ASSOCIATION OF HIGH BLOOD PRESSURE AND OBESITY AMONG ADULT FEMALES OF DELHI

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Abstract: Obesity or increased adiposity, especially related with abdominal region, has been found to be associated with a number of non-communicable disorders. Hypertension is one of such situations predisposed by increased weight gain. Undoubtedly, in urban settings such kinds of health problems are increasing rapidly. Therefore, the present study attempts to evaluate the prevalence of high blood pressure among the females of Delhi belonging to age group from 19-50 years. The sample consisted of 113 adult females. Demographic data was collected using a standardized proforma and anthropometric data was recorded using standardized techniques. Blood pressure conditions were defined using the NCEP ATP III guidelines and obesity was categorized based on BMI and WHR recommended over an international standard. Strong correlation has been found between blood pressure and body mass index, waist circumference and waist hip ratio at the 0.01 and 0.05 levels. This study reinforces the prevalence of high blood pressure among the adult females of Delhi.

Keywords: Urban setting, high blood pressure, obesity, non-communicable disorder

Introduction: Majorly, in all societies, hypertension and obesity have always continued to be major public health problems (1). However, several studies have fostered the fact for association of body weight with blood pressure thereby obesity acting as an independent risk factor for the onset of hypertension (1, 2, 3). Not only this, they both form independent risk factors for cardiovascular diseases (4, 5). Obesity or increased adiposity, especially related with abdominal region, has been found to be associated with a number of non-communicable disorders. One of the basic and convenient methods of assessing obesity is Body Mass Index (6). But it fails to take into consideration the amount of fat deposited in the abdominal or regional site (7). However, waist circumference and Waist Hip Ratio provide measure of abdominal adiposity with great ease and reliability (8, 9), as they correlate more closely with abdominal adipose tissue and are good predictor for cardio metabolic risk.

Undoubtedly, in urban settings such kinds of health problems are increasing rapidly. Therefore, the present study attempts to evaluate the prevalence of high blood pressure and its immediate correlates among the adult females of Delhi.

Materials and Methods: Sample consisted of 113 adult females belonging to age group from 19-50 years. Initially, ethical clearance was taken from the ethical committee of the institution for carrying out the study. Informed written consent was received from all the subjects who volunteered for the study. Demographic data was collected using a standardized proforma. Anthropometric measurements were taken according to standard techniques and keeping in mind the standards recommended by WHO.

Waist circumference was measured at the midpoint between the lower margin of the least palpable rib and the top of the iliac crest, using a stretch-resistant tape. Hip circumference was measured around the widest portion of the buttocks, with the tape parallel to the floor. For both measurements, the subject was asked to stand with feet close together, arms raised by the sides and body weight evenly distributed, with least clothing. Weight was measured using simple weighing machine, while stature was noted using anthropometer with its crossbar raised up to the height of the subject touching the vertex, in mid sagital plane. Body Mass Index and Waist Hip ratio were further calculated using the previously recorded measurements. Blood pressure- systolic and diastolic was taken using mercury sphygmomanometer and stethoscope in normal sitting position following standardized technique (Shaver, 1988).

Blood pressure conditions were defined using the NCEP ATP III (National Cholesterol Education Program Adult Treatment Panel III) guidelines, while obesity related conditions were based on BMI, WHR and waist circumference recommended over an international basis. Statistical analysis was done using SPSS 20.0.

Results: Of 113 females, majority of them belonged to either overweight (36.3%) or obese (38.1%) category, while 18.6% belonged to normal BMI category (Table1). On assessing for waist circumference, 64.6% of the females lied in the risk category. However for WHR, about 43% females were found in the normal category (Table2). On the other hand, relatively few females have been found to be hypertensive in terms of systolic and diastolic blood pressure (Table3).

