

## Original Research Article

# A comparative study of prevalence of overweight and obesity among urban, and rural population of South India

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**Received:** 12 November 2018

**Revised:** 14 February 2019

**Accepted:** 15 February 2019

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## ABSTRACT

**Background:** Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health.<sup>1</sup> People are generally considered obese when their body mass index (BMI), a measurement obtained by dividing a person's weight by the square of the person's height, is over 30 kg/m<sup>2</sup>, with the range 25–30 kg/m<sup>2</sup> defined as overweight. Aims and objectives were to estimate the prevalence of overweight and obesity among the study population and to compare the study results between urban and rural area population.

**Methods:** A community based cross-sectional study from April 2008 to May 2009 (1 year) conducted at urban health centre, Harazpenta and rural health centre, Patancheruvu. Total of 1409 persons in the age group of above 15 years were involved in this study. Data collection by using pre-designed, pretested questionnaire. Data analysis by using MS office 2016. Epi info2016, rates, ratios, proportions and Chi-square tests were used.

**Results:** Among urban population prevalence of obesity was 12.7% compared to 5.4% in rural area. The prevalence of pre obesity was more among males (26.2%) in urban area than rural area (16.72%). In the study population 42.9% of the individual who had BMI>25 were from upper middle class in urban area, when compared to 43.3% with BMI>25 belongs to upper class in rural area.

**Conclusions:** All over weight and obese subjects should be educated to know about the occurrence of various health problems due to overweight.

**Keywords:** Overweight, Obesity, Rural, Urban

## INTRODUCTION

Obesity is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health.<sup>1</sup> People are generally considered obese when their BMI, a measurement obtained by dividing a person's weight by the square of the person's height, is over 30 kg/m, with the range 25-30 kg/m defined as overweight.<sup>1,2</sup> Some East Asian countries use lower values.<sup>2</sup> Obesity increases the likelihood of various diseases and conditions, particularly cardiovascular

diseases, type 2 diabetes, obstructive sleep apnea, certain types of cancer, osteoarthritis and depression.<sup>3,4</sup> Obesity is most commonly caused by a combination of excessive food intake, lack of physical activity, and genetic susceptibility.<sup>1,5</sup> A few cases are caused primarily by genes, endocrine disorders, medications, or mental disorder.<sup>6</sup> Obesity is mostly preventable through a combination of social changes and personal choices.<sup>1</sup> Changes to diet and exercising are the main treatments.<sup>2</sup> Diet quality can be improved by reducing the consumption of energy-dense foods, such as those high in

fat or sugars, and by increasing the intake of dietary fiber.<sup>1</sup> Obesity is a leading preventable cause of death worldwide, with increasing rates in adults and children.<sup>7</sup> In 2015, 600 million adults (12%) and 100 million children were obese in 195 countries.<sup>8</sup> Obesity is more common in women than men.<sup>1</sup> Authorities view it as one of the most serious public health problems of the 21st century. Obesity can lead to social stigmatization and disadvantages in employment.<sup>9</sup>

Obesity in India has reached epidemic proportions in the 21st century, with morbid obesity affecting 5% of the country's population.<sup>10</sup> India is following a trend of other developing countries that are steadily becoming more obese. Unhealthy, processed food has become much more accessible following India's continued integration in global food markets. This, combined with rising middle class incomes, is increasing the average caloric intake per individual among the middle class and above income households.<sup>11</sup> Obesity is a major risk factor for cardiovascular disease; NGOs such as the Indian Heart Association have been raising awareness about this issue.<sup>12</sup>

Aims and objectives were to estimate the prevalence of overweight and obesity among the study population and to compare the study results between urban and rural area population.

## METHODS

**Study design:** A community based cross-sectional study.

**Study place:** Field practice area of Osmania medical college, urban area of Harazpenta, Hyderabad and rural area of Patancheru, Medak district.

**Study period:** April 2008 to May 2009 (1 year).

**Selection of the study population:** Adults above 15 years of age in Harazpenta and Patancheruvu.

**Selection procedure:** Random sampling.

**Statistical analysis:** By using MS office 2016, epiinfo2016.

**Statistical test:** Rates, ratios, proportions and chi-square tests.

**Data collection:** By using pre-designed, pretested questionnaire after taking ethical committee approval.

## Calculation of sample size

According to Chow, Cardon et al prevalence of hypertension was 20.3%, diabetes was identified in 3.7%, prevalence of overweight was 16.9%, and obesity was 4.4% in rural Andhra Pradesh.<sup>13</sup> Using this prevalence of overweight 16.9 in Andhra Pradesh was calculated the sample size with the following formula:  $4 PQ/L^2$  (L=20%, P=16.9% and Q=100-P, Where L=allowable error, P=prevalence, calculated sample size= $4 \times 16.9 \times 83.1 / 3.38 \times 3.38 = 658$ ).

Required sample size is 658 the total study subjects in the urban area was 708 and in the rural area 701.

