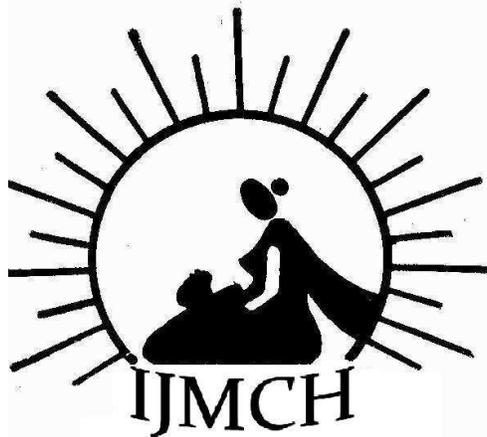


**A Study of Overweight and Obesity and Its Association with Blood Pressure Levels amongst Females of Bathinda, Punjab**

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To determine the frequency of overweight and obesity and its association with blood pressure levels in females of both rural and urban areas of Bathinda district of Punjab.

## A Study of Overweight and Obesity and Its Association with Blood Pressure Levels amongst Females of Bathinda, Punjab

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### ABSTRACT

**Research Question:** To determine the frequency of overweight and obesity and its association with blood pressure levels in females of both rural and urban areas of Bathinda district of Punjab.

**Settings and design:** Hospital based study design

**Participants:** 1273 females in the age group 21 – 60 years were examined. 616 were from the rural population and 657 were from the urban population.

**Methodology:** Subjects selected were patients or their attendants visiting various OPDs at Adesh Institute of Medical Sciences and Research, Bathinda. A questionnaire was used to study each subject to provide information regarding age, sex, residence, previous history of disease etc. Quetelet Index was determined by calculating the ratio of weight (in kg) to height (in meters square), to represent the Body Mass Index as a measure of overweight and obesity. Blood pressure was measured and hypertensive patients classified as per the Seventh Report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure, JNC VII. Statistical analysis was carried out by Student's paired 't'-test. The data was expressed as mean  $\pm$  SD and the p value < 0.05 was taken as significant.

**Results:** The frequency of overweight and obesity was 9.6% and 15.1% amongst urban and rural females respectively. Over weight and obese urban females (63) had statistically highly significant elevated blood pressure levels ( $p < 0.001$ ) than non overweight and obese females from the same population. Similar results were obtained when blood pressure levels of overweight and obese rural females (93) were compared with non obese females of the same populations.

**Key Words:** *Obesity, blood pressure, hypertension, body mass index.*

## INTRODUCTION

The increasing trend of overweight and obesity related diseases in developing countries constitute a major public health problem. Punjab is one of the prosperous states of India with traditionally rich dietary habits. Overweight and obesity are significant risk factors for coronary artery disease, hypertension, type 2 diabetes and dyslipidemia (1-3). The frequency of overweight and obesity vary greatly in different countries due to marked changes in the patterns of diet and lifestyle of each region. Most of these studies have been conducted on urban populations. Very few studies have focused on females from both urban and rural populations. Considering the co-morbidities like coronary artery disease, hypertension and diabetes mellitus associated with overweight and obesity and its implications on women's health, especially since the majority of females are in the reproductive age group, this study aims to evaluate the frequency of overweight and obesity and its association with blood pressure levels so that preventive and management strategies may be framed.

## MATERIALS AND METHODS

Subjects selected were female patients or their attendants visiting various OPDs at Adesh Institute of Medical Sciences and Research, Bathinda. A questionnaire was used to study each subject to provide information regarding age, sex, residence, previous history of disease etc.

A total of 1273 subjects in the age group 21-60 years were examined. Amongst them 616 were from the rural population and 657 were from the urban population. Subjects were categorized into 4 age groups: Group I: 21-30 years; Group II: 31-40 years; Group III: 41-50 years; and Group IV: 51-60 years.

The weight, height and blood pressure were recorded. Weight was taken on a weighing scale with standard minimum clothing to the nearest 0.5 kg. Height was measured on a vertical scale to the nearest 0.5 cm, with heels, buttocks, occiput against the wall and head in Frankfurt plane. Quetelet Index was determined by calculating the ratio of weight (in kg) to height (in meters square), to represent the Body Mass Index (BMI) as a measure of obesity. According to the WHO criteria, a BMI of more than 25 and 30 indicates over weight and obesity respectively (4). Blood pressure was measured and hypertensive patients classified as per the Seventh Report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure, JNC VII (5).

## OBSERVATIONS

The following observations were made:

The frequency of overweight and obesity was observed as 9.6% amongst the urban females and 15.1% amongst rural females.

**Table I a: Comparison of BMI of urban females.**

<b>Age Group</b>	<b>Number</b>	<b>No of overwt./obese</b>	<b>Percentage</b>	<b>BMI of ( n = 63) Mean <math>\pm</math>SD</b>
<b>21 – 30</b>	186	5	2.86%	22.71 $\pm$ 2.93
<b>31 – 40</b>	208	16	7.69%	25.06 $\pm$ 3.39
<b>41 – 50</b>	178	19	10.67%	26.50 $\pm$ 3.96
<b>51 – 60</b>	85	23	27.05%	26.10 $\pm$ 3.39

**Table I b: Comparison of BMI of rural females.**

<b>Age Group</b>	<b>Number</b>	<b>No of overwt./obese</b>	<b>Percentage</b>	<b>BMI of ( n<sub>1</sub> = 93) Mean <math>\pm</math>SD</b>
<b>21 – 30</b>	96	8	8.33%	23.94 $\pm$ 4.26
<b>31 – 40</b>	163	22	7.36%	24.16 $\pm$ 4.00
<b>41 – 50</b>	147	27	18.36%	24.21 $\pm$ 4.26
<b>51 – 60</b>	210	36	17.14%	24.74 $\pm$ 4.27

Table I a and b depict that in females of the age group 21-30 years, 2.86% were overweight and obese in the urban population whereas 8.33% were obese and over weight in the rural population. Similarly, in the eldest age group of 51-60 years, 27.05% were found to be overweight and obese in the urban population, whereas 17.14% were overweight and obese in the rural population. It was also observed that in the urban population, the proportion of overweight and obese females increased with increasing age in all age groups. However, this trend was seen only in the age group of 31-50 years in the rural population.

