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## Hypertension in Relation to Obesity, Smoking, Stress, Family history, Age and Marital Status among Human Population of Multan, Pakistan

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The present study was carried out to assess hypertension in relation to obesity, smoking stress, family history, age and marital status among human population of Multan, Pakistan. The present data was collected randomly from the male population aging from 16 to 85 years. The male population was divided into three age groups i.e old male (age above 50 years), mature male (age 31 to 50 years) and young male (age 16 to 30 years). The study revealed that there was a strong relationship between hypertension and obesity in all age groups. Hypertensive patients had association with age, smoking, stress, family history and marital status. When comparison was made between mild, moderate and severe hypertensive patients, it was found that old married males were suffering from severe hypertension. Family history of hypertension and myocardial infarction also had a strong association with hypertension. The prevalence of hypertension was found to be maximum (17.08%) in males of age group >50 as compared to mature males (14.16%) and young males (13.48%) in observed sample population. The results from the observed population suggested that prevalence of obesity was (11.49%). The obesity was maximum (12.19%) in males of age group >50 as compared to mature males (11.51%) and young males (10.64%). In the normotensive individuals the prevalence of obesity was (8.74%) as compared to (26.99%) in hypertensive individuals.

**Key words:** Hypertension, obesity, smoking, marital status, population

## INTRODUCTION

Cardiovascular disease is responsible for a large and increasing proportion of death and disability worldwide. Half of this burden occurs in Asia. It has been estimated that blood pressure intervention (diastolic blood pressure alone) would be expected to avert about one million deaths per year throughout Asia in 2020. About half a million deaths might be averted annually by this intervention in China alone<sup>[1]</sup>. According to the investigations of Gerber and Stern<sup>[2]</sup> body weight and fatness have received greater attention in this regard than frame size or body height. Increased weight has been associated with increased risk of hypertension and cardiovascular disease<sup>[3]</sup>. An elevated blood pressure is a very important public health problem with prevalence of 15% in different parts of world population<sup>[4]</sup>. Different factors, which influence the blood pressure, are body weight, fatness, kidney function, diets, salt balance, physical activity, social and environmental stress<sup>[5]</sup>. With increasing awareness of the fact that hypertension is the main risk factor for the cardiovascular diseases, the major attempts have been made to identify and treat hypertensives. Since the early 1960s and 1970s the wide spread control of hypertension is probably responsible for the decrease in the deaths from strokes and heart attacks<sup>[6]</sup>. Hypertension is of several types<sup>[7]</sup>. It can be volume-loaded hypertension, neurological hypertension, one kidney Gold Blatt hypertension or it can be due to primary aldosteronism and pregnancy toxemia. The Systemic hypertension is usually asymptomatic, readily detectable, usually easily treatable and leading to lethal complications such as coronary artery disease, stroke, renal failure and congestive cardiac failure, if untreated<sup>[8]</sup>. Stamler *et al.*<sup>[9]</sup> and Castelli<sup>[10]</sup> in separate studies found the prevalence of hypertension in hyperglyceridaemic and hypercholesteroleamic subjects. It is very essential to label and treat in appropriately individuals who are not persistently hypertensives and the marked variability in the blood pressure makes it necessary to be very careful for the diagnosis of hypertension including measurement of blood pressure on several occasions. In most clinical trials more than one third of the people found to have blood pressure 95 mm Hg (diastolic) at the initial screening examinations but on repeated examinations they had values below 90 mm Hg. Certainly all who are found to have slightly high blood pressure should be informed and advised to make changes in life style that may reduce the chances of developing permanent hypertension, weight reduction in obese, regular exercise, relaxation and moderate sodium restriction<sup>[11,12]</sup> and there is an even greater need to identify those who are hypertensives and

