

Body mass index and its relation with hypertension, diabetes mellitus and ischemic heart disease in a general health clinic in Nepal

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Background: Obesity is increasing rapidly in both developed and developing countries and the new generations are at increased risk. Similarly, the prevalence of non-communicable diseases are also increasing. In this context, attempt has been made to correlate the situation.

Objective: To find out the Body Mass Index (BMI) in patient suffering from three common non-communicable diseases - hypertension, diabetes mellitus and ischemic heart disease (IHD).

Materials and Methods: A retrospective study was carried out in the clients attending General Health Check up Clinic at Tribhuvan University Teaching Hospital, Kathmandu during a period of six months. Those suffering from Hypertension, Diabetes Mellitus and Ischaemic Heart Disease were included and BMI was analysed.

Results: In this study, a total of 464 records were analyzed. Analysis of BMI revealed 5.8% to be underweight (<18.5), 52.2% to be normal (18.5-25.0), 37.9% to be overweight (25.1-30.0) and 4.1% to be obese (>30.0). Out of 19 obese cases, 73.7% had hypertension, 10.5% had diabetes mellitus and 5.3% had IHD. Similarly, out of 176 overweight cases 46.0% had hypertension, 6.8% had diabetes mellitus and 3.4% had IHD. The cases with normal weight or underweight had significantly lower incidence of these diseases. Out of 242 normal cases, 21.1% had hypertension, 5.4% had diabetes mellitus and 2.9% had IHD. Out of 27 underweight cases, 3.7% had hypertension, 3.7% had diabetes mellitus and none had IHD.

Conclusion: This study showed that overweight and obesity is not uncommon in Nepali population; and is related with the higher incidence of hypertension, diabetes mellitus and IHD.

Introduction

Obesity is increasing rapidly in both developed and developing countries. This reflects declining levels of physical activity and the rising consumption of diets high in sugars and fats. This trend is also obvious among young people. New generation is entering adulthood with unprecedented levels of obesity. Obesity and diabetes are linked as weight gain leads to insulin resistance through several mechanisms.

Body mass index (BMI) have commonly been used as indicator of obesity.¹ In clinical practice, World Health Organization (WHO) recommended cutoffs of BMI have commonly been used as indicators of obesity.² However, Asian populations have a higher body fat percentage for a given body mass index (BMI) than Caucasians. Increased BMI is known to be related to ischemic heart disease (IHD) in populations where many are overweight (BMI $\geq$ 25 kg/

m²) or obese (BMI $\geq$ 30).³ Lower BMI is associated with lower IHD risk among people in the normal range of BMI values (20-25 kg/m²), but below that range the association may well be reversed.³ Obesity is not only a predisposing risk factor for the development of dyslipidemia, hypertension and diabetes mellitus,⁴⁻⁶ it is also a significant predictor for IHD.⁷⁻⁹ Furthermore, studies have confirmed that weight control can be a strong tool for preventing hypertension¹⁰. A study conducted in New Zealand confirmed higher mortality mainly related to diabetes and IHD, with higher BMI¹¹. In developing countries including Nepal, there has been a rapid increase in the prevalence of non-communicable diseases like hypertension, diabetes mellitus and IHD leading to increased mortality related to these diseases.

Objective

To find out the Body Mass Index (BMI) in patient suffering from three common non-communicable diseases -

hypertension, diabetes mellitus and ischemic heart disease (IHD) in patients attending general health check up clinic in Kathmandu.

Materials and Methods

A retrospective observational study was carried out in the clients attending general health check up clinic at Tribhuvan University Teaching Hospital for a period of 6 months. This clinic carries out medical check up of various categories of population like medical fitness for employment, annual check up for people with chronic diseases etc. A total of 464 records were included in the study. Body height in centimeters (cm) was measured by having the subjects stand on their heels, buttock and head against the height measuring tape measure affixed to the iron bar. Body weight was measured in kilograms (kg) with a standard portable scale. Body height and body weight were measured with light clothes and bare feet. BMI was calculated as body weight in kg divided by the square of body height in meters. The cut-off values of hypertension were taken as 140 mmHg for systolic blood pressure and 90 mmHg for diastolic blood pressure regardless of the age; or a documented medical history of hypertension. Blood pressure was recorded in sitting, lying and standing position.

