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Trends in the distribution of body mass index among women aged 20-60 years

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Abstract:
Introduction: Risks of coronary heart disease, ischemic stroke and type-2 diabetes mellitus increase steadily with increasing body mass index (BMI), a measure of weight relative to height.
Materials and Methods: A multistage random cluster sampling procedure was used to draw sample from this region. Randomly selected women aged >20 and <60 years were studied during sampling.
Results: 21.6% women were found to be malnourished in the total population. The degree of obesity had been observed as overweight 26% and Obese-I 11.7 % and Obese-II were 66.7% Age remains the most significant risk factor for obesity among women. In overweight women, average waist circumference was 83.5 cms and average waist circumference of obese-I and obese-II were 88 cms and 108 cms. Central obesity was present in 44.3% women The prevalence of obesity was high in 40–59.9 age group females than 20–39.9 age group and >60 age group
Conclusion: Both rapid urbanization and industrialization in developing countries together with the adoption of modern life styles thougy added to wealth but have brought new problems in the form of non-communicable diseases.

Keywords: Obesity, urbanization, Body Mass Index

INTRODUCTION

Overweight and obesity lead to adverse metabolic effects on blood pressure, cholesterol, triglycerides and insulin resistance. Risks of coronary heart disease, ischemic stroke and type -2 diabetes mellitus increase steadily with increasing body mass index (BMI), a measure of weight relative to height. Many low and middle-income countries are now facing a "double burden" of disease and CVD, thus slowing this epidemic. BMI is a ratio of body weight-for-

height thereby limiting its usefulness as an indicator for adiposity because no account is made of variations in body composition. The chance of developing metabolic syndrome is closely linked to overweight and obesity and a lack of physical activity. The aim of this study was to assess the prevalence of obesity with a modification to the value for BMI that is more applicable to the Asian Indian population.

MATERIALS AND METHODS

Population data of Chandigarh was taken from Directorate of census operations as per census 2011. Women aged >20 and <60 years were randomly selected for sampling. At the time of the initiating the study, in first stage, 350 women participated in the study. But 300 women completed the all the stages of study i.e. Questionnaire & dietary survey and anthropometric measurements. All were informed about the study protocol and written consent was obtained. A multistage random cluster sampling procedure was used to draw sample from this region. Randomly selected women aged >20 and <60 years was studied during sampling. Written consents were obtained from all study subjects before any data collection and measurements. Recommended BMI Chart for Asian Indians was used for BMI.

Assessment of obesity was done WPRO (Western Pacific Region of WHO, 2000) used for the classification obesity in Asia.

Status	BMI
Underweight	<18.5
Normal range	18.5-22.9
Overweight at risk	23-24.9
Obese I	25-29.9
Obese II	>30

Various screening centers such as permanent centers (in health clinics, community centers, etc.) and temporary screening centers (in schools, clubs, houses of worship, and private homes) were used to screen the population. Prior to screening, all women of ≥20 years were invited to come to a predefined place in very close vicinity to their house. Pregnant or menstruating women at the time of analysis, people with a fever or acute illness/surgery, on hormone therapy, breast feeding and those who recently engage in heavy exercise were excluded from the study.

RESULTS AND DISCUSSION

In the study, under observation 21.6% women were found to be malnourished in the total population. The degree of obesity had been observed as overweight 26% and Obese-I 11.7 % and Obese-II were 66.7 % (Table 1, Graph 1). In overweight women, average waist circumference was 83.5cms and average waist circumference of obese-I and obese-II were 88cms and 108cms (Table 2).Central obesity was present in 44.3% of women (Table 2, Graph 2).India has more than 30 million obese people, and the number is increasing alarmingly. The problem is more acute among women than men. In urban India, more than 23% of women are either overweight or obese, which is higher than the prevalence among men (20%) ((National Family Health Survey (NFHS-3), 2005-06). Thus, the country is burdened with two different nutrition-related health problems (Kennedy et al, 2006). It has to grapple with the problem of under nutrition and anemia in one hand and overweight or obesity on the other (Gaiha et al,2011). Unlike the developed countries where obesity is generally concentrated among the low/middle-income groups, elevated adiposity levels in developing countries are more

associated with women from the richer sections of the society, noticeably in urban areas (Gaur et al, 2013).

Physiologically, estrogen increases the metabolic rate slightly but only about one third as much as male sex hormone testosterone can do. It also causes deposition of increased quantity of fat in the subcutaneous tissues. The possible impact of estrogen and other factors that can affect carbohydrate metabolism may have also been important in mediating this sex difference (Harris et al., 1997).