advise them toward a healthy life style and medications if required<sup>[13]</sup>. Ahrens<sup>[14]</sup> reported 50% of all deaths each year in developed countries are due to this condition. Also, excessive body weight for given height, age and sex has been associated with an increased risk of cardiac and cerebrovascular disease<sup>[11]</sup>. In Pakistan, circulatory diseases cause over 12% of all deaths annually<sup>[5]</sup> and there are 5.5 million men and 5.3 million women who have hypertension. Ahrens<sup>[14]</sup> reported that hypertension occurs ten times more in persons having 20% or more above their ideal body weight. It has been found that blood pressure is related directly to fat deposits. Hypertension was regarded as affecting exclusively industrialized nations like N. America, Japan and Australia but this is no longer true. As developing countries modernize, they are able to control communicable disease and hence life expectancy of their populations increases. This is partly because of their adoption of life styles similar to those in industrialized countries and the accompanying risk factors like high blood pressure, smoking, high blood cholesterol levels, unhealthy diet, physical inactivity and obesity<sup>[5]</sup>. It has been shown that excess body weight is an important cause of hypertension in Pakistan. Achieving a desirable body weight is one of the non-pharmacological therapies, which helps to control hypertension. Weight loss in some individuals will result in lowering of blood pressure<sup>[5]</sup>. The present study was carried out to assess hypertension in relation to obesity, smoking, stress, family history and marital status among human population of Multan, Pakistan. Present research work also merits importance as the control of hyperlipidaemia and hypertension with control of smoking has produced drastic reduction in coronary heart disease in America and Scandinavia<sup>[15]</sup>. So the results of present study may influence the attitude of physician as well as society towards control of these factors.

## MATERIALS AND METHODS

The study period was from June 2002 to December 2002. The study was based on the data collected from 418 male individuals who were non-diabetic and taking no antihypertensive medications. Many of them were unaware even they had hypertension. Efforts were made to include samples of only those individuals who were apparently normal, without any diagnosis of hypertension and untreated or freshly diagnosed. Patients suffering from secondary hypertension, myocardial infarction, congestive cardiac failure, renal failure, diabetes mellitus, hypothyroidism, nephrotic syndrome and biliary obstruction were excluded from the study. The male population aging from 16 years to 85 years were divided

into three age groups i.e old male (above 50 years), mature male (31 to 50 years) and young male (16 to 30 years). Body mass index was noted by using the formula.

$$\text{Wt. Kg} / \text{Ht. m}^2 = \text{BMI}$$

The obesity was calculated as per criteria laid down by Bray<sup>[16]</sup>. For males, BMI of <20 corresponded to thin, 20-24 to average, 25-29 to over weight and 30 to obese. Height of all the subjects was measured on Holtain portable stadiometer . Weight was recorded in kilogram (Kg) to the nearest half kilogram on beam scale. From hypertensive, the presenting complaints and the history of the subjects with a special emphasis on personal past history, family history, lifestyle, family and job stresses, fears and shocks were also recorded. Blood pressure was measured with standard mercury sphygmomanometer. The measurement of blood pressure was carried out when patient was comfortable in a quiet room with arm's muscles relaxed and fore arm supported and positioned at heart level. They had not smoked or ingested caffeine within 30 min. prior to measurement. Blood pressure of newly diagnosed patient was taken at 3 or more occasions in a month's time before they were registered as hypertensive. The patients with hypertension were marked mild, moderate and severe in other three different groups with different age according to the following:

Diastolic blood pressure 95-104 mm Hg=Mild Hypertension.

Diastolic blood pressure 105-114 mm Hg=Moderate Hypertension

Diastolic blood pressure more then 115 mm Hg=Severe hypertension.

Patients with intake of oral contraceptives, renal hypertension, presence of protein urea, urinary tract infections, tuberculosis, renal colic haematuria, polyurea, dysurea, were excluded. The patients of Diabetes, Jaundice, Liver and gallbladder enlargement was also excluded. Urea and creatinine levels were assessed. Their marital status was also noted and was classified as married and unmarried

## RESULTS

The results from the present study suggested that among the observed male population of Multan (n=418), prevalence of hypertension was 15.07% (Table 1). The prevalence of hypertension when studied in different age groups, it was found that there was highly significant effect of age on hypertension. The prevalence

Table 1: Percentage of prevalence of hypertension in males of different age groups

Type	Age	Sex	N	Normotensive	Hypertensive
Old	>50	M	164	136.00	28 (17.08%)
Mature	31-50	M	113	97.00	16(14.16%)
Young	16-30	M	141	122.00	19(13.48%)
Total			418	355.00	63.00
% age				84.93	15.07

Table 2: Percentage of prevalence of obesity in males of different age groups.

