Body Mass Index an Important Anthropometric Parameter to Predict Health-Risk in Adult Population of Bastar Region of Chhattisgarh: A cross sectional study at GMC Jagdalpur

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Abstract

Obesity can be defined as a condition where there is an excess of body fat.Body Mass Index(BMI) an important anthropometric parameter to assess the obesity of an individual. Body mass index is a number indicates person's body fat calculated from person body weight and height. Anthropometric measurement i.e. Calculation of BMI is very less expensive, convenient method for calculating the body fat. In the current scenario cardiovascular disease and the metabolic disorders are the most serious and immediate health problem in many countries nowadays. For cardiovascular and metabolic diseases the major risk factor is obesity. Diseases that affect overweight and obese people include angina, coronary heart disease, type 2 diabetes mallitus, hyprtension, hypercholesterolemia, metabolic syndrome, gall stones, stroke, cancer, reproductive diseases and sleep apnea. People who are underweight may suffer from eating disorder such as anorexia (not eating enough), bulimia (overeating and purging), stress and mental disorder. The underweight people are at risk of several BMI related diseases. People with a low BMI are likely to develop a weakened immunity system, leaving them at a higher risk for other infections. Being underweight also increases chances of developing osteoporosis, and cardiovascular disease. In a recent survey done in Chennai, about 15% of children and adolescents are overweight. As per WHO estimation, there are more than 300 million obese and 200 million diabetic people in world. In addition there are 800 million overweight but not obese (BMI between 25-30). The present study was performed on 500(Normal and diseased) adult population of Bastar region (Chhattisgarh) to calculate BMI by which we can assess and predict the health risk in this population. In our BMI study at Bastar region of chattisgarh percentage of BMI was found to be more in diseased subject rather than normal subject. By our study it can be concluded that in contrast to control the diseased population is having more percentage of Overweigh, Obesity gr. I, Obesity gr. II & Obesity gr. III than normal subjects.

Keywords: Body Mass Index, Cardiovascular disease, Obesity, Overweight, Anthropometric parameter, Underweight

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Introduction

Coronary arterial disease is the most serious and immediate health problem in many countries of the world and has consumed a large share of time and wealth on its research. There is a rise from 4% to 11% in cardiovascular disease in urban population in India in the last five decades[1]. Around 26% of the population worldwide has been affected with hypertension[2]. Hypertension is the most common cardiovascular disease and is assuming epidemic proportions in developing countries[3]. In the last three decades the prevalence of hypertension in India has increased i.e. 30 times among urban residents and about 10 times in rural residents[4]. The prevalence of hypertension is 1.5 to 2 times greater in patients with diabetes compared to non-diabetic patients.

The overall prevalence of hypertension under the CUPS(Chennai Urban Population Study) was found to be 22.1%. As far as the 'Rule of Halves' may become applicable in case of hypertension in india which explains that the 50% are unaware that they have hypertension, of those who know only 50% take treatment, and of those who take treatment only 50% are under control. This makes the increasing awareness and improving control of hypertension India[5]. Metabolic syndrome now considered to be an intermediate condition that portends an increased future risk of development of type 2 diabetes mallitus and coronary artery disease(CAD). Insulin resistance is a n important part of metabolic syndrome and abdominal obesity is a major risk factor is associated with insuln resistance[6]. Owing to persistent insulin resistance pancreatic beta cells gets exhausted and leads to hyperglyceamia. As Asian Indians have high body fat and truncal and abdominal obesity is a leading predisposing factor for type 2 diabetes mallitus and cosequently insulin resistance[7]. As per the current information of IDF(international Diabetic Federation) the number of people with type 2 diabetes is increasing in every country. It was 366 million peoplehave diabtes in 2011; by 2030 this will have risen to 552 million. The low and middle income countries have 80% of

people with diabetes and greater number are between the 40 to 59 years of age. 4.6 million deaths were reported in 2011. Diabetes caused at least USD 465 billion dollars in healthcare expenditures in 2011; 11% of total healthcare expenditures in adults (20-79 years). 78,000 children develop type 1 diabetes every year.

The life style modification i.e. shifting high energy spending activity to adopting sedentary life style habits play a major role to become obese which is root cause of all metabolic and cardiovascular disease[8]. Obesity and diabetes are having strong link with each other. Obesity results from an imbalance between energy expenditure and intake which is modulated by genetic predisposition. International Diabetes Congress in Helsinki, Finland reported that obesity is the most preventable and important risk factor for Diabetes Mellitus Type 2[9]. Almost four out of five people who are newly diagnosed with diabetes are obese. Scheen and Lefebvre[10] in 1998 have reported that the risk for diabetes to be about 2-folds in the mildly obese, 5 fold in the moderately obese and 10 folds in morbidly obese persons. Owing to rampant rising trend of diabetes and hypertension has compelled the health ministry to reduce the diagnostic cut-offs for BMI to 23 kg/m2. In October 2008 standards have been set for the first time in the Ministry's consensus guidelines for the Prevention and Management of Obesity and Metabolic Syndrome for the country was released. The Health Ministry, the Diabetes Foundation of India (DFI), the All-India Institute of Medical Science (AIIMS), Indian Council of Medical Research (ICMR), the National Institute of Nutrition (NIN) and 20 other health organizations had released their guidelines jointly i.e. Body Mass Index(BMI) is 23 kg/m2 as opposed to 25 kg/m2 globally was set a new diagnostic cut off. A person with a body mass index of 23 kg/m2 will now be considered overweight and below 23 kg/m2 as one with normal BMI, unlike the cut-off limit of 25 kg/m2 earlier.