Table1 Frequency, mean and S.D. of different BMI categories

BMI Categories	N (%)	Minimum range	Maximum range	Mean ± S.D.
Underweight	8 (7)	16.2	18.4	16.8 ± 0.79
Normal Weight	21 (18.6)	19.7	24.9	22.1 ± 1.60
Overweight	41 (36.3)	25	29.9	27.3 ± 1.57
Obese	43 (38.1)	30	40.7	34.2 ± 3.02

Table2 Frequency for normal and risk categories of waist circumference and waist hip ratio

Categories	WC N (%)	WHR N (%)
Normal	40 (35.4)	49 (43.4)
Risk	73 (64.6)	64 (56.6)

Table3 Frequency for different categories of blood pressure (systolic and diastolic)

Categories	SBP N (%)	DBP N (%)
Normotensive	19 (16.8)	6 (5.3)
Prehypertensive	82 (72.6)	76 (67.2)
Hypertensive	12 (10.6)	31 (27.4)

Adiposity markers (waist circumference, BMI, WHR) showed significant positive association (at the 0.01 and 0.05 level) with blood pressure (both systolic and diastolic) among the adult females of Delhi. On the other hand, negative correlation existed between systolic blood pressure and height. Weight and hip circumference have also shown significant but positive correlation with blood pressure at the 0.01 level. With demographic markers (age, education, occupation and dietary habits), age has been found to be positively associated with blood pressure (at the 0.001 level). Education has shown negative correlation with systolic blood pressure, while dietary habits negatively correlated with diastolic blood pressure, and occupation was found to be correlated with blood pressure, positively and non-significantly (Table4).

Table4 Correlation of blood pressure with different markers

Variables	Correlation Coefficient		P value	
	SBP	DBP	SBP	DBP
Adiposity markers				
Waist Circumference	0.225**	0.377**	0.008**	0.000***
BMI	0.341**	0.405**	0.007**	0.001**
WHR	0.284**	0.231*	0.006**	0.048**
Anthropometric markers				
Stature	-0.081	0.019	0.439	0.924
Weight	0.340**	0.419**	0.029	0.075
Hip Circumference	0.270**	0.365**	0.573	0.274
Demographic markers				
Age	0.293**	0.256**	0.002**	0.678
Education	-0.075	0.013	0.007**	0.024**
Occupation	0.005	0.034	0.062	0.270
Dietary Habits	0.047	-0.025	0.517	0.749

Discussion: Delhi occupying a central place in Indian geography, while southern position in the Asian context, has been found to have the frequency of 10.6% and 27.4% for systolic and diastolic blood pressure, respectively. However, this prevalence rate of hypertension among the females of Delhi is not something to be focused upon in a very critical way but at the same time must not also be taken in a very casual way. Several studies conducted in India have reported huge prevalence rates of hypertensive

category (11, 12, 13). However, the present study has reported lower frequency. This is not in accordance with a study, whereby, it has been reported that south Asians have a high prevalence of hypertension, for which similar results are also reported in the urban Indian settings (14).

Various studies have confirmed a close relationship of body weight and BMI with systolic and diastolic blood pressure (15, 16). Many research works have confirmed the fact that the risk of developing hypertension increases with increase in body weight (17, 18), that plays a crucial role in the adult life (19). There are also studies that showed a significant correlation between blood pressure and WHR (20, 21). In accordance with the present study, waist circumference has been found to be strongly associated with blood pressure in many works (22, 23).

Present study revealed a significant correlation between age and blood pressure, which is contrary to what has been shown in the INTERSALT study, whereby it has been proven that age is independent of hypertension risk. However, the Framingham study has shown that out of 23 potential contributors for mortality, only education and age at the time of study, among both genders, related to "survival with good function" (24). Moreover, socioeconomic status, consisting of their education, occupation and income, plays a significant role in a person's morbidity and mortality experiences (25, 26, 27, 28, 29). Numerous studies have established the fact that lower levels of education are associated with hypertension (30, 31, 32). Lastly, Vegetarian diet tends to have an effect in terms of lower blood pressure among the consumers than non-vegetarian diet (33).

Conclusion: The present study clearly indicates that fat deposition, majorly in the central or abdominal region and increased weight gain has played an important role in genesis of hypertension among the adult females of Delhi.

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