

Prevalence of Abdominal Obesity after Delivery in Urban and Rural Women of Haryana, India

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Abstract: Being a mother is one of the most important phase of any women's life which she cherishes for life. This time is associated with rapid weight gain, which is generally lost with time but many could retain it and hence could move towards being overweight or finally obese. The purpose of this study was to compare the prevalence of abdominal obesity post delivery in women of Haryana, India. **Methods:** This was a comparative study with 102 women, 51 from rural and 51 from urban areas of Hisar, Haryana. Measures for their height, weight, BMI and central obesity markers i.e. waist circumference (WC), hip circumference (HC) and waist to hip ratio (W/H) were taken. **Results:** Women in rural areas had an average BMI of 21.54 kg/m² while in urban areas it was 24.18 kg/m² for women. Average waist circumference was 76.50 cm for rural and 82.07 cm for the urban women. The average W/H measures for urban areas were 0.87 whereas for rural areas it was 0.85. **Conclusion:** The results showed that women in urban areas had more BMI and central obesity post pregnancy as compared to their age matched rural counterparts post delivery.

Keywords: central obesity, BMI, post pregnancy, waist circumference, hip circumference.

I. INTRODUCTION

India is a fast developing nation and emerging as a global power. Once considered as an undernourished nation today India is facing a dual problem of malnourishment along with obesity (1). The World Health Organization has described obesity as one of today's most neglected public health problems, affecting every region of the globe (2). Obesity is reported to be more prevalent in females than males in India (3). Various studies have also reported that females are more centrally obese as compared to males and hence are more susceptible to various metabolic co-morbidities associated with overweight and obesity (4,3). Indians are also more obese at a lesser BMI as compared to western people (Table 1). This is probably due to their typical "Asian Indian phenotype". Indians also come in one of the ethnic groups for which waist circumference or waist-hip ratio may reflect more body fat at a given body mass index level.

Various studies found a higher percentage of body fat in Asians at lower BMI (5,6) as well as an increased prevalence of truncal fat, compared to Caucasians(7). This means Indians could be obese with less weight measured as per BMI. Central obesity also termed as "abdominal obesity" is measured by waist circumference (WC), hip circumference (HC) and waist to hip ratio(W/R). Measurement of waist circumference alone is a reliable indicator of the metabolic health of the person (4). As per the guidelines by International Diabetes Federation criteria for ethnic or country-specific values for waist circumference, Indian women above a WC of >80 cm and men > 90cm are at higher risk for associated co morbidities(Table 2(a),(b)).

Pregnancy is a time when there is rapid weight gain in females, which is normal and expected as of the normal physiological process of pregnancy. After delivery some amount of weight is retained and if it is in excess it could be a cause for developing obesity in future along with various life style diseases. Similarly, increased waist size post pregnancy can present the similar health issues. If it goes unchecked, it can lead to development of various non-

communicable diseases in future. Women should be educated and made more aware of this unseen and unreported problem of central obesity and how this could be prevented with correct advice regarding weight gain and its management before, during and after delivery.

Through this study, we have tried to compare the prevalence of abdominal obesity in women after delivery, with an aim to see how motherhood adds to the scenario of obesity in both the rural and urban areas of Haryana state.

Table 1: Obesity classification according to WHO and Asia-Pacific guidelines

	WHO (BMI)	Asia Pacific (BMI)
Underweight	<18.5	<18.5
Normal	18.5 -24.9	18.5-22.9
Overweight	25-29.9	23-24.9
Obese	>30	>25

Abbreviations: WHO, World Health Organization; BMI, body mass index. (Int J Chron Obstruct Pulmon Dis. 2017; 12: 2465–2475.)

Table 2: (a) International Diabetes Federation criteria for ethnic or country-specific values for waist circumference

Country or ethnic group	Sex	Waist circumference (cm)
South Asian (Includes India)	Men	>90
	Women	>80

Source: Adapted from Zimmet & Alberti (2006)

Table 2: (b) World Health Organization cut-off points and risk of metabolic complications

Indicator	Cut-off points	Risk of metabolic complications
Waist circumference	>94 cm (M); >80 cm (W)	Increased
Waist circumference	>102 cm (M); >88 cm (W)	Substantially increased
Waist-hip ratio	≥0.90 cm (M); ≥0.85 cm (W)	Substantially increased

