



STUDY FOR PREVALENCE AND PREDICTORS OF OBESITY AMONG ADULT POPULATION IN THE RURAL FIELD PRACTICE AREA OF IGIMS, PATNA: A CROSS-SECTIONAL STUDY.

Community Medicine

Dr. Vikash Chandra	Senior Resident, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.
Dr. Sanjay Kumar Choudhary*	Additional Professor, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India. *Corresponding Author
Dr. Setu Sinha	Associate Professor, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.
Dr. Sanjay Kumar	Prof & Head, Department of Community Medicine, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.

ABSTRACT

Background: Obesity is also explained as an unexpected gain of the adipose tissue due to an enlargement of fat cell size (hypertrophic obesity) or an increase in fat cell number (hyperplastic obesity) or combination of both.

Material and Methods: In this study multi-stage sampling was done. The final sample size was rounded off to 1200. Height and weight were recorded and BMI was calculated for each individual. Data was inserted in Microsoft Excel 2010 after coding. Data analysis was done by applying SPSS software. The statistical significance was evaluated at 95% level.

Results: The overall prevalence of obesity was increased as age increases, higher in those educated up to secondary and above. The variation was statistically detectable ($p=0.005$).

Conclusion: There is crucial need to provide awareness programs and health education of good health for the prevention of obesity.

KEYWORDS

Obesity, overweight, Body mass index, predisposing factors (adults).

INTRODUCTION:

Obesity is also explained as an unexpected gain of the adipose tissue due to an enlargement of fat cell size (hypertrophic obesity) or an increase in fat cell number (hyperplastic obesity) or a combination of both. Obesity is often declared in terms of Body Mass Index (BMI). Body mass index is explained as the weight in kilograms divided by the square of height in meters (kg/m^2). (Park 2017). Of these over 600 million men and women was obese.¹ According to WHO the prevalence of worldwide obesity has doubled in more than 70 countries since 1980.²

In 1997, a WHO expert committee classified a BMI of 25.0 – 29.0 kg/m^2 as overweight, 30 – 34.9 kg/m^2 as obesity and $\geq 35 \text{ kg/m}^2$ as morbid obesity.³ Guidelines for obesity and overweight placed on body mass indices (BMI) for Asian Indians were rectified based on consensus developed through discussions by a Prevention and Management of Obesity and Metabolic Syndrome group.⁴ And obesity as a BMI ≥ 25 using values lower than the ethnic specific BMI previously advocated for Asian Indians.⁴ The revised guidelines categorize overweight as a BMI of 23.0 – 24.⁵

Obesity is becoming a public health issue, especially among the urban population. This is assigned to the changes in lifestyle, for example, individuals have shifted from active to sedentary, changes in nutritional habits; foods consumed are mainly carbohydrates and fats which provide more calories than what is expected.⁶ This may have major complications toward high prevalence of non-communicable disease such as diabetes mellitus, hypertension, and cardiovascular disease in early middle age.^{7,8} Diet and lifestyle are ostensibly major contributors to weight problems and varies with different socioeconomic status (SES) especially countries like India.⁹

It has been estimated that in 2016 globally, more than 1.9 billion adults, 18 years and older, were overweight. Of these, over 650 million were obese. This constitutes 39% of adults aged 18 years and over as overweight and 13% as obese. Obesity is more common in females, 11% of men and 15% of women suffer from this condition (WHO 2017).¹⁰ The National Family Health Survey-3 (NFHS-3) also reported that in India, obesity (BMI $\geq 25 \text{ kg/m}^2$) was more prevalent in the urban areas and in higher socio-economic groups compared to the interior (rural) areas, especially among women (Men- urban: 15.9 vs. rural: 5.6%; Women- urban: 23.5 vs. rural: 7.2%).¹¹ According to the NFHS-3 data, in the three States studied, the percentage of women who were obese (BMI $\geq 25 \text{ kg/m}^2$) was highest in Tamil Nadu (24.4%), followed

by Maharashtra (18.1%) and Jharkhand (5.9%) and a similar order was reported among men in the three States with 19.8, 15.9 and 5.3 per cent being obese respectively.¹² In Bihar, obesity is seen in 12.6% males and 11.7% females (NFHS-4, 2015-16).¹¹ In India the magnitude of overweight ranges from 9% to 27.5% and obesity ranges from 1% to 12.9%.^{13,14}

AIMS AND OBJECTIVE:

To assess the prevalence of obesity among adult population in the Rural Field Practice Area of IGIMS, Patna.