Now, those with BMI of 25 kg/m2 will be clinically termed obese (as opposed to 30 kg/m2 at the international level), and those with BMI of 32.5 kg/m2 will require bariatric surgery to eliminate excess fat. Same criteria was also applied for waist circumstances will now be 90 cm for Indian men (as opposed to 102 cm globally) and 80 cm for Indian women (as opposed to 88 cm at the international level).

Aims and objectives

The main objective is-

1. To find out the prevalence of health-risk.
2. To estimate the prevalence of different level of BMI in normal and diseased population of Bastar region of Chhattisgarh.

Materials and Method

500(256 Male and 244 female) population from 18 years to 80 years, coming in OPD and IPD patients in department of medicine LSBRKM Govt. Medical college and Maharani Hospital Jagdalpur. Subjects were included as-

1. Normal subjects (Male and Female)
2. Diseased (Male and Female) Population suffering from Type 2DM, HT, and Type 2 DM with HT.

Permission was taken from IEC (Inst. Ethical Committee) of GMC Jagdalpur.Subjects coming to the hospital were evaluated in terms of their height(m^2) and weight(kg) by using

1) Stadiometer for measuring height
2) Weighing machine for recording weight
3) Measuring tape while recording height in hospital ward
4) Measuring Scale for marking height on the wall in different hospital ward.
5) BMI calculator by which after matching height with weight BMI was calculated.

While recording height and weight if the normal or disease subject if female then female attendant presence was made mandatory. While recording height and weight usually all measures were recorded thrice and then average used to be taken of three and then entered in data.

How BMI is calculated?

For example, an adult who weighs 70 Kg, and whose height is 175 cm or 5'7", 1.75m will have a BMI of 22.9.

First we will convert 175cm = 5'7"=1.75m

BMI=70(Kg)/ $(1.75)^2$ (m) =22.9Kg/ m^2

Normal Ranges of BMI

BMI(Body Mass Index) can be defined as person's weight in kilograms (kg) divided by his or her height in meters squared. The National Institutes of Health (NIH) now defines normal weight, overweight, and obesity according to **BMI** rather than the traditional height/weight charts. BMI is universally expressed in units of kg/m^2, resulting from mass in kilograms and height in metre. The common definitions of BMI (Kg/m^2) (As per ICMR Hyderabad, AIIMS Delhi, Diabetic Foundation of India and National Institute of Nutrition) and ranges are as under:

Underweight: Less than 18
Normal (Healthy and Low risk): 18 to 23
Overweight (Little Risk): 23 to 25
Obesity Gr. I (High Risk): 25 to 30
Obesity Gr. II (Very High Risk): 30 to 35
Obese Class III (Highest Risk): More than 35

Advantages of our BMI study

1) Health awareness knowledge imparted in normal and diseased population.
2) Method and time duration of walking was taught to all subjects.
3) Diet control advices were given to diabetic and hypertensive patient like avoiding excess consumption of fatty diet and use of salt restricted diet.
4) Fruits with different glycemic index and their use in diabetic patient was taught.
5) Risk factors like smoking, anxiety, depression etc. proper counseling was done and risk factor free living lifestyle suggestions were given.
6) Subjects having BMI <18 Kg/ m2: Advices given that how to maintain energetic balanced diet in minimum financial budget.
7) Counselling of child's with overweight and obese was done.
8) Health professional and health workers were made aware that how to maintain normal level of BMI.
9) Confusions were clarified regarding minor and major health related issues.

Result and Discussion

Researches over the last several years have shown that physical bodies and genetic make up of Indian population are different from their western counterparts as Indians suffer from abdominal obesity compared to people in the West who has uniform obesity. This body composition puts Indian in the high risk zone for diabetes and hypertension. In the past several studies has been carried out to predict the association between obesity, cardiovascular and metabolic disease. As per Burton[11]et al stated that increase in general obesity or central obesity is strongly linked with Type 2 DM. He further stated that Type2 DM is 2.9 times higher in over weight i.e. BMI more than 27 than in normal weight subjects of 20 to 75 years age.DeNino[12] et al 2001 and Feller[13] et al 2010 has suggested abdominal obesity has been correlated to various metabolic disturbance and increased metabolic risk to diabetic and cardiovascular risk are in appraisal these days.Parikh[14] et al 2002 metabolic profile worsens with the increase in BMI and WHR, WHR, however abdominal obesity (WHR) causes more hazardous influence on the metabolic status of Type 2 Diabetes patients.

