significant amount of fat mass retention (Rathi M. and Palekar T 2012) [8], Changes in social roles such as entering or leaving marriage influence physical characteristics such as body weight. Females who were unmarried at the baseline and married at follow-up showed greater weight change than those who were married at both   times. [9]

Zargar AH at el (2004) stated that Obesity is a growing problem even in developing regions like India and is more common in females and in urban population. [10] Shah Ebrahim, et al (2010) studied that Migration into urban areas is associated with increases in obesity, which drive other risk factor changes. [11] Whereas Christie A et at (2012) observed in a study done in united states that prevalence of obesity in rural adults was 39.6% and urban adults was 33.4%. [12] This is in contrast to the findings observed in India. A study done by Kaur et al (2013) found that Prevalence of Overweight is 75.33% in Urban and 67.99% in Rural women.[13] Long-term weight loss strategies are of limited success[14], and the costs associated with obesity treatment are high [15]. Obesity prevention is therefore an important public health priority and for this it is necessary to know the weight status of urban and rural females
Hence this study aimed to describe and compare the body compositions of the females of childbearing age from urban and rural areas.

II.   Methodology

In this Cross sectional study, a Total 1063 females were included out of which 545 were from rural area and 518 from urban area of Pune. Ethical approval was taken from Institutional Ethical Committee. Data was collected from January 2013- March 2014. Females from the age group of 20 – 45 were included in the

study. Pregnant, Post partum, menopausal females and Physically disabled females were excluded from the study. Written consent was taken from all the participant. Demographic data like no. of children, Education level, Monthly Income, Working Status was assessed for all participants. Socioeconomic status was assessed using the Kuppuswami's Socioeconomic Status Scale as revised in 2012.[16] The anthropometric measurements were taken by using standard technique recommended by Lohman et al 1988.[17] Body weight and height measurements were made two times and Average was considered the final reading. Body weight was measures to the nearest 0.1 Kg using digital electronic scale with the subject wearing minimum clothes and height was measured to the nearest 0.1 cm using stadiometer. Skinfold Measurements were taken at Chest, Subscapular, Thigh, Abdomen, Triceps, Midaxillary and Suprapubic area as per ACSM Guidelines.[18] All the skinfold measurements were taken to the nearest 1.0 mm using Skinfold caliper. Readings were measured at three times and average was considered as the final reading. Body Mass Index (BMI) and Waist Hip Ratio (WHR) was calculated through following equations, BMI = Weight (Kg.) / (Height in cm)^2 , WHR = Waist Circumference in cm/ Hip Circumference in cm. Body Density was calculated using 7 site formula for females and Body Density was converted into Percentage of Body Fat By using Siri's Equation where percent body fat = 100[(4.94/Body Density) – 4.50] [19]. BMI was categorized as Normal, Underweight, Overweight & obese using Indian classification and Cut off values for waist Circumference was considered 80 cm.[20] Data was analyzed and statistical significance was considered at 95 % Confidence Interval.

III.   Results

The present study has included 1063 females of the reproductive age group from Urban (n= 518) and rural (n=545) area. The mean and standard deviation of age, anthropometric variables and adiposity indices of the two groups are described in the Table 1.

The overall prevalence of overweight was 13.55% (95 % CI – 0.11 to 0.15) and that of obesity was 31.42% (95% CI – 0.28 to 0.34). Table 1 shows the prevalence of Overweight and obesity in urban and Rural females and it reveals that Urban female have higher prevalence in overweight and obesity than rural females. In the table 2, When compared, BMI and percentage of Body Fat of Urban females was found statistically higher than that of the Rural females as p<0.000. The Central obesity was significantly higher in urban females than rural females as observed by waist circumference and W:H Ratio. As per the cut off values given for the waist circumference for predicting the risk of developing cardiovascular diseases, 62 % urban females showed waist circumference more than 80 cm. whereas only 33% rural females had more circumference.