MATERIAL AND METHODS:

The present study was carried out in the Rural Field Practice Area of IGIMS, Patna and its attached PHC. Primary Health Centre, Maner is a part of this training centre and is under administrative control of Indira Gandhi Institute of Medical Sciences, Patna. This PHC comprises of 46 villages, 20 panchayats and covered a population of 3, 16, 156.

Study design: A cross-sectional (community-based study) to estimate the prevalence of obesity among adult population.

Study area: Rural Practice Area of IGIMS, Patna.

Study period: 6 months.

The study subjects were selected on the basis of following criteria- INCLUSION CRITERIA:

- (1) Adults within age group of 20-60 years.
- (2) Resident of the village for past 1 year.
- (3) Willing to enroll as participants for study.

EXCLUSION CRITERIA:

1. Adults below 20 years and above 60 years
2. Fasting on previous day
3. Severely ill and bed ridden and suffering from diseases in which there is loss of weight or gain of weight.
4. Pregnant women and lactating mothers.

Sampling details:

(a) Sample size:

The findings of NFHS 4 (2015-16) conducted in Bihar indicated the prevalence of obesity to be 10.3%. Considering the relative precision of 25%, the sample size was determined using WHO software Size v 2.0 as follows –

The sample size was estimated to be 536. Design effect of 2 was

applied to account for multi-stage sampling. To this, a non-response rate of 10% was added based on the previous experience in this area. The final sample size was rounded off to 1200.

(b) Sampling procedure:

Multi-stage sampling was done. In the first stage, 40 villages were selected by Simple Random sampling using probability proportional to population size (PPS) technique. In the second stage, 30 Households were selected from each village by systematic sampling with a random start. One study subject was selected randomly from each Household. Thus, a total of 1200 details were studied. After the beginning screening, the cases were identified and detailed Performa was filled for these subjects. Age and sex paired controls were identified for each case and detailed Performa was filled for them also.

Method of Data Collection:

The cross-sectional study was carried out to identify the subjects with overweight (pre- obese) and obesity. The Medical Officer in-charge of RHTC, Maner was informed about the objectives and importance of this study. ASHA workers of the study area were invited and trained in the orientation meeting conducted at the PHC. All the selected houses in the study area were visited and a household folder was prepared. Subjects satisfying the eligibility criteria of the study were interviewed. It involved getting the information on age, educational status, socio-economic status and non-communicable diseases like hypertension, diabetes. Height and weight were recorded and BMI was calculated for each individual. BMI was calculated as weight in kilogram divided by the square of the height in meter ($BMI = kg/m^2$). The study agreement was approved by the institutional Ethical Committee.

Data analysis:

The figures were entered in Microsoft Excel 2010 after coding. Statistical test was done by applying SPSS software. The frequency distributions of socio-demographic details of study subjects were presented. The frequency rates of obesity were evaluated in relation to certain selected components such as Age, Educational status, Occupation, Hypertension, and Diabetes and appropriate statistical tests were done. The prevalence rate is defined as number of subjects with overweight or obese divided by number of subjects covered, multiplied by 100.

Prevalence rate (%) = Number of subjects with obese $\times$ 100

Number of subjects covered

To identify the association between overweight and obese with the above components, appropriate statistical tests were done. The statistical significance was evaluated at 95% level.

RESULT:

Table – 1: Distribution and prevalence rate of the subjects in relation to certain selected factors according to socio-demographic profile:

Variables	Frequency (n = 1148)	Percent (%)	Obese	Non-obese	Prevalence of obesity (%)	Significance
AGE (IN YEARS)						
20 -29	375	32.7	15	360	4	$X^2 = 22.716$ P = 0.000
30 – 39	285	24.8	30	255	10.5	
40 – 49	222	19.3	27	195	12.2	
50 – 60	266	23.2	38	228	14.3	
EDUCATIONAL STATUS						
Illiterate	400	34.8	42	358	8	$X^2 = 14.931$ P = 0.005
Primary and Higher primary	440	38.3	25	415	8.9	
Higher Secondary and College	308	26.8	43	265	12.7	
OCCUPATION						
Sedentary work	614	53.5	93	521	15.5	$X^2 = 47.178$ P = 0.000
Moderate work	534	46.5	17	517	2.8	

SOCIO-ECONOMIC CLASS					
1	25	2.2			
11	147	12.8			
111	209	18.2			
1V	359	31.3			
V	405	35.3			

In the table – 1(Age) show that the majority of the subjects (32.7%) belong to the age-group of 20-29 years and 40-49 years constituted only 19.3%. That the prevalence of obesity increased as age increases. The variation among the age groups was statistically detectable (p = 0.000).