Waist-to-Hip Ratio or WHR is a health risk indicator given by a person's ratio of the waist circumference to the hip circumference. Waist circumference measure the circumference of waist at its smallest point, usually just above the navel. This is calculated as waist measurement divided by hip measurement (W/H). For example, a person with a 25" waist and 38" hips has a waist-hip ratio of about 0.66.As per WHO the male and female will be considered as obese when WHR is more than 0.85 for female and 0.90 for male. Thais[15] et al has concluded in his study role of "Normal Weight Central Obesity" that patient with CAD, normal weight with central obesity was associated with the highest risk of mortality. Studies in Hong Kong and Singapore[16, 17]showed that risk for cardiovascular disease or diabetes is high at lower BMIs. Data from China indicate that the prevalence of hypertension, diabetes, dyslipidaemia with higher BMI was below the current cut-off point for overweight (25 Kg/m^2)[18]. Asian Indian have a high BMI and abdominal obesity and excess fat[19,20] therefore WHO expert consultation proposed a new BMI cut-off of 23.0Kg/m^2 for public health action in Asia[21]. In the study of Sushma et al (2010) at Jodhpur Rajasthan the values for BMI was found to be more than 24 kg/m^2 which was showing positive relation between cardiovascular disease and body fat. Similarly Gupta R et al in his study on Punjabi Bhatia community in Jaipur calculated the BMI more than 24Kg/m^2.Bastar region BMI study is correlating above studies are as we have also got BMI more than 24Kg/m2 in predominantly in diseased subject in our study. We have observed comparative BMI ranges as in normal overweight subject it is 9.11% which is less than overweight diseased subject i.e.15.23%. As far as in normal obese grade-1was concerned BMI was 12.1% than 17.14% in diseased subject which is a big difference. Moderate difference of BMI was also observed in Normal Obese grade- 2 which was 8.1% than 12.38% in diseased subject. A sizeable difference was also seen in normal obese grade -3 which was 3.29% than 7.61% in diseased subjects.

Fig. 1: Materials used for BMI study

BMI Calculation thr. BMI Calculator

Fig. 2: BMI calculator

Measurement of height and Weight

Fig. 3: Measurement of Height and weight for BMI calculation

Results of BMI study at Jagdalp[ur

	PARAMETERES	NORMAL		DISEASED	
		FIGURE	PERCENTAGE %	FIGURE	PERCENTAGE %
1	UNDERWEIGHT	43	10.88	5	4.76
2	NORMAL	215	54.43	42	40.00
3	OVERWEIGHT	36	9.11	16	15.23
4	OBESITY Gr. I	48	12.15	18	17.14
5	OBESITY Gr. II	32	8.10	13	12.38
6	OBESITY Gr. III	13	3.29	8	7.61
7	SEVERE OBESITY	8	2.02	3	2.85
	TOTAL	395		105	

Fig. 4: Detail data of normal and diseased adult population at Jagdalpur

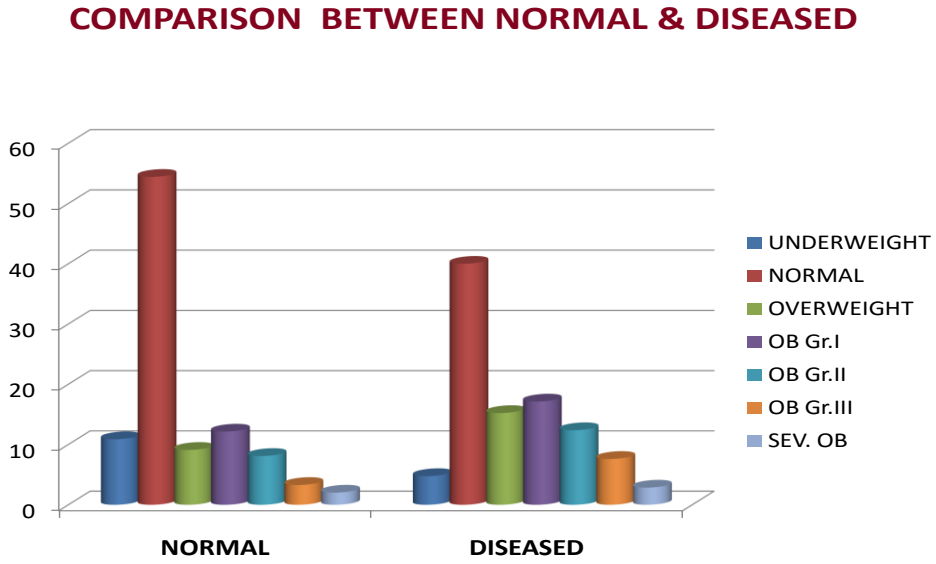

Fig. 5: Graphic presentation of BMI study at Jagdalpur.

Conclusion

By our study it can be concluded that in contrast to normal the diseased population is having more percentage of overweight, Obesity Gr: I , Obesity Gr: II and, Obesity Gr: III than normal subject.

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