A clinical study of prevalence of obesity and abdominal obesity in adult patients attending hamidia hospital, Bhopal

Sunil Dwivedi [1*], Amit Dwivedi [2], Ashish Behl[3]

[1,3]Professor and HOD, [2]Medical Officer, [1]Dept. of Biochemistry, [3]Dept. of Physiology, [1,3] I.T.S.-Centre for Dental Studies and Research Murad Nagar, Ghaziabad, Uttar Pradesh, [2]District Hospital, Rewa, Madhya Pradesh, India

***Correspondence Author: Sunil Dwivedi**
Email- drsunil_phd@rediffmail.com

Abstract
Objectives: Obesity is a health problem in the majority of the developed countries and is emerging as a serious problem in the developing countries. In this study, we examined 200 adults to determine the prevalence of obesity and abdominal obesity.
Material and Methods: In this hospital based study, 200 adults patients (both males and females), > 20 years of age, were randomly selected and examined for body mass index (BMI) and waist to hip ratio (WHR).
Results: Out of 200 study subjects, 122 were males and 78 were females. BMI ranged between 15.62 to 44.17 kg/m^2 in males and between 19.53 to 51.59 kg/ m^2 in females. BMI in females was comparatively more than that in males.(28.41 $\pm$ 5.05 Vs 26.42 $\pm$ 3.94; $p < 0.001$) WHR ranged between 0.77 to 1.27 in males and between 0.73 to 1.33 in females. Males were comparatively more obese than their female counter parts as per WHR (1.02 $\pm$ 0.08 Vs 0.95 $\pm$ 0.10; $p< 0.001$). According to BMI, the overall prevalence of obesity in the study population was 20.5%; the prevalence of obesity in males was 12.29% and in females 33.33%. The prevalence of overweight was 49.5%; males were comparatively more overweight than females (53.28% Vs 43.49%) as per BMI. A higher prevalence of abdominal obesity was seen in females (85.89%) than in males (66.4%).
Conclusion: It has been concluded from this study that obesity and abdominal obesity is a growing problem even in developing region like ours. Both obesity and abdominal obesity is more common in females as compared to males.

Keywords: Prevalence, obesity, abdominal obesity, BMI, WHR, Adults.

Introduction
Obesity is the plague of today's modern society.[1] Obesity is a problem of global proportion, with more than a billion overweight adult in the world of whom at least 300 million are clinically obese.[2]

Obesity is a term used to indicate excessive deposition of fat in the body. Obesity is a major public health problem in developed countries and is reaching epidemic proportion in developing countries too.[3] Obesity has been reported to be associated with higher morbidity and mortality. Central adiposity is known to be associated with abnormal carbohydrate and fat metabolism and increased incidence of coronary artery disease.[4]

Prevalence of obesity varies in different populations and the prevalence could vary in same population according to age and sex. Data on body mass index and prevalence of obesity are scarce from the developing regions of the world.[5]

The etiology of obesity is complex and multifactorial and both genetic and environmental factor play an important role in its development. According to the first law of thermodynamics (i.e., energy cannot be created or destroyed), obesity results from an imbalance between energy expenditure and energy intake. Obesity is result of changes in diet and lifestyle that accompany economic development, urbanization and globalization. Diet, nutrition and changing life styles are foremost among the principal drives of obesity in developing as well as developed counries.[6] In this report, we present some data on body mass index and waist / hip ratio in adult patients (> 20 years of age) attending various medical OPD's of Hamidia Hospital, Bhopal.

Material and Methods
This hospital based study was conducted on patients > 20 years of age. The patients were recruited randomly from various medical OPDs of Hamidia Hospital, Bhopal. The exclusion criteria were age below 20 years or over 75 years and unwillingness to take part in the study.

Particulars of each patient including age, sex and residence were recorded. Each patients was examined for height, weight, waist circumference and hip circumference. Height and weight were measured using the standard procedures suggested by Jelliffe (1966).[7] Measurements were taken in subjects without wearing shoes or heavy outdoor clothing. Height was measured to the nearest centimetre using an anthropometric rod with the subject standing erect on the floor with the back against a vertical mounted rules. Weight of the patients was measured on a pre-standardized scale to the nearest 100 gm. Waist and hip measurements were taken using an inelastic measuring tape. The hip circumference was measured at the maximum circumference around the hips, and the waist circumference was obtained at the narrowest point between the rib cage and the iliac crests at the level of umbilicus. The data was used to calculate body mass index (BMI) using the formula as weight (Wt.) / height^2 (m^2). Waist to hip ratio (WHR) was calculated by dividing waist circumference by hip circumference. A BMI of < 24.99 kg/m^2 was taken as normal; BMI of 25-29.9 kg/m^2 was considered overweight,

and BMI of > 30 kg/m^2 was considered obese. WHR by > 1.0 in men and > 0.85 in women was taken as cut off.

