RELATION OF HYPERTENSION WITH BODY MASS INDEX AND AGE IN MALE AND FEMALE POPULATION OF PESHAWAR, PAKISTAN

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Background: Hypertension, a condition developed as a result of high blood pressure is strongly correlated with body mass index (BMI). Obesity was noted to be a single best predictor of hypertension incidence, and was regarded as a major controllable contributor to hypertension. Overweight and obesity is conveniently determined from BMI. Present study was conducted in Khyber Medical College (KMC) Peshawar to investigate the relation of hypertension with BMI and age. The objective of the present investigation is to establish a relationship between hypertension and BMI in male and female population of Peshawar with consideration of age. **Methods:** This study was conducted at KMC, Peshawar during 2008–2009. A total of 1006 adult male and female volunteers were the subject of present research and were categorised in terms of their ages. BMI was determined from weight and height; the subjects were grouped as normal, overweight and obese. Hypertension was determined from the measure of blood pressure. **Results:** The results show a consistence relation between BMI and hypertension within age groups in both male and females. The figures exhibited a relation of age with BMI and hypertension in both males and females subjects. **Conclusion:** The results showed a higher trend of hypertension with increasing BMI. In young females it was noted that with a shift from normal BMI the incidence of hypertension was very high.

Keywords: Hypertension, BMI, blood pressure

INTRODUCTION

Obesity is defined as excessive accumulation of fat in the body resulting in increase in weight beyond that considered desirable with regard to age, height and bone structure and is a state of excess body weight, which is regarded as a pre-morbid addiction disorder, defined as 20% above a person's standard weight.[1] This fat deposition may be generalised, or may occur preferentially in different adipose tissue compartments.[2] The issue of overweight and obesity has become a serious public health concern throughout the world during the last few decades. The prevalence of overweight and obesity is increasing, and obesity is estimated to be a major leading cause of mortality and morbidity, causing an estimated 2.6 million deaths worldwide and 2.3% of the global burden of disease.[3]

A Pakistani national representative survey showed 25% of the population to be overweight according to the Asian-specific BMI cut-off values and 10.3% are obese. This data confirm a major public health problem in Pakistan.[4] In Iran obesity rates vary from rural to urban populations rising to 30% among women in Tehran. Adult obesity in Japan averages 20%, rising to 30% in men over 30 years old, and in women over 40 years old, representing a 3 to 4 fold increase over the last 40 years.[5]

Hypertension, a condition developed as a result of high blood pressure is strongly correlated with BMI. In a study, BMI of the subjects were measured against blood pressure. The prevalence of obesity-related, however, varies with age, race, and sex of the population studied. Studies have shown that approximately 30% of cases of hypertension may be attributable to obesity in men under the age of 45 years, this figure, however, in some cases may be as high as 60%.[6] It is documented that weight gain in adulthood in itself is an important risk factor for the development of hypertension.[4] Ghosh *et al*[7] demonstrated that in Bengalese Hindu men from West Bengal with average age of 37.5 years, obesity measures in the form of Waist Stature Ratio (WSR) and BMI explained that the grater risk of developing hypertension was associated with increasing BMI.

MATERIAL AND METHODS

The procedure involved in the present investigation was to fill a questionnaire by the subject stating his brief bio-data. The subjects' blood pressure was measured. BMI, which is the most commonly used indicator of obesity in population studies, was determined from height and weight. In recent years, BMI has become the medical standard used to measure over weight and obesity. This is a measure of how appropriate a person's weight is for his/her height.[8]

$$BMI\ (kg/m^2) = \frac{Weight}{Height^2}$$

A desirable BMI according to the WHO recommended cut-offs for Asians is considered to be between 18.5 and 22.9 kg/m^2. A BMI of 23–24.9 kg/m^2 is defined as 'overweight' and ≥25 kg/m^2 as 'obese'.[9]

A total of 1006 volunteers (adults men and women) were included in the study to be categorised as obese, overweight and control. Subjects were

screened through a medical history questionnaire, physical examination, weight measurement, blood pressure and lifestyle. Weight and height measurements were, taken. In the present work the age grouping was made according to those adopted by Brown *et al.*[11] These are classified as: Group I (those with age in the range of 20 years and 39 years), Group II (those with age in the range of 40 years and 59 years) and Group III (those with age of 60 years and above).

