



Original Research Article

## Study of prevalence of obesity and associated co-morbidities among adults of Gandhinagar, Gujarat

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### Abstract

**Background:** Obesity and its associated co-morbidities like hypertension and diabetes is recent out bursting problem all over the world.

**Aim:** To study prevalence of obesity and its relation with hypertension and diabetes.

**Material and methods:** Total 70 patients who came to outdoor patient department of Gayatri Hospital, Gandhinagar from January, 2014 to June, 2014 were included in present study. Body mass index, waist circumference, blood pressure and random blood sugar were estimated in all patients to detect obesity, hypertension and diabetes.

**Results:** Out of 70 subjects, 30 were male and 40 were female. Total 29 subjects were found obese with BMI  $\geq 25$ . Out of 29 obese subjects, 18 were hypertensive and 13 were diabetic. Among 19 males with waist circumference  $\geq 90$  cm, total 12 were hypertensive and 4 were diabetic. Among 20 females with waist circumference  $\geq 80$  cm, total 16 were hypertensive and 8 were diabetic

**Conclusion:** General obesity determined by help of BMI is associated with hypertension and diabetes in both males and females while central obesity determined by help of waist circumference is associated with hypertension and diabetes in females only.

### Key words

Obesity, Hypertension, Diabetes, Body mass index, Waist circumference.

### Introduction

Chronic imbalance between energy intake and actual energy needs of the body leads to obesity and overweight in long term. Sedentary lifestyle,

lack of exercise and consumption of fatty food leads to worldwide epidemic of obesity [1]. Among developing countries, obesity is now fast growing problem especially in lower socioeconomic status [2]. Overweight or obesity is the leading cause of hypertension, diabetes, osteoarthritis, various types of cancers in women like breast cancer and uterus cancer, menstrual disorder and infertility and many more diseases. Diabetes and hypertension

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are metabolic disorders with high incidence of morbidities [3, 4]. Demographic transition combined with modernisation and industrialisation has resulted in extreme changes in lifestyles internationally which leads to increase prevalence of obesity [5]. Under nutrition and overweight/ obesity are both higher for women than men. Screening for obesity followed by health education of obese persons for weight reduction will be useful for early prevention of its co-morbidities like hypertension and diabetes.

### Material and method

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Total 70 patients who came to outdoor patient department of Gayatri Hospital, Gandhinagar from January, 2014 to June, 2014 were included in present study after obtaining their informed written consent. Height, weight and waist circumference of each subject was done at hospital. Random blood sugar was carried out by glucometer and blood pressure of each subject was estimated on left arm in supine position by mercury sphygmomanometer. Blood pressure level of  $\geq 140$  mmHg for systolic and  $> 90$  mmHg for diastolic was considered as hypertension. When systolic and diastolic blood pressure were of different category then higher category was selected to consider subject as hypertensive. Random blood sugar of  $\geq 140$  mg/dl was considered as diabetic [6].

Waist circumference was taken after breath out. It was measured at the level of midpoint of lower margin of rib cage and the iliac crest to nearest 0.1 cm. Cut off level of waist circumference was  $\geq 90$  cm and  $\geq 80$  cm for male and female respectively. Height of each subject was taken by height measuring scale with subjects standing on it without shoes, heels attached, the hips and shoulders leaned against the measuring scale with 0.1 cm as minimum measuring unit. Weight of the each subject was

measured without shoes by using weighing machine with 100gm as minimum measuring unit. The Body Mass Index (BMI) was calculated as the weight in kilograms divided by the square of height in meters. Cut off level for BMI was taken as  $\geq 25$  to label a person as obese.

### Observation

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Out of 70 subjects, 30 were male and 40 were female. Total 29 subjects were found obese with BMI  $\geq 25$  and rest 41 were non obese with BMI  $< 25$ . Out of 29 obese subjects, 18 were hypertensive and 11 were normotensive. Among non obese subjects, 13 were hypertensive and 28 were normotensive. Out of 29 obese subjects, 13 were diabetic and 16 were non diabetic. Among non obese subjects, 4 were diabetic and 37 were non diabetic. Among 70 subjects, total 31 were hypertensive and 17 were diabetic as per **Table – 1**.

Out of 30 males, 19 had waist circumference  $\geq 90$  cm and rest 11 had  $< 90$  cm. Among 19 males with waist circumference  $\geq 90$  cm, total 12 were hypertensive and 4 were diabetic. Out of 40 females, 20 had waist circumference  $\geq 80$  cm and rest 20 had  $< 80$  cm. Among 20 females with waist circumference  $\geq 80$  cm, total 16 were hypertensive and 8 were diabetic as per **Table – 2**.

### Discussion

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Obesity and related co-morbidities are burning problem in India in the current era, with morbid obesity affecting 5% of the Indian population [7]. Almost 10% of India's population was either overweight or obese in 2006. Junk food and oily food has become taste mark for Indian population in current global food market. Indians are genetically more susceptible to fat accumulation especially around the waist [8].



Body Mass Index (BMI) is a measure of general obesity and powerful predictor of type 2 diabetes while waist circumference measures the central obesity [9].

Problem of overweight is increasing than underweight in most of the countries in both urban and rural areas as per Mendez et al. [10] Consumption of high energy and fatty foods had been linked to the risk of obesity by Hu et al. [11] and Lin et al. [12]. Sedentary lifestyle and physical inactivity had been associated with obesity and cardiovascular disease risk by many authors [13, 14, 15, 16, 17, 18]. Strong associations between obesity and risks of hypertension, diabetes, and other cardiovascular diseases had been demonstrated by various prospective and cross sectional studies [19, 20, 21, 22, 23, 24, 25, 26, 27].

The strong association between high BMI and risk of hypertension was found by Gelber RP [28] during its prospective cohort study among 4920 subjects. Strong association between high BMI and hypertension was also suggested by National Health and Nutrition Examination Survey III during 1988-1994 among adults of United States [29]. Prevalence of hypertension was higher in females with BMI >25 as per Bhat NA [30]. Higher prevalence of hypertension in persons with BMI >25 was found by Patnaik L [31] in his study at Orissa on 336 persons above 18 years of age.

Overweight and obesity were significantly associated with diabetes and high blood pressure was suggested by Mokadad AH [32]. Risks of hypertension and diabetes were directly related to waist circumference measurement as per Olinto MTA [33]. Oksum IS [34] found that waist circumference was positively correlated with blood pressure and fasting blood glucose. Larger waist circumference identifies people at increased cardiovascular risks as per Han TS [35].

Our findings also correlated with above mentioned different studies.

## Conclusion

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General obesity determined by help of BMI is associated with hypertension and diabetes in both males and females while central obesity determined by help of waist circumference is associated with hypertension and diabetes in females only. Obesity associated co-morbidities can be early identified by routine screening of all obese persons, so that many of the complications can be prevented in future.

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**Table – 1:** Relation of BMI with hypertension and diabetes.

BMI	Blood pressure		Diabetes	
	Hypertensive	Normotensive	Diabetic	Non diabetic
≥25	18	11	13	16
<25	13	28	4	37
Total	31	39	17	53

**Table – 2:** Relation of waist circumference with Hypertension and diabetes.

Waist circumference	Blood pressure		Diabetes	
	Hypertensive	Normotensive	Diabetic	Non diabetic
Male (n = 30)				
≥90	12	7	4	15
<90	2	9	4	7
Female (n = 40)				
≥80	16	4	8	12
<80	1	19	1	19