A Cross Sectional study to determine prevalence of overweight and obesity and its association with Hypertension and Diabetes in Kungher (RHTC Area) population of GMERS Medical College-Dharpur Patan.

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Abstract

Obesity is a well-known risk factor of hypertension and diabetes. This study was aimed to investigate the prevalence of overweight and obesity in Kungher (Rural Health Training Center Field Practicing Area) population and to evaluate its relationship with hypertension and diabetes. This Cross sectional study comprises of 163 subjects attending a local medical camp between 25- 70 years of age. Height, weight, BMI, systolic and diastolic blood pressure, fasting blood sugar and post prandial blood sugar were determined using standard methods. It was found that the prevalence of overweight and obesity was 15% and 34% respectively and it was predominant among women than men. Systolic blood pressure, diastolic blood pressure and post prandial blood sugar were significantly elevated in obese subjects than in normal BMI subjects (control). It was concluded that the results showed a higher trend of hypertension and diabetes with increase in BMI.

Keywords: Obesity, Hypertension, Diabetes, Overweight, RHTC

Introduction

The issue of overweight and obesity has become a serious public health concern throughout the world in the past few decades. In India, it has reached epidemic proportion in the 21st century with morbid obesity affecting 5% of the country's population. [1] Although the terms overweight and obesity are often used interchangeably, overweight refers to an excess of body weight compared with height; obesity refers to an excess of body fat. BMI is the most widely used measure to define obesity. It is determined by dividing weight (wt.) in kilograms by height (ht) in meters square.[2] A desirable BMI according to the WHO recommended cut-offs for Asians is considered to be between 18.5 and 22.9 kg/m2. A BMI of 23–24.9 kg/m^2 is defined as overweight and >25 kg/m^2 as 'obese'. [3] A strong association has been depicted between BMI and mortality among Asian populations.[4] BMI is also positively and independently associated with morbidity and mortality from hypertension and type II diabetes mellitus. [5] Relationships between obesity and the risk for hypertension and diabetes should be assessed early, if not, it might lead to micro and macro vascular complications. Though the association of BMI with hypertension and diabetes has long been the subject of epidemiological research, it has not been sufficiently explored in rural population. Hence

the present study was aimed to find the prevalence of overweight and obesity in this segment of rural population and to explore the relation of BMI with hypertension and diabetes.

Materials and Methods

A cross sectional study was carried out in 163 participants attending a free medical camp at Kungher(RHTC Area) village, belonging to the age group 25-70. Gender-wise distribution of 163 subjects was 92 males and 71 females. BMI was measured from height and weight using the standard protocol of Weiner and Lourie.[6] Height was measured using height measuring scale with 0.1cm division value and weight using potable weighing machine without shoes. Blood pressure was determined using the standard mercury sphygmomanometer. Normal BP is defined as less than 120/80 mmHg, pre-hypertension as 120–139/80–89 mmHg, stage I hypertension as 140–159/90–99 mmHg, and stage II hypertension as equal to and above 160/100 mmHg.[7] Fasting and post prandial blood sugar was determined using glucometer. Written informed consent was obtained from all subjects.

STATISTICAL ANALYSIS:

Statistical analysis of data was done using SPSS (trial version). Values are expressed as mean value. Standard deviation was done to obtain accuracy. One way ANOVA was performed to determine the significance and P value less than 0.05 was considered significant.

Results and Discussion

Total participants who attended the free medical camp were divided into 4 groups based on BMI namely, normal, underweight, overweight and obese. Figure 1 shows the prevalence of overweight, obesity, hypertension and diabetes in Kungher(RHTC Area) population. Among 163 participants screened, overweight and obese subjects correspond to 15% and 34% respectively. Occurrence of underweight subjects was 16%. Prevalence of obesity was found to be quite high in this rural community as it is almost in par with the normal population (35%). In the past, the overweight prevalence was traditionally higher in urban areas. However, the opposite trend applies nowadays. This could be because subjects living in rural areas have poorer access to health care and they practice medical self-care less.[8] Increase in body weight may also be due to the change in lifestyle factors which, has also started affecting the rural community like fat-rich diet, increased energy intake and low energy output due to lesser involvement in physical activities.

Based on gender, overweight and obesity were predominant among female (9% and 19%) that in male (6% and 15%). Similar observations have been reported in India by Gothankar.[1]Worldwide, gender differences are more pronounced, with 10% of men and 14% of women obese.[9] Similarly, the prevalence of hypertension and diabetes were 20% and 11 % respectively. Hypertension was more pronounced among male (13%) than in female (7%), which is consistent with the findings of Humayun*et al*.[10] whereas much difference was not observed in diabetic subjects of both gender. However in obese subjects, Bhat*et al*.[11] has reported high prevalence of hypertension in female than in male.