In the table-1(Education) shows majority of the subjects (34.8%) belonged to Primary and Higher primary group and subjects having education level of higher secondary and college constituted 26.8%. That the prevalence of obesity was higher in those educated up to secondary and above. The difference was statistically detectable (p = 0.005).

In the table-1(Occupation) shows majority of the subjects (53.5%) belonged to sedentary work group and subjects of moderate group constituted only 46.5%. That the prevalence of obesity was higher in sedentary workers. The difference was statistically detectable (p = 0.000).

In the table-1(Socioeconomic class) shows majority of the subjects (35.3%) belong to class v and class 1 constituted only 2.2%.

Prevalence of Obesity

Table 2: Distribution of subjects matter according to Body mass index (BMI)

BMI	Frequency (n = 1148)	%
Underweight	181	15.8
Normal	517	45
Overweight	341	29.7
Obese	109	9.5

The table-2 shows subjects (9.5%) belonged to obese group and Overweight constituted 29.7%.

Non-communicable Diseases

Table 3: Distribution and prevalence rate of subjects according to Hypertension

Hypertension	Frequency (n =1148)	%	Obese	Non-obese	Prevalence of obesity (%)	Significance
Yes	49	4.3	22	27	44.9	$X^2 = 73.685$ P = 0.000
No	1099	95.7	88	1011	8	

The table-3 shows majority of the subjects (95.7%) did not have hypertension and subjects having hypertension constituted 4.3%. That the prevalence of obesity was higher in subjects with hypertension. The difference was statistically detectable (P = 0.000).

Table 4: Distribution and prevalence rate of subjects according to Diabetes

Diabetes	Frequency (n =1148)	%	Obese	Non-obese	Prevalence of obesity (%)	Significance
Yes	23	2	14	9	60.9	$X^2 = 71.258$ P = 0.000
No	1125	98	96	1029	8.5	

The table-4 shows majority of the subjects (98%) did not have diabetes and subjects with diabetes constituted 2%. That the prevalence of obesity was higher in subjects with diabetes. The difference was statistically detectable (p = 0.000).

DISCUSSION:

The present study was conducted to estimate the prevalence of obesity and its associated factors in the rural field practice area of Indira Gandhi Institute of Medical Sciences, Patna. Prevalence of obesity in India has also shown the rising trend. The fundamental cause of obesity is an energy variation between calories consumed and calories expended. The changes in traditional life style and increased consumption of junk food have led to an increased intake of fat rich energy-dense foods.

BACKGROUND PROFILE OF THE STUDY SUBJECTS**Age:**

It was observed in the present study that the majority of the subjects (32.7%) belonged to the age-group of 20-29 years and 40-49 years constituted only 19.3%. The frequency of obesity increased as age increases. (Table-1)

Rautela et al (2018) observed that 63.2% of the study participants belonged to the age group 21–40 years. The average age of the study participants was 38.3 (± 13.6) years.¹⁵

Tripathy et al (2016) observed that 65 % of the study sample belonged to 18–44 years age group. They found that obesity was significantly higher among the older age group (45–69 years).¹⁶

SK Sadhukhan et al (2007) found that overall prevalence rate of obesity was low (1.3%) and there was significant difference in the prevalence of mean BMI among different age groups.¹⁷

Sunita Asthana et al (1999) conducted a population-based study on 625 women (15 years and above), selected by multistage random sampling technique from affluent localities of Varanasi city, India and, found a direct relationship between age and obesity. The prevalence rate of obesity showed an increasing trend over the successive age period, increasing from 8% in 15–20 years age group to 50% in women aged 50 years and above. The prevalence rate of obesity was highest in the age group 40 years and above.¹⁸

N Gopinath et al (1994) observed during a community based epidemiological survey of coronary heart disease on a randomized sample of 13414 adults in the age group 25–64 years living in urban Delhi the increasing trend in the prevalence rate of obesity with increase in age in females, from 22.8% in 25–34 years to 43.1% in 55–64 years.¹⁹

Education:

It was seen that majority of the subjects (34.8%) belonged to Primary and Higher primary group and subjects having education level of higher secondary and college constituted 26.8%. The prevalence of obesity was higher in those educated up to secondary & above. (Table-1)