M, men; W, women

II. METHODOLOGY

The present study was carried out in the year 2015-16 over a period of 7 months. The sample consisted of 102 women, 51 from rural and 51 from urban areas of Hisar district of Haryana state. Rural women were contacted at their respective homes for data collection. Those who fulfilled the inclusion criteria and gave their consent for the participation were measured for the outcome variables. Each participant filled a written consent form before the readings were taken. The information required for the study was collected with the help of the structured questionnaire. Table 3 shows the baseline characteristic of the participants. They were measured for their height, weight, BMI, waist circumference (WC) and hip circumference (HC). The measurement for waist and hip circumference was taken as per the guidelines in report of WHO expert consultation guidelines 2008, Geneva.(8) The participants were included if they had their last delivery within last 1- 1.5 years and were healthy without any metabolic disease. They were excluded if they were pregnant, if had a baby older than 1.5 year or were having any lifestyle disease like hypertension, diabetes, cardiovascular condition requiring regular medication.

Table 3: Baseline characteristics of the participants

Variables	Total(102)		Rural(51)		Urban(51)	
	N	%	N	%	N	%
Age						
16-24	67	65.6%	37	72.5	30	58.8
25-30	30	29.4%	12	23.5	18	35.2
31-35	05	4.9%	02	3.9	03	5.8
BMI						
<18.5	24	23.5	18	35.2	06	11.7
18.5-22.9	40	39.2	17	33.8	23	45
23-24.9	07	6.8	03	5.8	04	7.8

25-30	18	17.6	09	17.6	09	17.6
>30	13	12.7	04	7.8	09	17.6
Education level						
<10	09	8.8	09	17.6	0	0
10-12	47	46	27	52.9	20	39.2
Graduate	36	35.2	11	21.5	25	49
Postgraduate	10	9.8	04	7.8	06	11.7
Education level of husband						
<10	08	7.8	08	15.6	0	0
10-12	32	31.3	24	47	08	15.6
Graduate	36	70.5	10	19.6	26	50.9
Postgraduate	26	25.4	09	17.6	17	33.3
Type of delivery						
Cesarean	13	12.7	02	3.9	11	21.5
Normal	89	87.2	49	96	40	78.4
Musculoskeletal Complains						
Back pain	36	35.2	10	19.6	28	54.9
Leg pain	06	5.8	01	1.9	05	9.8
Hands pain	05	4.9	00	0	05	9.8
Other	01	0.9	01	1.9	00	0
Working	09	8.8	01	1.9	08	15.6
Not working	93	91.1	50	98	43	84.3
Birth weight						
<2.5Kg	28	27.4	10	19.6	18	35.2
>2.5Kg	74	72.5	41	80.3	33	64.7

Methods of measurement:

Height- Height was measured with a non stretchable measuring tape to the nearest cm. Subjects were requested to stand upright without shoes with their back against the wall, heels together and eyes directed forward.

Weight- Weight was measured using a portable digital weighing machine. Subjects wore light clothing, stood upright without shoes and weight was recorded to the nearest 0.5 kg.

Waist circumference- Waist circumference was measured using a non-stretchable measuring tape. Subjects were asked to stand erect in a relaxed position with both feet together on a flat surface; they wore light cloths and any unwanted bulky clothing was removed. They were asked to breathe normally. WC was measured as the smallest horizontal girth between the costal margins and the iliac crests at the end of expiration. Mean of two readings was taken as WC.

Hip circumference- Hip circumference was measured from around the widest portion of the buttocks, with a non-stretchable measuring tape parallel to the floor.

Body mass index - BMI was calculated using the formula: weight (kg)/height² (m²).

Definitions

- **Overweight** was defined as a BMI ≥ 23 kg/m² but < 25 kg/m² (based on the World Health Organization Asia Pacific Guidelines) with or without abdominal obesity (AO) (9).
- **Abdominal obesity** (AO) was defined as a waist circumference (WC) ≥ 90 cm for men and ≥ 80 cm for women (10).
- **Isolated abdominal obesity** (IAO) was defined as a waist circumference of or ≥ 80 cm in women with a BMI < 25 kg/m².

Statistical analysis:

Statistical analysis was performed using the SPSS version 21 software. Statistical formulas for mean and standard deviation were calculated. Continuous variables were expressed as mean \pm SD and categorical variables were expressed as number (%).