Interestingly it has been found and seen in the graph 1, the educational status increases from 1 – 7 as described in Kuppuswami Scale, the Mean BMI increases. Illiterate and primary educated females showed lesser BMI than Professionals and highly educated. Percentage of females who has obesity increases with the education level. We also found in the graph 2 that females with lower Socioeconomic status were lean than females with higher socioeconomic status.
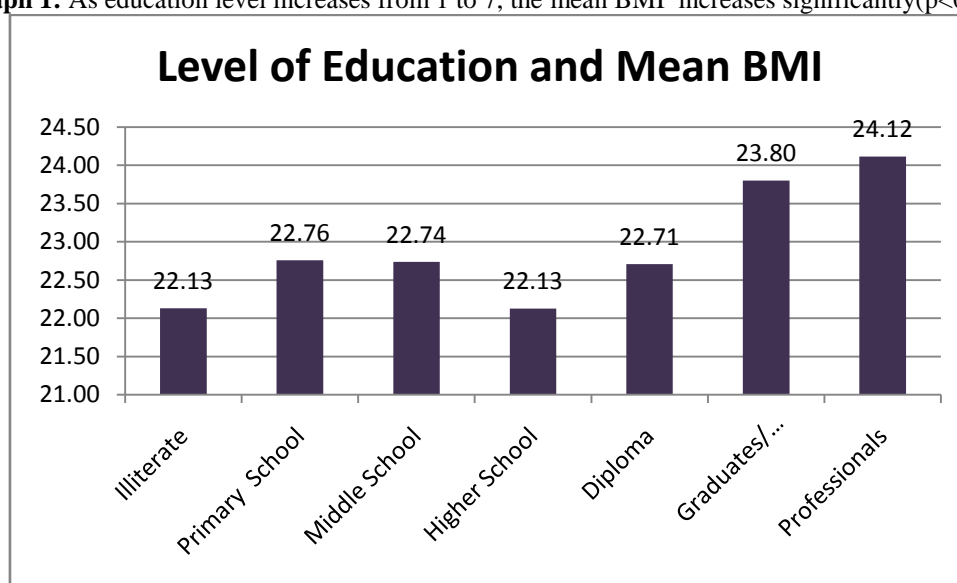
Table 1. Percentage of Prevalence of Overweight and Obesity among Urban and Rural Women of Pune according to the South East Classification of BMI.

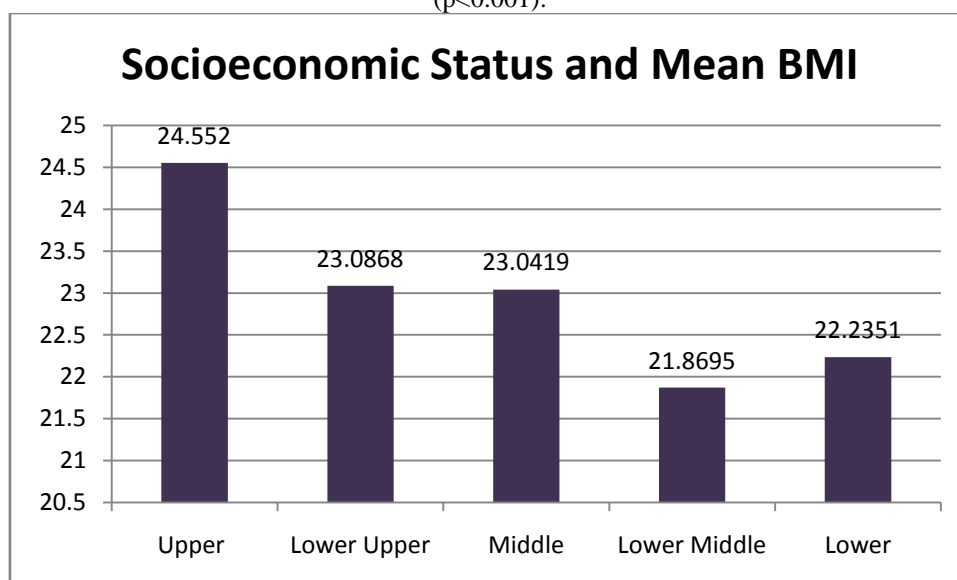| Prevalence of	Overall	Urban (95% CI)	Rural (95% CI)
Underweight	13.92%	8.49% (6.30 – 11.32)	19.08% (15.92 – 22.69)
Normal weight	41.11%	34.56% (30.49 – 38.85)	47.34 % (43.09 – 51.63)
Overweight	13.55%	16.41%(13.38 –19.95)	10.83%(8.40-13.81)
Obesity	31.42%	40.54%(36.30-44.92)	22.75%(19.34-26.55)