Type	Age	Sex	N	Non obese	Obese
Old	>50	M	164	144.00	20(12.19%)
Mature	31-50	M	113	100.00	13(11.51%)
Young	16-30	M	141	126.00	15(10.64%)
Total			418	370.00	48.00
% age				88.51	11.49

of hypertension was maximum (17.08%) in males of age group >50 as compared to mature males (14.16%) and young males (13.48%) (Table1). The results suggested that among the observed population, prevalence of obesity was 11.49% (Table 2). The obesity was maximum (12.19%) in males of age group >50 as compared to mature males (11.51%) and young males (10.64%) (Table 2). In the normotensive patients, the prevalence of obesity was 8.74% as compared to hypertensive individuals where it was (26.99%) (Table 3 and 4). When a comparison was made between mild, moderate and severe hypertensive individuals, it was found that obesity was maximum (19.05%) in severe hypertensive patients as compared to (7.94%) in moderate hypertensive individuals (Table 5). Among the hypertensive individuals it was found that 46.04% were smokers as compared to normotensive individuals where smoking was only in 16.90% individuals (Table 3 and 4). In severe hypertensive individuals smoking was maximum (33.34%) as compared to individuals with moderate hypertension (12.70%) and mild hypertension where it was (1.59%) (Table 5). From personal past history, it was observed that (34.9%) hypertensive individuals were with some socio-economic stress or with some personal psychological problems. In normotensive individuals, it was found that occurrence of stress is (5.92%) (Table 3 and 4). In severe hypertensive individuals stress was maximum (23.81%) as compared to individuals with moderate hypertension (9.53%) and mild hypertension (1.59%) (Table 5). It was revealed from present study that (55.5%) hypertensive individuals had family history of hypertension. In normotensive individuals it was found that (9.3%) individuals were with family history of hypertension (Table 3 and 4). In severe hypertensive individuals, family history was maximum (47.62%) as compared to individuals with moderate hypertension (7.94%) (Table 5). It was observed that (81.1%) hypertensive individuals were married as compared to normotensive individuals (64.79%).

Table 3: Percentage of obesity, smoking, stress, family history and marital status among normotensive individuals

Type	Age	Normotensive	Obese	Non Obese	Smoking	No Smoking	Stress	Normal	Family History	No History	Single	Married
Old	> 50	136	11.00	125.00	31.00	105.00	11.00	125.00	14.00	122.00	2.00	134.00
Mature	31-50	97	8.00	89.00	11.00	86.00	6.00	91.00	10.00	87.00	74.00	23.00
Young	16-30	122	12.00	110.00	18.00	104.00	4.00	118.00	9.00	113.00	49.00	73.00
Total		355	31.00	324.00	60.00	295.00	21.00	334.00	33.00	322.00	125.00	230.00
% age			8.74	91.26	16.90	83.10	5.92	94.08	9.30	90.70	35.21	64.79

Table 4: Percentage of obesity, smoking, stress, family history and marital status among hypertensive individuals

Type	Age	Hyper Tensive	Obese	Non Obese	Smoking	No Smoking	Stress	Normal	Family History	No History	Single	Married
Old	>50	28	9.00	19.00	17.00	11.00	12.00	16.00	15.00	13.00	1.00	27.00
Mature	31-50	16	5.00	11.00	4.00	12.00	6.00	10.00	11.00	5.00	0.00	16.00
Young	16-30	19	3.00	16.00	8.00	11.00	4.00	15.00	9.00	10.00	11.00	8.00
Total		63	17.00	46.00	29.00	34.00	22.00	41.00	35.00	28.00	12.00	51.00
% age			26.99	73.01	46.04	53.96	34.92	65.08	55.56	44.44	19.05	80.95

Table 5: Presentation of obesity, smoking, stress, family history and marital status among hypertensive individuals according to severity of hypertension

Hypertensive	No.	Obese	Non Obese	Smoking	No Smoking	Stress	Normal	Family History	No History	Married	Singal
Mild hypertension	3	0	3	1 (1.59%)	2	1 (1.59%)	2	0	3	3(4.77%)	0
Moderate hypertension	21	5 (7.94%)	16	8 (12.70%)	13	6 (9.53%)	15	5 (7.94%)	16	16 (25.40)	5
Severe hypertension	39	12 (19.05%)	27	21 (33.34%)	18	15 (23.81%)	24	30 (47.62%)	9	32 (50.80%)	7
Total	63	17	46	29	34	22	41	35	28	51	12

