

Relationship between body mass index and percent body fat among females of Raipur city

ABSTRACT

Obesity is the major risk factor for the development of many diseases. BMI is widely used as a surrogate measure of obesity, but underestimates the prevalence of obesity, defined as an excess of body fat .The aim of this study was to investigate the relationship between body mass index (BMI) and body fat percentage (BF%) in females . The study was a cross-sectional design. A selected sample of 70 females aged 25-50 years participated in a detailed height and weight measurement were taken using standard methodology and body fat percent estimated by bio - electrical impedance analysis. The result s to the present study body fat was found to be higher in female subjects and 70 percent of subjects had body fat more than 30 percent .According to BMI 65.71 percent subjects were found to be overweight and obese .subjects were having lower range increased the percent BF of subjects also increased. **This shows positive relationship between BMI and percent BF.**

INTRODUCTION S

Overweight and Obesity is defined as excess body weight or fat accumulation in the body to the extent that health may be impaired. ~~It may lead to reduced life expectancy and increased life problems. Obesity is on the rise everywhere, in both developed and developing countries among all the age groups of human population. This is a cluster of risk factors for cardiovascular disease. The clustering of factors includes overweight/obesity, hyperinsulinemia, hypertension, hyperlipidemia, fasting hyper glucose or type 2 diabetes mellitus, and obesity (particularly central obesity) plays a central role in the metabolic syndrome [1]~~

~~The major causes of the rapid global rise in obesity rates lie in the profound environmental and societal changes now affecting large parts of the world and creating societies in which physical activities are low and the availability of high-fat, energy-dense foods has increased.(2)~~

The prevalence of obesity is increasing in developed and developing countries in children, adolescents and adults.(3)



32 Anthropometry is one of the most basic tools for assessing nutritional status, whether over
33 nutrition or under nutrition. A variety of methods are available to measure body fatness and body
34 thinness. The most frequently used tools in public health evaluations and clinical screening are
35 anthropometric-based measurements such as skin fold-thickness or circumference measurements
36 or various height- and weight-based indexes such as weight-for-height, body mass index [BMI;
37 $\text{wt (kg)/ht}^2 \text{ (m)}]$.4-5

38 WHO Expert Consultation decided to retain the universal BMI cut-off points of 25 kg/m^2 for
39 overweight and 30 kg/m^2 for obesity.(6)

40 ~~Asian Indians are commonly dyslipidaemic and are predisposed to develop accelerated~~
41 ~~atherosclerosis. Besides elevated levels of total cholesterol and low-density lipoprotein~~
42 ~~cholesterol, high levels of serum triglycerides and low levels of high-density lipoprotein~~
43 ~~cholesterol add to the atherogenic risk. Such a profile of dyslipidaemia commonly accompanies~~
44 ~~obesity and insulin resistance. (8)~~

45
46 ~~Excess body fat and lesser amount of lean tissue Asian Indians are commonly dyslipidaemic and~~
47 ~~are predisposed to develop accelerated atherosclerosis¹. Besides elevated levels of total~~
48 ~~cholesterol and low-density lipoprotein cholesterol, high levels of serum triglycerides and low~~
49 ~~levels of high-density lipoprotein cholesterol add to the complement each other in volume and~~
50 ~~weight so that the value of BMI does not increase.(9)~~

51
52 ~~Asian Indians have a characteristic obesity phenotype, consisting of relatively lower body mass~~
53 ~~index (BMI). In Asian Indians, the relative contribution of fat is more and muscle is decreased;~~
54 ~~therefore, theoretically BMI would not accurately assess obesity. Asian Indians when the~~
55 ~~percentage body fat (%BF) is used as the reference standard.(10)~~

56 Although body mass index (BMI) is the most frequently used method to assess overweightness
57 and obesity, this method has been criticized because BMI does not always reflect true body
58 fatne⁽⁸⁾ 1-12) and has some limitations in assessing the risk of obesity-related diseases in
59 persons with low muscle and high body fat [13],

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68 composition measurements [13, 14-15].

Until now, bioelectrical impedance analysis (BIA) has been considered as the simplest, most reproducible and least expensive method for body composition evaluation in clinical practice, and it showed high accuracy and excellent correlation with dual-energy X-ray absorptiometry (DXA) in assessing BF% [16-17]. Therefore, BIA is considered the most cost-effective and feasible replacement for DXA in assessing body composition. BF% has been most commonly used in practice. However, the accuracy of BF% measurements is dependent on height and cannot be evaluated independently from fat free mass (FFM) [18].

The WHO's 2004 call for more research to be conducted in diverse populations seems quite important and necessary if the relationships between BMI, body fat and chronic disease are to be better defined. Along with measures of anthropometry and body composition, it is important to better understand both the genetic relationships between populations and the environments in which they are living.

Hence the present study was designed to investigate the relationship between body mass index (BMI) and body fat percentage (BF %) in females.