III. RESULTS

The study showed the average BMI of 21.54 kg/m² for rural and 24.18 kg/m² for the urban women. 53% of women had BMI above normal in urban areas while this figure was 47% in rural areas.(Fig.1) While the average waist circumference was 76.50 cm for rural and 82.07 cm for the urban women.(Fig.2) Table 4 shows the values for comparison between the rural and urban settings. These findings show that urban women were found to be overweight as per the Asian Indian WHO classification for BMI. Similarly, they were found to be more centrally obese with their waist circumference measures more than 80 cm. As per the WHO criteria cutoff values for waist circumference of more than 80 cm for women increases the risk for obesity and susceptibility for metabolic complications in future. The average W/H measures for urban areas were 0.87 whereas for rural areas it was 0.85. The WHO states that abdominal obesity is defined as a waist-hip ratio above 0.90 for males and above 0.85 for females. It was observed that women in rural areas were having a normal BMI and were not centrally obese as compared to the urban women.

Table 4: Comparison of rural and urban areas (Mean ± Standard Deviation)

	RURAL	URBAN
Age(Yr)	23.33 ± 3.22	24.63± 2.99
Height(m)	1.50 ± 0.13	1.53 ± 0.140
Weight(kg)	48.05 ± 8.57	54.38 ± 8.85
BMI(kg/m ²)	21.54 ± 4.89	24.18 ± 5.73
Waist Circumference(cm)	76.50 ± 10.52	82.07± 9.09
Hip Circumference(cm)	89.44 ±7.78	93.52±7.78
Waist/Hip Ratio	0.85	0.87
Baby birth weight(kg)	2.80±0.46	2.73±0.51

IV. DISCUSSION

The prevalence of overweight among young women in the developing world has reached an alarming state (11). The present data indicate that women in urban areas are found to be more overweight and centrally obese as compared to the women in rural areas of Hisar district of Haryana, India. The average BMI was found to be more in the urban women which was 24.18Kg/m², while in rural women it was 21.54Kg/m². It indicates urban women are already in an overweight bracket as per Asian classification of BMI values and hence at an increased risk of developing associated co morbidities. In an earlier study for covariates of overweight and obesity in north Indian women, urban residence was reported as one of the covariates for being overweight or obese(12). Similar findings were presented by another study where urban habitation was one of the reasons for overweight and obesity.(13) The WC in urban areas(82.0 ± 9.09) was also found to be above the recommended parameters of WC for women(>80cm) as compared to rural women(76.50 ±10.52). Similarly, the waist to hip ratio for the rural and urban areas was 0.85 and 0.87 respectively. This was again above the recommended values for W/H ratios as per WHO guidelines for Asian women. The results could be possibly because of the basic difference in the lifestyle of the two regions where women in rural areas are involved in more amount of physical activity as compared to urban women. Rural women in Haryana are more physically active, be it for daily household chores or taking care of farm or field work. Their daily work involves more walking and less dependence on any kind of mode of commuting. This trend is even seen during pregnancy when though the overall physical activity is reduced in all expecting women but comparatively physical activity is still more in rural than the urban women. On the other hand, majority of urban women have a sedentary lifestyle with more dependence on vehicles and domestic help for daily household activities. This activity is further reduced if the woman is working, where majority of the time is spent sitting especially for those involved in desk jobs. There are various studies that show urbanization being one of the reasons for obesity in women.(12,13)

Urban women also had more complains of various musculoskeletal problems than the rural (Fig.3). The most prevalent one was back pain with 54.9% of women reporting it in urban areas as compared to 19.6% in rural areas. It was followed with leg pain with 9.8% reporting in urban and only 1.9% in rural women. The incidence of back pain during pregnancy is relatively high and researchers worldwide have suggested that it may be between 30% and 70% (14,15). In another Indian study the incidence of back pain in pregnant women was found to be 33.7% in second trimester while it was 42% in the third trimester of pregnancy (16). Our findings are after delivery where many women still complaint of such

musculoskeletal pains. These could be because of the associated changes in posture during pregnancy and the residual effects of increased joint and ligament laxity along with changes in strength of musculoskeletal system, which occurred during pregnancy period.

The prevalence of a cesarean delivery was 7 times more in urban than in rural women with reporting of 21.56% and 3.9% in urban and rural settings respectively. Previous studies have reported that the increased BMI could also increase the chances for cesarean section (CS) and various other delivery complications increases too (17,18,19). As per a recent 2016 study, children born by elective or non elective cesarean section are at an increased risk of overweight and obesity (20). Since CS is found to be more prevalent in urban areas, it could further add to the increasing pool of overweight and obesity in these regions. Therefore, potential consequences of cesarean section on the health of the children should be discussed among both health care professionals and childbearing women.

V. CONCLUSION

This study showed that women living in urban areas of Haryana are more overweight and obese as compared to rural areas. They were found to be above the recommended limits of BMI, WC and W/H as per WHO guidelines for Asian population. Women in rural areas were within recommended ranges for the similar parameters. Hence, urban women were at increased risk of various co morbidities of overweight and obesity. Indian women should be encouraged to be more physically active during pregnancy to avoid excess weight gain and hence its retention to avoid pregnancy complications like cesarean section and development of obesity in future.