**DISCUSSION**

The present study comprised of a random sample of male population, which has been selected on strict criteria based on healthy, non-obese, obese, normotensive and hypertensive individuals. The results from the present study suggested that there was highly significant effect of age on hypertension. The prevalence of hypertension was maximum (17.08%) in males of age group >50 as compared to mature males (14.16%) and young males (13.48%). When comparison was made between mild, moderate and severe hypertensive patients, it was found that old males (age group >50) were maximum with severe hypertension. It means that age has an effect on severity of hypertension. The findings of this study are similar to that of Assmann *et al.*<sup>[17]</sup> with a difference that it was designed to identify risk factors for coronary artery disease among a population without strict criteria of excluding obesity, diabetes, complications and without selecting the specific age range of subjects. Secondly, there may be some environmental, racial and dietary factors, which are underlying these differences. The level of physical activity is related with fatness and blood pressure<sup>[18]</sup>. The study conducted on families by Williams *et al.*<sup>[19]</sup> found a strong correlation of dyslipidaemia and hypertension. Among 131 hypertensive subjects in 58 siblings similar abnormalities in fasting serum lipid concentrations were observed in two or more siblings in 48% of sib ships. More than one lipid levels were abnormal in almost all concordant sib ships, suggesting an association between hypertension and a syndrome of mixed lipid abnormalities probably Familial Combined

Dyslipidaemia. The lipid abnormalities were higher cholesterol, higher triglycerides, higher L.D.L. cholesterol and lower H.D.L. Although present study has not been conducted in this pattern, but in about 16.27% of subjects gave a family history of hypertension. For, men and women, hypertension increases with age, ranging from a low of 3% for urban females aged 15-24 years to a high of 58% for urban females aged 65 years and over. Prevalence of hypertension for females is lower than for males at younger ages and then crosses over, exceeding that of males for ages 35-44 years. This has been observed in US population<sup>[20]</sup>. Over all, urban Pakistanis have a higher prevalence of hypertension than rural dwellers. Hypertension at most age groups for men and women in urban areas appears to being at earlier ages<sup>[5]</sup>. A decrease in diastolic blood pressure combined with an increase in systolic blood pressure is associated with a higher cardiovascular mortality in men. A strong positive relationship between cardiovascular disease and the blood pressure has been reported by several groups<sup>[15,21]</sup>. At national level, in a study conducted by Haider<sup>[22]</sup> hyperlipidaemia was found in 48% of patients with hypertension. The type IV lipoprotein abnormalities was found in 32% of hypertensive subjects as compared to 39% of hypertensive subjects in the present study with the same abnormality. Type IIB abnormality was found in 10% of hypertensive subjects, the results of which are very similar to the present study. However, type IIA abnormality was found in 6% of the hypertensive subjects as compared to 1% of hypertensive subjects in the present study. The criterion of selection was nearly similar. However, in the present study the

criterion of age is in a different pattern in which children have been completely excluded and study is based only on males. The increased association of cholesterol and blood pressure has also been observed in high-risk population such as Eastern Thailand than in low risk population such as in South California<sup>[23]</sup>. A higher trend towards LDL cholesterol has been observed in case of hypertensive group in the above study. Another research work by Ekelund *et al.*<sup>[24]</sup> observed the lowering of LDL cholesterol levels with lowered incidence of hypertension. Still another research has shown that LDL cholesterol level may blunt endothelium dependent vasorelaxation<sup>[25]</sup>. The understanding of metabolism of lipoprotein by artery wall has yielded new insights into the factors that may be involved in arterial response<sup>[26]</sup>. The study was primarily conducted for the collection of basic health data about, BMI, shock, smoking, age, marital status and family history of myocardial infarction and in relation to hypertension for the detection of risk factors for coronary artery disease in healthy persons. Obesity can be of different types<sup>[7]</sup>. Life long obesity begins in childhood and characterized by an increase both in number and in size of adipose cells. Adult onset obesity begins at the time of maturity and characterized by increase in size of adipose cells with no increase in number. Exogenous obesity is due to over eating and endogenous obesity is due to metabolic or endocrine abnormalities. Association of lipid and insulin abnormalities with hypertension have been detected by many other studies<sup>[27,28]</sup>. Njolstad *et al.*<sup>[29]</sup> conducted a study to examine the association between smoking, serum lipids, blood pressure and myocardial infarction on 11843 men and women aged 35-52 years. During twelve years 495 cases of first myocardial infarction among men and 103 cases among women were identified. Myocardial infarction incidence was 4.6 times higher among men. The incidence was increased six fold in women and three fold in men who smoked at least twenty cigarettes per day as compared with never smokers. The extensive literature review indicates that such type of studies, which were focused to show relationship of these parameters with that of hypertension are rare in Pakistan. Researchers in Pakistan are stimulated to begin to identify strategies for hypertension screening, medication compliance and adherence to lifestyle change recommendations. Therefore results of this study might gave a wake up call to influence the attitude of physicians as well as the society towards control and prevention of these multitude factors

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