Results

A total of 200 adult (122 males and 78 females) patients were screened for obesity. Most (28.5%) of these subjects belonged to the age group of 40-49 years. Age of the males ranged between 20 and 75 years (mean 46.50±13.36), while the age of females ranged between 20 and 75 years (mean 42.74±14.36). The overall proportion of males was more than females in study population (Table 1).

Table 1: Age and sex distribution of the study population

Age group	Males		Females		Total	
	No.	%	No.	%	No.	%
20-29 yrs	12	6	16	8	28	14
30-39 yrs.	18	9	13	6.5	31	15.5
40-49 yrs.	37	18.5	20	10	57	28.5
50-59 yrs.	31	15.5	12	6	43	21.5
60-69 yrs.	15	7.5	15	7.5	30	15
> 70 yrs.	9	4.5	2	1	11	5.5
Total	122	61	78	39	200	100

The BMI ranged between 15.62 to 44.17 kg/m^2 in males and between 19.53 to 51.59 kg/m^2 in females. Females were comparatively more obese as compared to males as per BMI (28.41±5.05 Vs 26.42±3.49; p <0.001) (Table 2).

Table 2: Body mass index (BMI) of the study population

	Males(n = 122)	Females (n = 78)	Total (n = 200)	P value
Mean	26.42	28.41	27.41	P < 0.001
S.D.	3.49	5.05	4.27	(Significant)
Range	15.62 – 44.17	19.53 – 51.59	15.62-51.59	

WHR ranged between 0.77 to 1.27 in males and between 0.73 to 1.33 in females. Males were comparatively more obese than their female counterparts as per WHR. (0.98±0.09 Vs 0.95+0.10; p <0.001) (Table 3).

Table 3: Waist hip ratio (WHR) of the study population

	Males (n = 122)	Females (n = 78)	Total (n = 200)	P value
Mean	1.02	0.95	0.98	P<0.001
S.D.	0.08	0.10	0.09	(Significant)
Range	0.77 – 1.27	0.73 – 1.33	0.73-1.33	

Of 200 subjects, 99 (49.5%) had overweight (BMI 25-29.9 kg/m^2) and 41 (20.5%) had obesity (BMI >30 kg/m^2). Males were comparatively more overweight than their females counterparts; (53.28% Vs. 43.49%). Females were found to be more obese as compared to males (33.33% Vs 12.29%) as per BMI criteria (Table 4).

Table 4: Distribution of bmi groups in males and females by different age groups

Age group	Sex	n =	BMI <25		BMI 25-29.9		BMI >30	
			No.	%	No.	%	No.	%
20-29 yrs.	Males	12	08	66.67	02	16.67	02	16.67
	females	16	07	43.75	07	43.75	02	12.5
	overall	28	15	53.57	09	32.15	04	14.28
30-39 yrs.	Males	18	08	44.45	09	50	01	5.55
	females	13	02	15.38	08	61.54	03	23.08
	overall	31	10	32.26	17	54.84	04	12.90
40-49 yrs.	Males	37	15	40.54	19	51.36	03	8.10
	females	20	05	25	07	35	08	40
	overall	57	20	35.08	26	45.62	11	19.30
50-59 yrs.	Males	31	06	19.35	20	64.52	05	16.13
	females	12	03	25	04	33.33	05	41.67
	overall	43	09	20.93	24	55.81	10	23.26
60-69 yrs.	Males	15	03	20	10	66.67	02	13.33
	females	15	01	6.67	07	46.67	07	46.67
	overall	30	04	13.33	17	56.67	09	30
> 70 yrs.	Males	09	02	22.22	05	55.56	02	22.22
	Females	02	0	0	01	50	01	50
	Overall	11	02	18.19	06	54.54	03	27.28
All group	Males	122	42	34.43	65	53.28	15	12.29
	Females	78	18	23.08	34	43.59	26	33.33
	Overall	200	60	30	99	49.5	41	20.5

Abdominal obesity according to WHR, was found in 148 (74%) individuals. Females (85.89%) were found to be more abdominally obese as compared to their male (66.40%) counterparts (Table 5).