Table 1 & Graph-1: prevalence of obesity amongst subjects

STATUS (BMI)	NUMBER	PERCENTAGE
Underweight (<18.5)	65	21.6%
Normal (18.5-22.9)	102	34%
Overweight (23-24.9)	78	26%
Obese-I (25-29.9)	35	11.7%
Obese-II (≥ 30)	20	6.7%

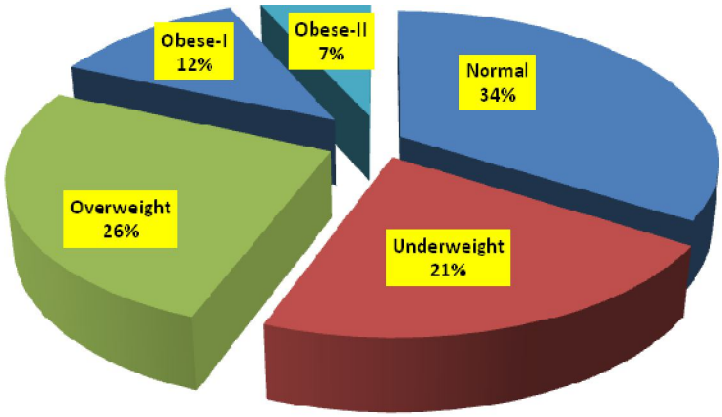
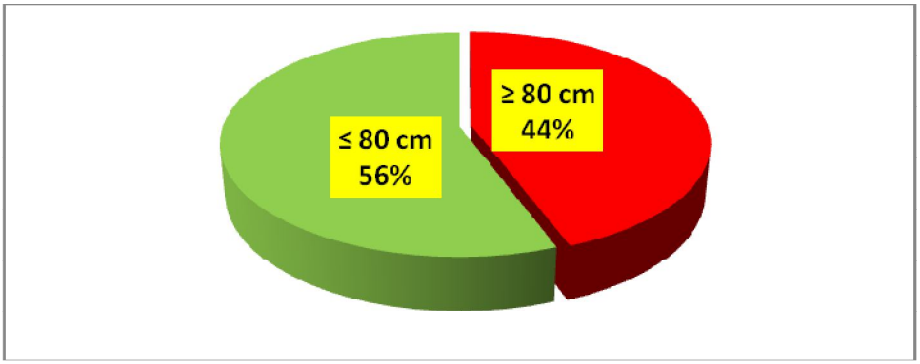


Table 2: Waist Circumference amongst the women

STATUS (BMI)	AVERAGE WAIST CIRCUMFERENCE (cms.)
Underweight (<18.5)	70
Normal (18.5-22.9)	72
Overweight (23-24.9)	83.5
Obese-I (25-29.9)	88
Obese-II (≥ 30)	102

Table 3 & Graph 2: Relationship between waist circumferences amongst the women.

WAIST CIRCUMFERENCE (cms.)	NUMBER	PERCENTAGE
≥ 80 cm	133	44.3%
≤ 80 cm	167	55.7%



Age remains the most significant risk factor for obesity amongst women. The prevalence of obesity was high in 40–59.9 age group women than 20–39.9 age group and >60 age group (Table 4, Graph 4). Level of obesity was more in post-menopausal women than pre-menopausal women (Table 5).The frequencies of being underweight, normal, overweight, obesel and obeselI taken separately were 24.7%, 43.7%, 17.4%,10.5%, 3.7% among premenopausal womenand 16.4%, 17.3%, 40.9%, 13.6%, 11.8% among postmenopausal women, respectively. Menopause is one of the critical periods of a women's life during which weight gain and onset of worsening of obesity are favored. At this period, the prevalence of obesity is the highest (De Paz et al. 2006; Sharma et al. 2008). Pregnancy and menopause are significant factors in the development of obesity in women. Fluctuations in reproductive hormones concentrations make them prone to weight gain. Serotonin contributes to the regulation of food intake and appetite behavior. As body mass index (BMI) increases, the amount of serotonin synthesis decreases to indicate satiety at lower levels of food intake. In men, this decrease occurs when men reach a BMI classifying them as "overweight," whereas women do not experience this drop until reaching a BMI classifying them as "obese."

Table 4 and Graph 3: relationship of age with obesity amongst the women.

