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Original Article

Prevalence of obesity and associated hypertension and diabetes in Delhi, metropolitan city of India



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ABSTRACT

Background: Obesity is a global health burden and is now described as 'New World Metabolic Syndrome'. Worldwide, its prevalence is increasing geometrically due to changing lifestyle and is understood to be a multifactorial disorder.

Objective: To ascertain the fraction of obese population in Delhi, a metropolitan city of India. **Materials and methods:** A cross-sectional survey was conducted on people ($n = 652$) of different age groups (11 years and above) belonging to different areas of Delhi. A questionnaire was prepared including fields such as age, sex, weight, height, food habits, qualification, occupation, exercise, disease, and medication. The data were analyzed, and correlation between obesity and various fields was drawn.

Results: Out of 652 subjects, 30.4% were overweight and 12.12% were obese. Number of obese subjects was maximum in the age group of 41–50 years, with more males and females in age groups of 11–30 and 31–50 years, respectively. Along with obesity, hypertension (25.9%) and diabetes (19.1%) were most commonly associated. Non-vegetarian diet preference was positively correlated with obesity. Food frequency did not have any significant correlation with obesity. Subjects with sedentary lifestyle were more prone to obesity.

Conclusion: Number of obese subjects is high in Delhi, and it is positively correlated with age. Obesity was positively associated with many diseases especially diabetes and hypertension. Thus, there is an urgent need to educate the masses regarding the benefits of exercise as awareness alone can help to manage this global epidemic.

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1. Introduction

Globally, an alarming trend of rise in obesity in both adults (28% increase) and children (47% increase) in past 33 years has

been observed, with the number of overweight and obese people rising from 857 million in 1980 to 2.1 billion in 2013 (more than 30% of world's population).¹ Obesity has become a global epidemic and is described as 'New World Metabolic Syndrome'.

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The problem of obesity is no more restricted only to the developed world. Presently, the epidemic poses new challenges in developing countries and urges immediate attention and prevention. India is already struggling to eradicate the problem of under nutrition and anemia on one hand and the burden of overweight and obesity has been added on the other.² India has more than 30 million obese people, and the number is increasing alarmingly.³

Obesity is a multifactorial disease associated with many other significant diseases such as type 2 diabetes, cardiovascular diseases (hypertension, atherosclerosis, deep vein thrombosis, coronary artery disease, and varicose vein), osteoarthritis, gallbladder stones, kidney problems, respiratory disorders, and certain cancers which further compound the associated morbidity and mortality.⁴

Overweight and obesity are basically conditions of excessive fat accumulation that impair health. It is due to energy imbalance when number of calories consumed exceeds calories used. Obesity is associated with many factors such as social, environmental, psychological, biological, endocrinological, and genetic.⁴ Activities that formerly required high energy expenditure have today been replaced by the ease offered by urbanization, and industrial and technological progress, leading in turn to lower energy consumption at work, during commuting, and in domestic and leisure activities.

This study was designed to determine the prevalence of obesity and its concomitant ailments in a population belonging to different age groups living in Delhi, a metropolitan city of India. Further, association of obesity with various variables such as age, sex, diet, and lifestyle was also analyzed.

It is important to observe the prevalence of obesity for the population health assessment for epidemiological studies and to create awareness of its associated risk factors and health problems to bring self consciousness among the masses.

2. Materials and methods

A cross-sectional study was conducted among the people living in different regions and clusters of north, south, east, west, and central Delhi, a metropolitan city of India. Oral consent was obtained from subjects before conducting the survey. Individuals belonging to age group 11 years and above in Delhi, were surveyed. The sample size was of 652 subjects. It was a community-based survey. Data were collected by means of a questionnaire that consisted of following fields: height, weight, sex, exercise, vegetarian/non-vegetarian diet, food frequency, occupation, concomitant diseases, medication, occupation, and nature of work. Data were collected between December 2013 and May 2014.

2.1. Diagnostic criteria and key study variables

Obesity. Body Mass Index (BMI) is simple and practical measure used to classify population into different groups such as underweight (UW), normal (N), overweight (OW), and obese

(OB) on the basis of weight and height. It was calculated using the following formula:

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height}^2 (\text{m}^2)}$$

Weight was measured using a digital weighing machine and height was measured using a non-elastic measuring tape (least count of 0.1 cm). According to WHO, UW, N, OW, and OB were defined as BMI ≤ 18.5 , 18.5–24.9, 25–29.9, and $\geq 30 \text{ kg/m}^2$, respectively.⁵ BMI values are independent of age and sex. BMI is interpreted differently for children and teens belonging to age group 2–19 years because there are changes in weight, height, and body fatness with age during growth and development. Their BMI is expressed relative to other children of the same sex and age. The BMI-for-age percentiles are calculated from the CDC growth charts which were based on national survey data collected from 1963–1965 to 1988–1994.⁶ According to CDC, UW, N, OW, and OB were defined as BMI <5th, 5th to <85th, 85th to <95th, and ≥ 95 th percentile, respectively for children and teens of the same age and sex.⁷

So, obesity which includes OW or OB group is defined as BMI $\geq 25 \text{ kg/m}^2$ and ≥ 85 th percentile in adults and adolescents, respectively.

Co-morbidity. Known cases of hypertension, diabetes, thyroid, angina pectoris, joint pain, asthma, varicose vein, gout, or ovarian cyst along with obesity.

Medication. It included all the medicines whether Ayurvedic, homeopathic, or allopathic (generic/branded) taken by the subject either for any disease or as nutritional supplements. It may be OTC or prescription based drug.

Food habits.

1. **Vegetarian and non-vegetarian diet:** The subjects were enquired whether they are on vegetarian diet (including milk and its products and eggs) or non-vegetarian diet (having meat or fish at least once a week).
2. **Food frequency:** It is the number of times the subject takes food in a day.

Lifestyle.

1. **Nature of work:** The subjects were enquired about their lifestyle and based on regular physical activity, they were categorized as active or sedentary.
2. **Exercise:** The subjects were enquired regarding regular physical exercise program including walking, playing, gym, yoga, or aerobics.

Subjects were grouped into different age groups (11–19, 20–30, 31–40, 41–50, 51–60, and ≥ 61 years). Each age group was further divided on the basis of gender. Basic descriptive statistics for subject data were expressed as mean \pm standard deviations. Pearson correlation coefficients (r) were calculated to access the link between BMI groups and age, gender, disease, vegetarian/non-vegetarian diet, exercise, lifestyle, and food frequency. Statistical analysis of data was carried out using the GraphPad (Prism version 5) software.

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