Similarly, Diabetes Mellitus was considered when the fasting blood sugar level was more than 7.4 mmol/l, and was followed by confirmation with post-prandial sample or confirmed by a documented medical history of diabetes mellitus.

Ischemic Heart Disease was diagnosed with electrocardiographic findings or a definite medical history of coronary artery disease.

Results

Out of 464 clients who attended the clinic during the study period, 78.7% were males and 21.3% were females (Table 1). The main bulk (46.6%) of the clients were male from 36-45 years age group.

Table 1. Age and sex distribution

Age Group (Years)	Male	Female	Total
16-25	30	18	48
26-35	51	21	72
36-45	216	25	241
46-55	32	17	49
56-65	16	11	27
>65	20	7	27
TOTAL	365	99	464

Thirty-eight percent were overweight and 4% were obese (Fig. 1).

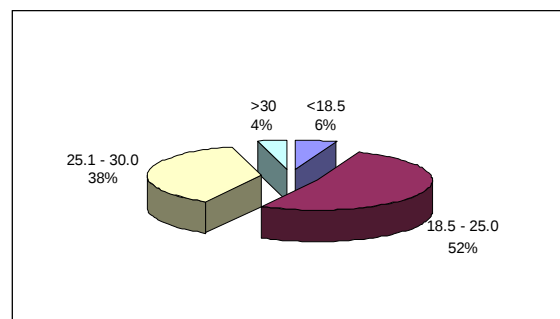


Fig. 1. Distribution of BMI

The overall prevalence of hypertension in this study was 31.5%. With increasing BMI, the prevalence was higher as shown in (Fig. 2).

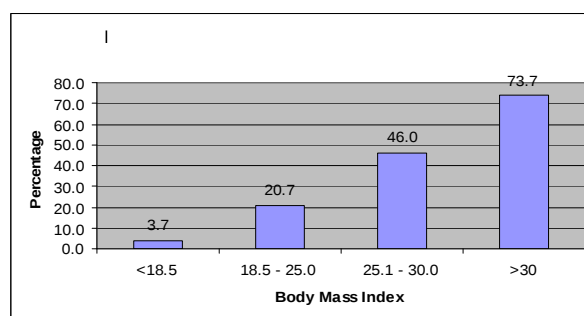


Fig. 2. Body mass index and hypertension

The overall prevalence of diabetes mellitus in this study was 6.0%. In the group with BMI more than 30, the prevalence was 10.5% (Fig. 3).

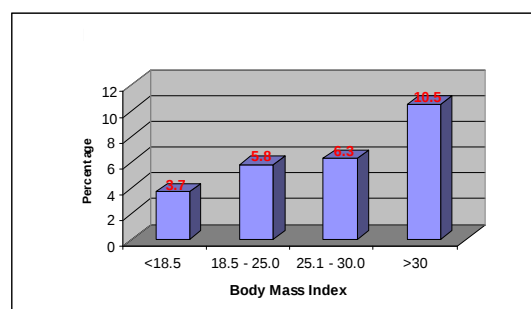


Fig. 3. Body mass index and diabetes mellitus

The prevalence of IHD was not as high as hypertension and diabetes. However, higher prevalence was noted with higher BMI.

Body mass index and its relation with hypertension

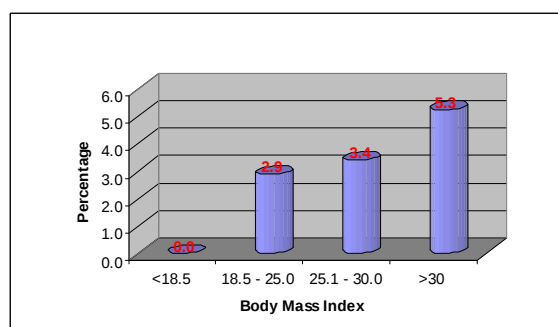


Fig. 4. Body mass index and ischaemic heart disease

The overall percentage of clients with two or more non-communicable diseases (Hypertension, Diabetes Mellitus and IHD) was 4.5% (Fig. 4). With increasing BMI, the risk of suffering from multiple diseases increased. In Obese group, it was as high as 10.5% (Fig. 5).