## RESULTS

This Table 1 shows that male population was 20.32% high in urban than female population where as in rural area the female population was 11.28% more.

**Table 1: Sex and age wise distribution of study group in urban and rural areas.**

Age group (years)	Urban			Rural		
	Male N (%)	Female N (%)	Total N (%)	Male N (%)	Female N (%)	Total N (%)
15-25	98 (23.0)	78 (27.7)	176 (24.9)	111 (35.7)	113 (29.0)	224 (32.0)
26-35	168 (39.4)	70 (24.8)	238 (33.6)	63 (20.3)	94 (24.1)	157 (22.4)
36-45	66 (15.5)	42 (14.9)	108 (15.3)	56 (18.0)	65 (16.7)	121 (17.3)
46-55	48 (11.3)	48 (17.0)	96 (13.6)	44 (14.1)	47 (12.1)	91 (13.0)
56-65	34 (8.0)	36 (12.8)	70 (9.9)	25 (8.0)	55 (14.1)	80 (11.4)
Above 66	12 (2.8)	8 (2.8)	20 (2.8)	12 (3.9)	16 (4.1)	28 (4.0)
<b>Total</b>	426 (60.16)	282 (39.84)	708 (100)	311 (44.36)	390 (55.64)	701 (100)

In the study population in the urban area there was a higher proportion of males (60.16%) compared to females (39.84%). Where as in the rural study population there was higher proportion of females (55.64%) compared to males (44.36%).

Among urban population prevalence of obesity was 12.7% compared to 5.4% in rural population, this

difference was found to be statistically significant ( $X^2=22.67$ ,  $p<0.00001$ , CI=95%).

Over weight was 22% in urban population, 19.8% in rural population, but this difference was statistically not significant ( $X^2=1.03$ ,  $p<0.30$ , CI=95%).

Over weight and obesity (BMI>25) in urban area was 34.7% and rural area was 25.1%, and this difference was

found to be statistically significant ( $X^2=15.12$ ,  $p<0.0001$ ,  $CI=95\%$ ).

Overall prevalence of overweight and obesity ( $BMI>25$ ) in the study group was 30%.

**Table 2: Sex wise distribution of overweight/obesity among urban and rural areas.**

Sex	Urban (n=708)			Rural (n=701)		
	Normal weight BMI 18.55-24.99	Overweight and obesity BMI >25	Total	Normal weight BMI 18.55-24.99	Overweight and obesity BMI >25	Total
<b>Male</b>	236 (55.4)	158 (37.1)	426 (100)	214 (69.4)	67 (21.5)	311 (100)
<b>Female</b>	146 (51.7)	88 (31.3)	282 (100)	238 (61.0)	110 (28.2)	390 (100)
<b>Total</b>	382 (53.9)	246 (34.7)	708 (100)	452 (64.4)	177 (25.1)	701 (100)

\*Under weight was not included in this Table.

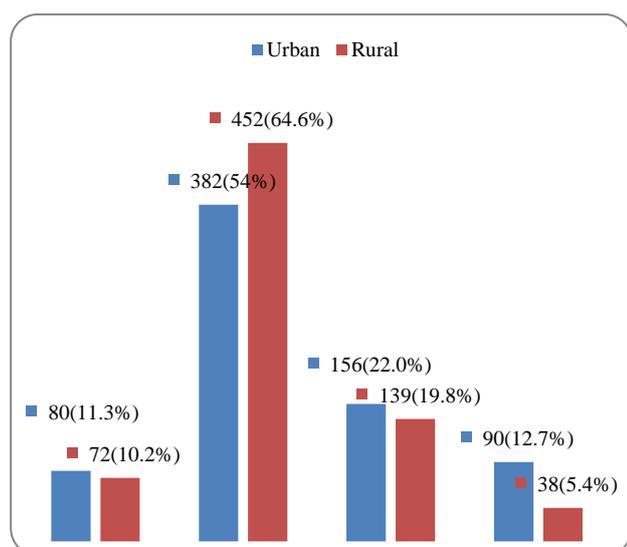
**Table 3: Socio economic status wise distribution of overweight/obesity among urban and rural areas.**

Socio economic status	Urban (n=708)			Rural (n=701)		
	Normal weight BMI 18.55-24.99	Overweight and obesity BMI >25	Total	Normal weight BMI 18.55-24.99	Overweight and obesity BMI >25	Total
<b>Upper class</b>	120 (49.5)	100 (41.3)	242 (100)	34 (56.6)	26 (43.3)	60 (100)
<b>Upper middle class</b>	88 (54.3)	66 (40.7)	162 (100)	135 (71.8)	47 (26.1)	188 (100)
<b>Middle class</b>	84 (54.5)	46 (29.8)	154 (100)	192 (67.1)	50 (17.5)	286 (100)
<b>Upper lower class</b>	76 (59.3)	24 (18.7)	128 (100)	87 (54.3)	51 (31.8)	160 (100)
<b>Lowerclass</b>	14 (63.6)	8 (36.3)	22 (100)	4 (57.2)	3 (42.8)	7 (100)
<b>Total</b>	382 (53.9)	246 (34.7)	708 (100)	453 (63.3)	177 (25.1)	701 (100)

\*Under weight was not included in this Table.