Table 1 gives the mean values of various parameters in different categories of BMI. In case of obese subjects, Systolic BP (136.60 mmHg), Diastolic BP (86.96 mmHg) and post-prandial blood sugar (160.59mg/dl)

were significantly elevated than in that of normal BMI subjects (122.45 mmHg, 78.07 mmHg and 134.26 mg/dl). In case of overweight and underweight subjects, significant variation was observed in all the parameters with the exception of post prandial blood sugar level (141.12 mg/dl) in overweight subjects.

The relationship between BMI and hypertension is of particular interest to developing countries as excess cardiovascular mortality among lean hypertensive subjects has been reported in some longitudinal studies.[12] The association between hypertension and BMI is evident from table 2. In normal and underweight subjects majority of them are in the pre-hypertension stage (65%). In overweight subjects, the % of population in pre-hypertension stage is more (71%) and also 12% in stage I hypertension. Similarly in obese population 16% in stage I and 22% in stage II hypertension respectively. The important point is that only obese patients are in stage II hypertension. This clearly indicates the positive association of hypertension with BMI. This is consistent with the findings of Mungreiphy*et al.,*[4]Humayun*et al.,*[10] and Ahmed *et al.*[13]

Table 3 gives the distribution of IGT (Impaired Glucose Tolerance) and diabetic subjects in different categories of BMI. Prevalence of diabetes in overweight and obese subjects was 25% and 18% respectively, whereas in normal population it is only 3%. Diabetes prevalence was significantly higher in overweight and obese subjects than in normal-weight subjects. Among overweight and obese subjects 42% and 46% are in IGT condition. Gothankar,[1] have also reported a positive association of BMI with diabetes. BMI is an indicator of obesity and would be a possible indicator of the risk of Diabetes Mellitus.[9]

Conclusion

Overweight and obesity has become a major health problem in this rural community. The study also indicates a positive association of BMI with hypertension and diabetes. Significant number of subjects are seen in pre-hypertension and IGT condition which clearly indicates and the need of creating awareness regarding overweight and obesity and related chronic diseases like hypertension and diabetes which would otherwise become emerging problems in the near future.

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Tables and Figures:

Table 1. Mean values of various parameters in different BMI classes

S.No.	BMI classes	Systolic BP mm/Hg	Diastolic BP mm/Hg	Fasting blood sugar mg/dl	Post prandial blood sugar mg/dl
1	Normal weight (n=57)	122.45(10.90)	78.07(5.48)	103.24(17.45)	134.26(24.09)
2	Underweight (n=26)	118.8(9.08)	78.46(6.12)	97.11(14.42)	131.5(14.89)
3	Overweight (n=24)	125.83(10.17)	78.33(6.37)	107.54(12.97)	141.12(21.20)*
4	Obese (n=56)	136.60(16.65)**	86.96(10.43)*	105.92(12.18)	160.59(39.49)*

Values are represented as mean (standard deviation)   ,*Values are significant at 5% level ,**Values are significant at 1% level

Table 2. Distribution of subjects in different categories of BMI and BP

S.No.	BMI classes	Normal BP	Pre-hypertension	Stage I hypertension	Stage II hypertension
1	Normal weight (n=57)	20(35%)	37(65%)	--	--
2	Underweight (n=26)	9(35%)	17(65%)	--	--
3	Overweight (n=24)	4(17%)	17(71%)	3(12%)	--
4	Obese (n=56)	3(5%)	32(57%)	9(16%)	12(22%)

Values are expressed as No. of subjects and their percentage in parenthesis

Table 3. Prevalence of IGT and Diabetes in different categories of BMI

S.No.	BMI classes	Normal blood sugar	IGT	Diabetes
1	Normal weight (n=57)	45 (79%)	10 (18%)	2 (3%)
2	Underweight (n=26)	22 (85%)	4 (15%)	--
3	Overweight (n=24)	8 (33%)	10 (42%)	6 (25%)
4	Obese (n=56)	20 (36%)	26 (46%)	10 (18%)

Values are expressed as No. of subjects and their percentage in parenthesis

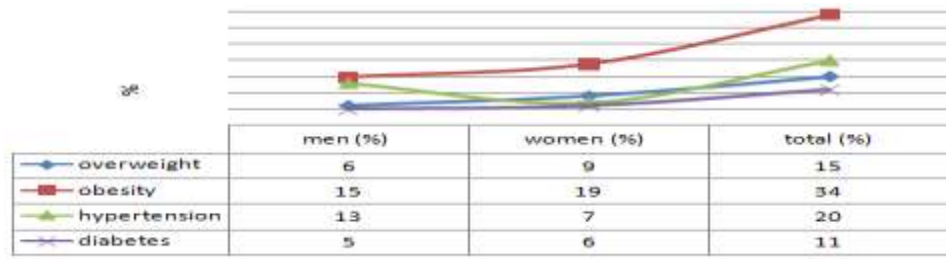|	men (%)	women (%)	total (%)
overweight	6	9	15
obesity	15	19	34
hypertension	13	7	20
diabetes	5	6	11

Fig 1. Gender- wise occurrence of overweight and obesity and its associated disorders in Kungher(RHTC Area) population