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Source of funding- Nil

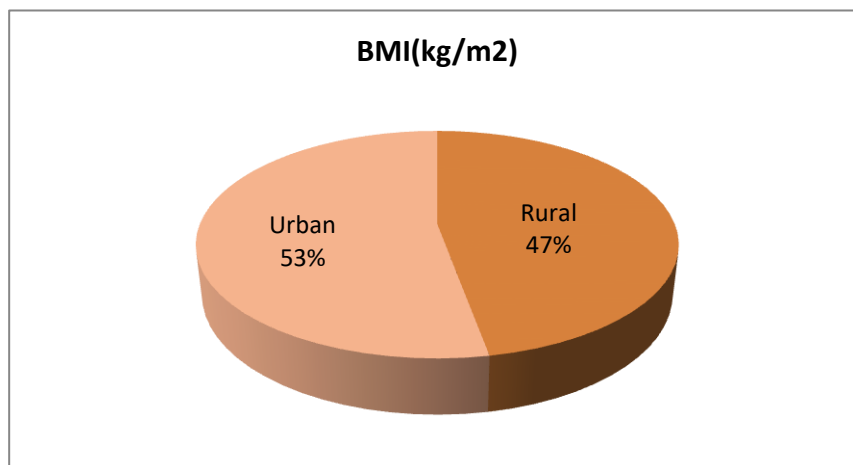


Figure 1: BMI (kg/m^2) above normal in rural and urban women

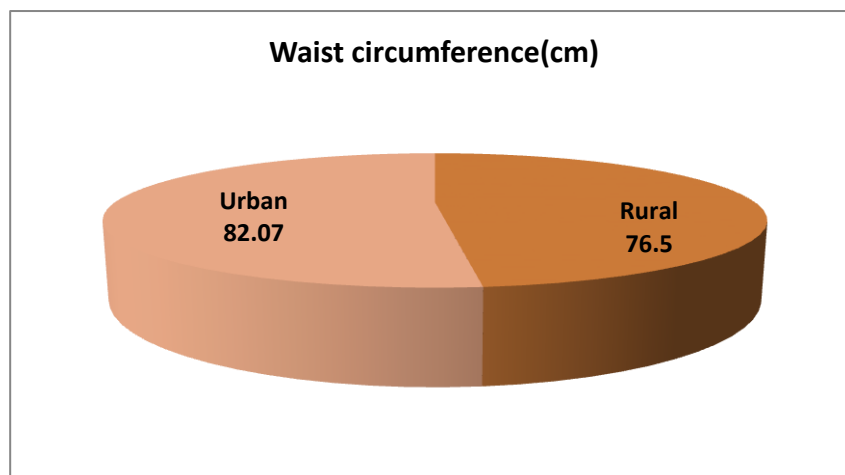


Figure 2: Waist circumference (cm) in rural and urban women

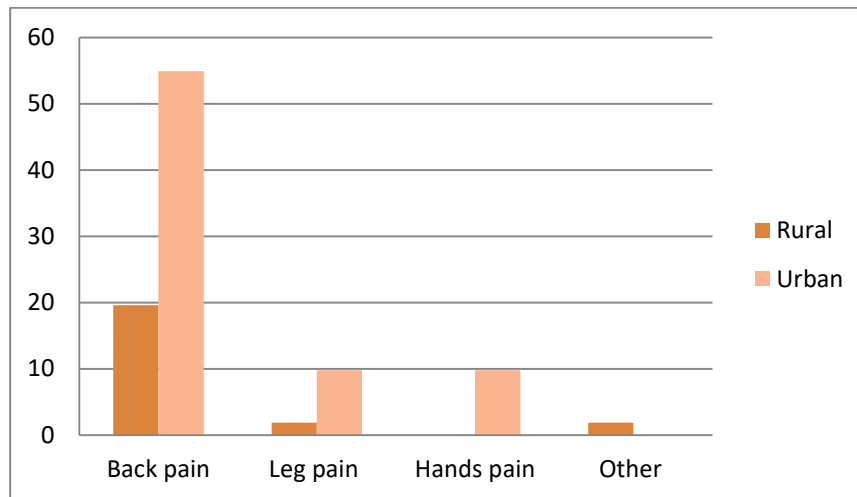


Figure 3: Comparison of musculoskeletal pains in rural and urban women

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