The prevalence of over weight and obesity ( $BMI>25$ ) among urban males was 37.1% and urban females was 31.3%, but difference was statistically not significant ( $X^2=2.08$ ,  $p>0.05$ ,  $CI=95\%$ ).

The prevalence of overweight and obesity ( $BMI>25$ ) among rural males was 21.5% and rural females was 28.2%, this difference was found to be statistically significant ( $X^2=4.07$ ,  $p<0.04$ ,  $CI=95\%$ ).



**Figure 1: Prevalence of overweight and obesity in study population.**

In urban area 37.1% of males were overweight and obese, where as in rural males were 21.5% this observed difference was found to be statistically significant ( $X^2=20.48$ ,  $p<0.0001$ ,  $CI=95\%$ ).

In urban area 31.3% of females were overweight and obese, where as in rural females were 28.2%, but the observed difference was statistically not significant ( $X^2=0.71$ ,  $p>0.05$ ,  $CI=95\%$ ).

The highest prevalence of overweight and obesity was seen in the upper class both in the urban area (41.3%) and in the rural area (43.3%).the observed difference was found to be statistically not significant ( $X^2=0.08$ ,  $p>0.05$ ,  $CI=95\%$ ).

The prevalence of obesity/overweight was high among married population both urban and rural areas (39.8% and 30.3% respectively, cut off level of BMI is  $>25$ ). The observed difference was found to be statistically significant ( $X^2=10.30$ ,  $p<0.001$ ,  $CI=95\%$ ).

**Table 4: Distribution of overweight/obesity according to marital status.**

Marital status	Urban (n=708)			Rural (n=701)		
	Normal weight BMI 18.55-24.99	Overweight and obesity BMI>25	Total	Normal weight BMI 18.55-24.99	Overweight and obesity BMI>25	Total
<b>Married</b>	255 (51.8)	196 (39.8)	492 (100)	309 (63.3)	148 (30.3)	488 (100)
<b>Unmarried</b>	103 (60.5)	38 (22.3)	170 (100)	80 (67.8)	5 (4.2)	118 (100)
<b>Widow/widower</b>	24 (52.2)	12 (26.1)	46 (100)	63 (66.3)	24 (25.2)	95 (100)
<b>Total</b>	382 (53.9)	246 (34.7)	708 (100)	452 (64.5)	177 (25.1)	701 (100)

\*Under weight was not included in this table.

## DISCUSSION

Our study results (Figure 2) was comparable to studies conducted by a study by Sood et al in an epidemiological study of obesity in Simla town. Prevalence of obesity was 34.7% among urban area using cut off level BMI>25.<sup>14</sup> A study done by Reddy et al among a cross-sectional population of Andhra Pradesh have noted that prevalence of obesity was 36%.<sup>15</sup>

In a report called priority non-communicable disease-health situation in the South East Asia region-1998-2000-WHO: 135” it was seen that the prevalence of obesity (BMI>25) in urban areas of India is ranged between 20-40%.

The study results (Table 2) correlates with the following studies conducted by Sonmez et al In their study has noted that 15% of males are obese and 32% females are obese.<sup>16</sup> A study conducted by Sidhu et al have noted that overall prevalence rate of overweight/obesity in their study was 43.88% and 22.26%, respectively, for urban and rural females.<sup>17</sup> A study conducted by Singh et al “in their study the overall prevalence of obesity was 6.8% and overweight 35% among women and 32.0% among men.<sup>18</sup> A similar finding was noticed by Chow et al in their study have noted that the prevalence of overweight was 16.9%, obesity was 4.4% in rural India. In the present study the prevalence of overweight was 19.8%, obesity was 5.4% in rural area.<sup>13</sup>

A study conducted by Rezende et al in their study has noted that the prevalence of overweight and obesity in their study population was high mainly among females. In our study prevalence of overweight and obesity was more in males.<sup>19</sup>

## CONCLUSION

Among urban population prevalence of obesity was 12.7% compared to 5.4% in rural area. The prevalence of pre obesity was more among males (26.2%) in urban area than rural area (16.72%). In the study population 42.9% of the individual who had BMI>25 were from upper middle class in urban area, when compared to 43.3% with BMI>25 belongs to upper class in rural area.

## Recommendations

- All over weight and obese subjects should be educated to know about the occurrence of various health problems due to overweight.
- To bring awareness among the family members of overweight/obesity subjects by way of providing health education to them.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Rao BB, Junapudi SS. A comparative study of prevalence of overweight and obesity among urban, and rural population of South India. *Int J Community Med Public Health* 2019;6:1091-5.