Table 5: Abdominal obesity in the study population

S. No.	Sex	n=	Normal		Abdominal obesity	
			n=	%	n=	%
1	Males	122	41	33.60	81	66.40
2	Females	78	11	14.10	67	85.89
	Total	**200**	**52**	**26**	**148**	**74**

Discussion

Obesity is one of the most common disorders of metabolism. The term obesity implies an excess of adipose tissue, but the meaning of excess is hard to define. It is not clear whether obesity represents a disease or a common clinical manifestation of a group of disorders. The description is necessarily arbitrary, since body weight (more accurately, quantity of body fat) is continuously distributed in populations, with no clear division between individuals who are obese and individuals who are thin. The cut-off point between normal and obese can only be approximated, and the health risk imparted by obesity is probably a continuum with increasing adiposity.[4]

Obesity is a health problem in the majority by developed countries and is developing into a serious problem in the developing countries of the world. [8]. In recent years with improving socio-economic status, the overall energy expenditure is reduced. This has resulted in increased prevalence of obesity.[9]

The present study has shown that 20.5% of adult patients have obesity and this is far more common in females than in males. The prevalence of overweight was 49.5% which was more common in males than in females. The BMI has been widely used in the assessment of fatness in individuals and communities. This is because the index is correlated with other estimates of fatness and it applies to all population without the need for a reference population.[10]

The prevalence of obesity reported from different countries has sown significant variability : Hedley AA et al. 2004[11] reported a 65.1% and 30.4% prevalence of overweight and obesity among US adults respectively; Gutierrez-Fisac JL et al. 2004[12] reported a 49% and 31.5% prevalence of overweight and obesity respectively in older adults in spain; Erem C. et al. 2004[13] reported a higher prevalence of obesity (23.5%) among Turkish Population, which was more common in women (29.4%) than in men (16.5%), Jia WP et al. 2004[14] reported 29.5% and 4.3% prevalence of overweight and obesity respectively in urban Chinese older than 20 years of age in Shanghai, China, which was more common in women than in men. A higher prevalence of overweight in men and obesity in women was also reported by Arroyo P. et al. 1994[15] in Maxican adults.

Various studies conducted in India also reported a high prevalence of overweight and obesity : Swami HM et al. 2005[16] reported 33.14% and 7.54% prevalence of overweight and obesity respectively in elderly in Chandigargh ; Zargar AH et al. 2000[4] also reported a higher prevalence of obesity among females (23.69%) than males (7.07%) in Kashmiri Adults.

WHR, being a physiological parameter, changes with time and body weight. A healthy level of WHR has not clearly been defined, although attempts have been made.[4] Over the past 10 years or so, it has become accepted that a high WHR (>1.0 in men and >0.85 in women) indicates abdominal fat accumulation.[17] A higher prevalence of abdominal obesity, as defined by WHR, was observed among females (85.89%) as compared to males (66.40%) in this study. Similar observations have been reported by Gutierrez-Fisac JL et al.[12] (78.4% Vs. 48.4%) in spain; Erem C. et al.[13] (38.9% Vs 18.1%) in Turkey. A study conducted by Agrawal R.P. et al. 2004[18] in type 2 diabetic subjects in North-West India also reported a higher prevalence of abdominal obesity in females (95.57%) than males (59.66%).

Fat distribution pattern is more important than total adiposity in determining a patient's risk from obesity. Individuals with abdominal obesity are at greater risk of cardiovascular complications than those with gluteal obesity.[19]

Obesity has adverse effects on health and longevity in both young and old individuals and it has been shown that obese individuals have an increased overall mortality rate compared to the normal weight population.[20]

In addition to being a disease in its own right, obesity substantially increases the risk of several fatal and non fatal but highly debilitating, non communicable diseases.[21] The adverse health consequences associated with obesity include cardiovascular disease, stroke; type 2 diabetes mellitus; hypertension; dyslipidemia; cancers of the breast, endometrium, prostate and colon; gallbladder disease; osteoarthritis, respiratory problems including asthma, obstructive sleep apnea; and obesity hypoventilation syndrome; hyperuricemia; and perhaps depression. Furthermore, aerobic capacity and the ability to perform physical activities may be hindered by obesity.[22]

Obesity is a disease associated with excessive human suffering and also a massive financial cost to society. Obesity is not simply a matter of overeating and lack of will power but a disease with a major genetic etiology modified by the environment and should be treated vigorously in the same manner as diabetes, hypertension and caronay artery disease.[1]

The treatment of obesity remains a major challenge. Many people who are obese never seek treatment. In addition, many people who begin treatment for obesity are unable to adhere to their treatment regimen for the duration needed to produce sufficient weight loss. In light of much evidence that reversal of obesity generally is difficult and long-term success rates are low, strategies to prevent obesity

are essential and potentially more effective than obesity treatment regimens for controlling the current obesity epidemic.[22]

Our survey has shown that we have significant problem of obesity is adults population and the magnitude of the problem is far more in women than in men. Urgent measures, in the form of increasing the level of physical activity and improving dietary habits need to be taken to contain this health hazard.

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