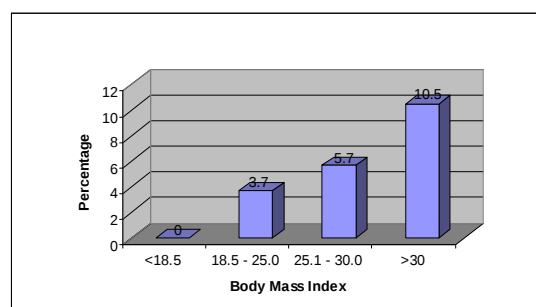


Fig. 5. Body mass index and multiple diseases

Discussion

In this study, analysis of BMI revealed 5.8% to be underweight (<18.5), 52.2% to be normal (18.5-25.0), 37.9% to be overweight (25.1-30.0) and 4.1% to be obese (>30.0). In a study conducted in Nepali population in 1992 by Dr. Karki had revealed 12.5% to be overweight and 2.4% to be obese¹². Thus, the current study indicates the increasing trend of BMI in Nepali population. Studies in community level are required to generate national statistics and monitor the trend in this regard.

BMI and Hypertension: The overall prevalence of hypertension was 31.5%, which is an alarming situation. A house to house survey conducted in urban Kathmandu in early eighties, showed the prevalence rate of hypertension to be 9.9 percent for both sexes. The same study observed a significant positive correlation between prevalence of

hypertension and obesity¹³. Similarly, a house to house survey conducted in rural area of Kathmandu valley in early eighties showed the prevalence rate of hypertension to be 6.0%¹⁴. A paper published in 1999 in the Sherpa ethnicity of Nepal showed 24.8% prevalence in high altitude dwellers and 21.7% in low altitude dwellers. The same study suggested that hypertension to be associated with an elevated BMI¹⁵. In our study, out of 176 overweight cases 81 (46.0%) had hypertension and out of 19 obese cases, 14 (73.7%) had hypertension. Hypertension, or high blood pressure, is the most common cardiovascular disorder affecting 20% of adult population worldwide. It is also an important public health problem of global dimensions, both in the developed and developing world¹⁶. Other studies have also confirmed weight control as a strong tool for preventing hypertension¹⁰.

BMI and Diabetes Mellitus: The overall prevalence of diabetes mellitus in this study was 6.0%. In the group with BMI more than 30, the prevalence was 10.5%. A cross-sectional prospective study of type 2 diabetes patients; revealed that 37% of all patients were obese¹⁷. Out of those obese diabetics, 88% had hypertension as well.

BMI and Ischemic Heart Disease: In this study, the prevalence of IHD increased with higher BMI. In obese clients, it increased to 5.3%. It is comparable with the findings from South Korea and India¹⁸⁻¹⁹. Increased body mass index (BMI) is known to be related to ischemic heart disease (IHD) in populations where many are overweight or obese. Substantial uncertainty remains, however, about the relationship between BMI and IHD in populations with lower BMI levels³. Contrary to the other studies^{3,20}, underweight (lower BMI) was not found to be associated with higher IHD risk in this study. Out of 27 underweight clients, none of them had IHD.

BMI and multiple non-communicable diseases: The overall percentage of clients with two or more non-communicable diseases (Hypertension, Diabetes Mellitus and IHD) was 4.5%. With increasing BMI, the risk of suffering from multiple diseases increased. In obese group, it was as high as 10.5%. Out of 21 cases with multiple diseases, 57.1% had 'diabetes and hypertension'; 23.8% had 'hypertension and IHD' and 19.1% had all three entities - 'diabetes, hypertension and IHD'. None of the cases had 'diabetes and IHD'. In study of type 2 diabetes patients in Sweden; revealed that 37% of all patients were obese. Out of those obese diabetics, 88% had hypertension as well¹⁷. A study conducted at Nepal Medical college showed 63.6% diabetics to have co-morbid hypertension²¹. In a hospital based study conducted in early eighties on diabetic patients, showed higher incidence of hypertension and IHD²².

Conclusion

In Nepal, so far obesity and non-communicable diseases have not been recognized as public health problems. However in Nepali population; overweight and obesity is not uncommon and is related with the higher incidence of hypertension, diabetes mellitus and IHD. For effective control of the increasing trend of overweight and obesity it is of critical importance to establish preventive measures in the community. Patient education is essential to achieve long-term self management of the weight problem. There is a need to have community study at the national level to determine the national BMI statistics and its relation with non-communicable diseases like hypertension, diabetes mellitus and IHD.

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