STATUS	AGE	20-29.9	30-39.9	40-49.9	50-59.9
	TOTAL: 300	100	68	89	43
Underweight	**65**	30 (30%)	15 (22%)	12 (13.5%)	8 (18.6%)
Normal	**102**	50 (50%)	25 (36.8%)	20 (22.5%)	7 (16.3%)
Overweight	**78**	13 (13%)	15 (22%)	35 (39.3%)	15 (34.9%)
Obese-I	**35**	5 (5%)	10 (14.7%)	15 (16.8%)	5 (11.6%)
Obese-II	**20**	2 (2%)	3 (4.4%)	7 (7.9%)	8 (18.6%)

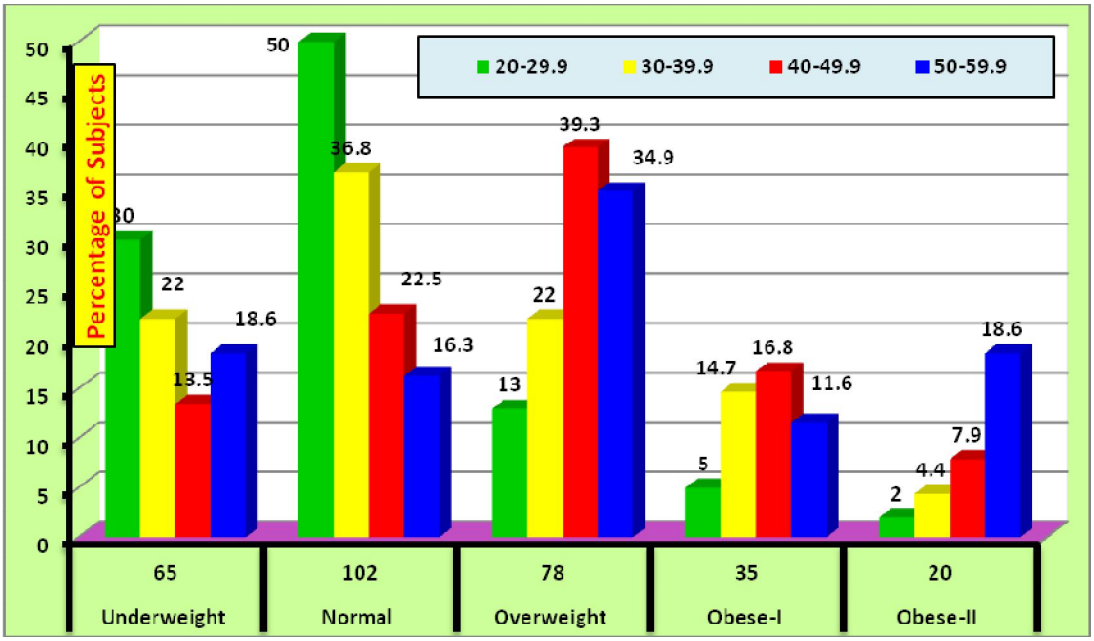


Table 5: Relationship of Obesity with Menopausal Status of women

STATUS		PRE-MENOPAUSAL	POST-MENOPAUSAL
	TOTAL: 300	**190 (63.34%)**	**110 (36.66%)**
Underweight	**65**	47 (24.7%)	18 (16.4%)
Normal	**102**	83 (43.7%)	19 (17.3%)
Overweight	**78**	33 (17.4%)	45 (40.9%)
Obese-I	**35**	20 (10.5%)	15 (13.6%)
Obese-II	**20**	7 (3.7%)	13 (11.8%)

The other reasons of obesity are unawareness, illiteracy, ignorance about intake of calories and regarding quality and quantity of food and domestic helps. Urbanization and industrialization in developing countries changed the lifestyles due to increased wealth but on the contrary gives rise to serious health hazards. Similar trend is happening in the area of study but more pronounced is the rural to urban shift.

CONCLUSION

The major point of the study was multistage random sampling from a clearly-defined population. Furthermore, body composition was measured using anthropometric values (weight and height) in addition to waist circumference for calculating central obesity. BMI is used as a screening tool to identify potential weight problems. Women with low BMI and waist circumference may have a lower risk of hypertension, cardiovascular disease, Cancer etc. Obesity is a combination of genetic, behavioral, cultural physical and social environmental impacts. Lifestyle modifications are more effective in preventing obesity and type 2 diabetes. Focusing on regular physical activity and healthy eating patterns can reverse the obesity and its related disorders.

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