Table 2

Particulars	Overall	Urban	Rural	P value
Mean Age in Yrs.	32.36 (SD= 7.07)	33. 11 (SD =7.02)	31.65(SD= 7.06)	P<0.001
Mean Height in cm.	1.54(SD= 0.04)	1.56(SD= 0.05)	1.53(SD= 0.04)	
Mean Weight in Kg.	55.04(SD=6.43)	59.08(SD=11.03)	51.20(SD=8.89)	P<0.001
Mean BMI (Kg/M^2)	23.01(SD= 1.14)	24.24 (SD= 4.33)	21. 84(SD = 3.60)	P<0.0001
Mean Waist Circumference in cm.	81.30(SD= 4.24)	85.04(SD=10.29)	77.75(SD=10.00)	P<0.001
Mean Waist Hip Ratio	0.83(SD= 0.06)	0.84(SD=0.053)	0.83(SD=0.049)	P=0.009
Mean Percentage of Body fat	26.34 (SD= 11.98)	30.20(SD=7.39)	22.66(SD=7.32)	P<0.001

Graph 1: As education level increases from 1 to 7, the mean BMI increases significantly(p<0.001)

Level of Education and Mean BMI

Illiterate	22.13
Primary School	22.76
Middle School	22.74
Higher School	22.13
Diploma	22.71
Graduates/…	23.80
Professionals	24.12

Graph 2: As Socioeconomic status lowers, the percentage of females who has BMI decreases significantly (p<0.001).

Socioeconomic Status and Mean BMI

Upper	24.552
Lower Upper	23.0868
Middle	23.0419
Lower Middle	21.8695
Lower	22.2351

IV.   Discussion

The present study found the higher rate of prevalence of overweight and obesity in the females of reproductive age from Urban area than the Rural area. The result of this study showed the similar results by the study done in the India by Gurjeet Kaur et al (2013).[13] They found prevalence of obesity was 29.33% in urban women and that in the rural women was 17%. A study done by Mendez et al (2005) also reported that prevalence of overweight and obesity was higher in urban women than rural women [21].

Urbanization mainly leads to the changes in the occupation patterns, lifestyle, family structures and to some extents also value system. These changes are reflected changes in the diatary pattern and the level of the physical activity. As the people are showing increase in the socioeconomic status, cereals intake declines and intake of fast food, sugar and fat is increasing. In urban population , consuming easily available food, more of sedentary lifestyle is occurring in the context of globalization. While the rural population is mainly involves in farming work whivh involves more of manual labour, and a high level of physical activity, urban population is involved in skilled or semiskilled work which mainly leads to sedentary lifestyle except for some of the urban slum dwellers. These changes in the dietary practices, physical activity and lifestyle are associated with rising affluence induced by developmental transition which ultimately contribute to the increasing prevalence of overweight and obesity in urban areas.

The result of this study was contradictory to the findings of the study done by Patterson et al 2004 where they reported that obesity was more common in rural adults (20.4%) than urban adults (17.8) [22]. Similar results was also reported by Verity Cleland et al (2010) as they found 24% of urban and 26% of rural women were classified as overweight and 19% of urban and 23% of rural women were classified as obese [23]. Here they showed Prevalence of obesity and overweight was higher in rural females as compare to urban females.

We found that the females having higher Socioeconomic status were more overweight and obese than the lower socioeconomic status. In developing countries like India, Higher socioeconomic status relates with less physical activity and more sedentary lifestyle. On the contrary, it has been observed in US that females with lower income had higher BMI and Body weight that the females with Higher BMI. (Couzelis, 2005) [24].

Percentage of Body Fat was found more in Urban females that rural females. Rural females involve in activities like washing clothes by hands, doing all household work, Farming work, and also the mode of transport is walking. Physical activities lead to development of lean body mass and reduction of fat mass. Brownson et al (2000) found that rural females spent more time doing household physical activity than the females who resided in more densely populated metropolitan communities[25]. This higher level of household activity in the rural females can be due to the limited access to and the higher cost of services that support household functions. This leads to the more energy expenditure and ultimately leads to less percentage of body fat and weight.

Further research can be done on prevalence of overweight and obesity with working status, parity status and diet pattern of the females from urban and rural females.

This study concludes that the urban females have more prevalence of Overweight and obesity than the rural females and more central obesity than Rural females. It is also concluded that education and socioeconomic status inversely affects BMI.

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Conflict of Interest :-
Conflict of Interest declared none.

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