**Table II: Comparison of systolic (SBP) and diastolic blood pressures (DBP) of overweight and obese and non overweight and non obese subjects of urban population**

Parameter	Overweight and Obese (n <sub>1</sub> = 63) Mean ± SD	Non overweight and obese (n <sub>2</sub> =594 ) Mean ± SD	t	p
SBP in mm Hg (females)	134.90 ± 13.81	126.34 ± 10.19	8.23	<0.001
DBP in mm Hg (females)	90.88 ± 8.57	83.61 ± 6.50	8.15	<0.001

(n<sub>1</sub> = no. of overweight and obese females, n<sub>2</sub> = no. of non overweight and non obese females.)

Table II depicts that on comparing the systolic and diastolic blood pressures of overweight and obese and non overweight and non obese females of all age groups from the urban population, obese subjects had higher blood pressure levels and the difference was found to be highly significant.

**Table III: Comparison of systolic and diastolic blood pressures of overweight and obese and non overweight and non obese subjects of rural population**

Parameter	Obese (n <sub>1</sub> = 93) Mean ± SD	Non obese (n <sub>2</sub> = 523) Mean ± SD	t	p
SBP in mm Hg (females)	141.97 ± 14.68	127.86 ± 11.92	10.17	<0.001
DBP in mm Hg (females)	90.19 ± 5.57	83.56 ± 6.56	9.16	<0.001

(n<sub>1</sub> = no. of overweight and obese females, n<sub>2</sub> = no. of non overweight and non obese females)

Table III depicts that on comparing the systolic and diastolic blood pressures of overweight and obese and non overweight and non obese females of all age groups from the rural population, overweight and obese subjects had higher blood pressure levels and the difference was found to be highly significant.

From Tables II and III it is observed that the results are similar in both urban and rural populations.

## DISCUSSION

The present study conducted on the urban and rural females of Bathinda district of Punjab observed a frequency of overweight and obesity as 9.6% in the urban females and 15.1% in the rural females indicating an increasing trend of overweight and obesity in the rural setting. This may be explained due to the traditionally rich diet of Punjabi females which is high in saturated fats and sugar.

The observed high rate of overweight and obesity is consistent with other studies. Age adjusted prevalence of obesity in women of the age group 20-59 years ranged from 8.9% to 15.7% in rural and urban cohorts of Jaipur, Rajasthan (6). Prevalence of obesity amongst females of Haryana ranged from 3.8% in rural females to 12.6% in urban females (7). A study conducted in rural Andhra Pradesh on both males and females determined the prevalence of obesity as 1.9% - 6.8%. (8). The differences in prevalence of obesity from region to region may be explained on the basis of varied diet patterns in different states.

Nationally representative surveys have shown the prevalence of overweight – obesity ranged from 10.6% to 14.8 % amongst women of reproductive age group and this increased from 1996 to 2006 (9). Comparison of two major studies by National Family Health Survey, (NFHS-2 and NFHS-3) in the years 1998-1999 and 2005-2006 have shown that the highest percentage of obese women (29.9%) is found in Punjab. (10)

The correlation between overweight and obesity and hypertension in the present study shows a positive association. Increased BMI was strongly associated with increased systolic and diastolic blood pressure levels amongst both urban and rural females and in all age groups. Similar findings have been observed in other studies. Significant relationship between hypertension and body mass index was observed in an urban Indian community (11). In a community based study of adult Asian Indians, strong relationships between elevated blood pressure levels and visceral obesity were observed (12). Also, significantly increasing trend of prevalence of hypertension with increasing BMI was reported in both males and females of Mumbai (13). Positive correlation between body weight and blood pressure levels has been observed in many international studies too. Rural females of Chinese population were reported to have increased prevalence of hypertension with higher BMI levels (14). Obese individuals had significantly higher systolic and diastolic blood pressures than non obese individuals in a study conducted in Brazil (15). Studies in the USA (NHANES-II) showed that the prevalence of hypertension in overweight adults was 2.9 fold higher than that for non overweight adults. The risk in those aged 20-44 years was 5-6 times greater than that in those aged 45-74 years thus once again giving evidence for a strong and direct relationship between body weight and blood pressure. (16, 17)

Obesity and hypertension continue to be major risk factors for cardiovascular diseases. The results of this study indicate that obesity is a risk factor for hypertension and affects all segments of a population.

## CONCLUSIONS

In the present study, the frequency of overweight and obesity was observed as 9.6% amongst the urban females and 15.1% amongst rural females. A strong and positive association was observed between overweight and obesity and elevated systolic and diastolic blood pressure levels in both urban and rural populations. The rising trend of increased frequency of overweight and obesity in rural population appears to indicate that

females from all age groups are susceptible to such lifestyle diseases. Awareness must be generated amongst the women about the consequences of overweight and obesity and hypertension. Preventive measures such as changes in dietary habits and increased physical activity should be aggressively advocated in rural as well as urban areas.

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