Rautela et al (2018) observed that among male study participants, more than two-third (68.3%) studied graduation or higher. However, only 46.3% of females had studied graduation or higher. Overall, almost 10% of study participants studied primary class or less. Tripathy et al (2016)¹⁶ found that nearly 23 % of the study participants had no formal schooling with only 10 % educated above high school.¹⁵

Molarius A et al (2000) studied 26 populations in the initial and final surveys of the World Health Organization (WHO) MONICA (Monitoring Trends and Determinants in Cardiovascular Disease) Project and found that, lower education was associated with a higher Body mass index in about half of the male and in almost all of the female populations, and the differences in relative body weight between educational levels increased over the 10 years study period.²⁰

Occupation:

It was observed that majority of the subjects (53.5%) belonged to sedentary work group and subjects of moderate group constituted only 46.5%. The prevalence of obesity was higher in sedentary workers. (Table-1)

Rautela et al (2018) observed that among males, 41.7% were office workers, having a private or government job. On the contrary, among females, three-fourth (75.7%) was homemakers.¹⁵

Tripathy et al (2016) revealed that about 49 % of the attendants were unpaid home makers followed by self-employed (25 %)-mostly agriculture and non- government employees (19%). They found that obesity was significantly higher among the government employee and the unpaid.¹⁶

N Gopinath et al (1994) during a community based epidemiological survey of coronary heart disease on a randomized sample of 13414 adults in the age group 25–64 years living in urban Delhi observed that, the prevalence rate of obesity was 29.3% in light activity group, 24.5% in moderate activity and 17.5% in heavy activity group.¹⁹

Socioeconomic status:

It was seen in the present study that majority of the subjects (35.3%) belonged to Class V and Class I constituted only 2.2%. (Table – 1)

In the study done by Rautela et al (2018), it was observed that 47.7% of the study participants belonged to upper socioeconomic class and 31.6% to upper middle socioeconomic class.¹⁵

Tripathy et al (2016) observed that mean household income of the study population was INR 58833 (approximately 905 USD).¹⁶

PREVALENCE OF OBESITY**Body Mass Index:**

The increased BMI has been termed as generalized obesity. The prevalence of obesity was found to be 9.7% and overweight subjects constituted 29.7%. (Table – 2)

Among all obese, BMI was ≥ 30 kg/m for 20.7% of the study participants in the study done by Rautela et al (2018) in Uttarakhand.¹⁵

Kamboj et al (2017) found in Uttar Pradesh a prevalence of overweight and obesity as 36.0% with the prevalence of overweight (BMI - 25-29.99) and obesity (BMI ≥ 30) being 28.0% and 8.0% respectively.²¹

Tripathy et al (2016) found that in their study conducted in Punjab, overweight (BMI > 25–29.9) was observed in 28.6 % and obesity (BMI > 30) in 12.8 % of participants with no urban rural difference. If Asian cut offs are used (overweight (BMI: 22.9–27.49) and obesity (BMI > 27.49), the proportion of overweight and obese was higher with 33 % of adult population as overweight and 25 % as having obesity.¹⁶

PRESENCE OF NON-COMMUNICABLE DISEASES**Hypertension:**

Majority of the subjects (95.7%) were having no hypertension and subjects having hypertension constituted 4.3%. The prevalence of obesity was higher in subjects with hypertension. (Table-3)

Prevalence of hypertension was 8.2% in overweight and 22.2% in obese in the study conducted by Mandal A et al (2014).²²

R Deshmukh et al in their study, observed strong positive correlation of BMI with both systolic and diastolic pressure.²³

Diabetes:

Majority of the subjects (98%) were non-diabetic and subjects having Diabetes constituted 2%. The prevalence of obesity was higher in subjects with diabetes. (Table – 4).

Frequency of diabetes was 15.5% in overweight and 20.2% in obese in the study conducted by Mandal A (2014).²²

CONCLUSION:

India is now facing the double burden of disease. The prevalence of obesity and non-communicable diseases is also high. Obesity does not lead to increase in mortality by itself, but a major risk factor for many chronic diseases. It is associated with five out of ten major causes of morbidity and mortality such as type 2 diabetes mellitus, hypertension, coronary heart disease, cerebro-vascular disease and cancer. There is urgent need to provide awareness programs and health education to spread healthy message on good nutrition and good health for the prevention of obesity.

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