Measurements of blood pressure were taken with a mercury sphygmomanometer. The mercury sphygmomanometer is a reliable apparatus. In the present investigations, the mercury sphygmomanometer blood pressure apparatus was used. In order to record the blood pressure, subjects were seated quietly for at least 5 minutes in a chair (rather than on an exam table) with their backs supported and their arms bared and supported at heart level. Two or more readings, separated by 2 minutes were then averaged. In cases, where the first two readings differed by more than 5 mm Hg, an additional reading was obtained and averaged with the previous reading. For hypertension WHO classification was used according to which subjects having a blood pressure of ≥140/90 mmHg is labelled as hypertensive.[10]

RESULTS

The tables obtained from the data below for all subjects having hypertension and compared with the BMI and age categories in both the male females.

Table-1: Gender-hypertension cross tabulation

	hypertension		
Gender	**no**	**yes**	**Total**
male	201	340	541
female	150	315	465
Total	351	655	1006

Table-2: Age-hypertension cross tabulation

	hypertension		
Age group	**no**	**yes**	**Total**
Group I (20–39 years)	120	150	270
Group II (40–59 years)	179	395	574
Group III (≥60 years)	52	110	162
Total	351	655	1006

Table-3: BMI-hypertension cross tabulation

	hypertension		
BMI Classes	no	yes	**Total**
Normal BMI	79	41	120
Overweight	156	216	372
Obese	116	398	514
Total	351	655	1006

From the above tables it is evident that out of 541, males, 340 (63%) were hypertensive and 315 out of 465 (68%) females were hypertensive. In the age Group I, i.e., (20–39 yrs) 56% adults are hypertensive in which most of them are overweight females while in Group II, i.e., (40–59 yrs) 56% subjects and in Group III (≥60 years) the incidence of hypertension is 27%. The relation of BMI normal with hypertension is 34% and overweight is 58% while that of obese is 77% indicating a strong relationship of hypertension with BMI.

DISCUSSION

The results indicate that there was a strong association of hypertension to BMI rather than age. However the increased prevalence of hypertension with advancing age was also evident from the results.[11] The females in the overweight BMI category indicates a significant prevalence of hypertension then their male counterparts in the same BMI category[12], while in the rest BMI categories the high blood pressure is prevalent in males. The 70% incidence of hypertension in young women of age 20–39 years in the overweight BMI class indicates that even a modest weight gain during adulthood could result in the appearance of cardiovascular risk factors and increased mortality.[13] The incidence of hypertension in men was significantly high in obese BMI class in the age group of 40–59 years however the results are consistent with Brown *et al.*[10] These results may be closely related to diet and socio-economic conditions encountered, especially at this age group. The diet factor was mainly attributed to the involvement in social activities such as wedding parties, where the diet is mostly rich in calories and high in fat. Other factors include overwork, lack of physical activities and low energy expenditure. Moreover, responsibilities tend to increase in middle ages, thereby producing stress, which may lead to anxiety and depression. There was a significantly high percentage of hypertension in female subjects in the age group of 20–39 years in the overweight category of BMI. This seems to be somewhat consistent with that documented by.[14]

However, our results of female subjects in this age group were not consistence with the findings of Brown *et al.*[10] There are several causes attributable to this high percentage of cases of hypertension in females in this age group, the confounding factor being the poverty. One typical cause was the distorted body image, which has a great repercussion on various factors, such as; career planning and lack of proposals for marriage. Besides this age group (20–39 years) is considered childbearing age and child growing age. These and others factors may lead to the development of psychological problems including stress. Therefore the possibility of having majority of hypertensive cases in females lie in this age group and BMI category. The results indicate high prevalence of obesity in females. Being overweight is associated with a higher risk of disease, particularly if body fat is concentrated around the abdomen.

CONCLUSION

Hypertension is directly related with BMI, it shows that with the increase in the BMI the trend of hypertension rises in both females and males. Hypertension is strongly related with age and gender. In males the prevalence of hypertension in general is high in all age groups; however there is a significant rise in the number of hypertensive females in the age group below 30 years in the overweight category and a slight rise in hypertensive trend in females above the age of 59 years in both overweight and obese categories as compare to males. In the normal BMI category, relatively large percentage of males shows sign of hypertension, whereas in the overweight category, hypertension among females is high. The current study did not include weight history and the effect of weight change on hypertension. Therefore, we cannot conclude from our data how the optimal weight should be achieved. Hypertension is more common in overweight and obese class in both males and females. In future effect of diet, socio-economic and psychological status is addressed to find the cause of age, gender, BMI and hypertension.

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