MATERIALS AND METHODS

The present cross - sectional study was taken to assess the prevalence of obesity 100 females age 25 to 50 years .Raipur were sampled for the study .Personal information about age, socio-economic status, dietary pattern and activity level were collected through a well designed questionnaire. Pregnant, Diabetic and chronic renal failure females were excluded from the study. Two anthropometric measurements height and weight was taken by standard techniques. Percent body fat was estimated by bio-electrical impedance analysis technique using.

The assessment of obesity two variable BMI and PBF were used in the present sample. BMI was calculated from measured values of height and weight for each subject. In general, BMI=weight (kg)/height (m²) for the assessment of overweight and obesity following BMI criteria of WHO (2000) used.

Table 1: Nutritional status based on the WHO and "Asian criteria" values

Nutritional Status	WHO criteria BMI cut-off	"Asian criteria" BMI cut-off
Underweight	<18.5	<18.5
Normal	18.5 – 24.9	18.5 – 22.9
Overweight	25 – 29.9	23 – 24.9
Pre-Obese	-	25 – 29.9
Obese	≥30	≥30
Obese Type 1 (obese)	30 – 40	30 – 40
Obese Type 2 (morbid obese)	40.1 – 50	40.1 – 50
Obese Type 3 (super obese)	>50	>50

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97 similarly, PBF was used for assessment of overweight and obesity by using criteria according to
98 WHO, females having percent bf above 30 were considered obese and those having per cent BF
99 below or equal to 30 as normal.

100 RESULTS

101 Mean age of sample was 37.5 years. They all belonged to upper middle income group and
102 followed a sedentary pattern of life style. Table 1 shows the basic characteristics of the studies
103 sample.

104 **Table 2** shows the basic characteristics of the studied sample .it is apparent from this table that
105 there is wide variation in minimum and maximum values of the studies.

106 **Table 3** showed that 35.7 percent subjects had BMI between 30 to 40 with mean 33.9 ± 1.87
107 and 30 percent of subject had percent of BMI between 25- 30 with 27.19 ± 1.18 while 19
108 percent 20-25 and 18.5-20 of subjects had mean BMI 23.79 ± 1.01 and 19.36 ± 0.46
109 respectively. Around 31.42 percent over weight (BMI 25-30) with mean BMI 27.09 ± 1.2 and
110 35.71 percent obese (30-40) with mean BMI 33.906 ± 1.87 .

111 Percent of body fat

112 According to percent BF as who classification 70 percent of subjects were found to have high
113 percent BF with mean 40.78 ± 6.94 while only 30 percent of subject had normal percent BF
114 below 30 with mean 23.31 ± 3.30 .

115 BMI and BF

116 Subject who were overweight (BMI: 25-30) had mean percent BF 39.02 ± 3.86 while obese
117 BMI ((30-40) had mean percent BF 46.07 ± 3.53 . subjects who came in normal category
118 according to BMI had mean percent BF 23.98 ± 1.30 .on the other hand subjects whose BMI
119 range was 18.5-20 had mean percent BF 21.36 ± 2.25 results show that in every category of
120 BMI subjects had some higher percent body fat but as the BMI increased their mean percent BF
121 also increased .only 34.28 percent of subjects had normal BMI and High percent BF. Thirty five
122 percent subjects had high BMI with h very High BF.

123 CONCLUSION

124 The result s to the present study body fat was found to be higher in female subjects and 70
125 percent of subjects had body fat more than 30 percent .According to BMI 65.71 percent subjects
126 were found to be overweight and obese .subjects were having lower range increased the percent
127 BF of subjects also increased. This shows positive relationship between BMI and percent BF.
128 This proves that the figures are alarming among females. The purpose of this study obesity is to
129 identify within each population. The purpose of this study preventing weight gain and obesity are

likely to be more cost effective and to have a greater positive impact on the long-term control of body weight than treating obesity once it has developed.

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TABLE I I
Basic characteristics of the subjects



Variable		Mean	SD	Minimum Value	Maximum Value
Age (yrs.)		23.33	11.93	25	50
Height (cm)		155.42	4.09	150	159
Weight (kg)		68.14	14.29	45	98
BMI (kg/m)		28.16	5.62	18.5	37.1
PBF		38.35	10.3	19.3	50.5

TABLE III

BMI, PERCENT BODY FAT OF THE SUBJECTS

Details	Number of Subjects	Percentage	Mean $\pm$ SD
BMI			
30-40	25	35.71	33.9$\pm$ 1.87
25-30	21	30	27.19 $\pm$ 1.18
20-25	19	27.14	23.79 $\pm$ 1.01
18.5-20	5	7.14	19.36 $\pm$ 0.46
% BF			
35 above	30	42.85	45.78 $\pm$ 3.49
30-34.9	19	27.14	32.89 $\pm$ 1.39
below 30	21	30	23.90 $\pm$ 3.71

TABLE IV

NUBER AND PERCENTAGE OF SUBJECTS

Total Number of Subjects	Non -Obese	Obese
70	24	46