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A COMPARATIVE STUDY OF SYSTOLIC AND DIASTOLIC BLOOD PRESSURE OF HEALTHY INDIVIDUALS WITH DIFFERENT RANGES OF BMI

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Abstract:
Objectives: *Obesity, and central obesity in particular, is associated with hypertension. The purpose of this study was to compare systolic and diastolic blood pressure (B.P.) in healthy, overweight and obese controls.*
Study design: *An analytical cross-section.*
Place and Duration: *In the Medicine Unit-II of Jinnah Hospital Lahore for one-year duration from April 2019 to April 2020.*
Material and methods: *81 (81) healthy people, both men and women (aged 18-60), were selected from the general population. Blood pressure was measured with a mercury sphygmomanometer. Body mass index (BMI) was calculated as weight (kilogram) divided by the square of your height (square meters). We divided the participants into a control group, overweight and obese according to their BMI. In the next step, we divided the subjects into categories according to gender and BMI. Group I comprised fifty-four (54) men, including 18 controls, 18 overweight and 18 obese. Group II comprised twenty-seven (27) women, including 09 controls, 09 overweight and 09 obese.*
Results: *Results of the present study reveal a significantly higher systolic as well as diastolic B.P in overweight and obese subjects as compared to controls except in male controls and male overweight subjects where the difference in systolic B.P was found to be statistically insignificant.*
Conclusion: *We can conclude that the increase in body weight seems to be related to the increase in systolic and diastolic B.P.*
Key words: *body mass index (BMI), central obesity, diastolic blood pressure, hypertension, obesity, obesity, overweight, systolic blood pressure*

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INTRODUCTION:

Being overweight is the sixth most important risk factor contributing to the overall burden of disease worldwide. More than a billion adults and 10% of children are currently classified as overweight or obese. In the US population, 30% of adults are obese and another 35% are overweight, as defined by the body mass index (BMI), calculated as weight (kilograms) / height (meters). The growing prevalence of obesity is increasingly accepted as one of the most important risk factors for the development of hypertension. Obesity, especially central obesity, is associated with hypertension. It has been reported that at least two-thirds of the occurrence of hypertension can be directly attributed to obesity

MATERIALS AND METHODS:

The study was conducted at the Medicine Unit-II of Jinnah Hospital Lahore for one-year duration from April 2019 to April 2020. Eighty-one (81) healthy individuals, both male and female (aged 18-60 years), were selected from the general population. Known hypertension has been ruled out. In addition, we excluded patients with kidney disease, diabetes and other systemic diseases. We also excluded pregnant women. Informed consent was obtained from all subjects and the relevant history was recorded in the proformas. Height was measured in centimeters (cm) on a standard height scale and weight in kilograms on a Camry scale. Body mass index was calculated as weight (kilogram) divided by the square of height (square meters). Subjects with a BMI of 20-24.9 kg / m2 were considered a control group, while subjects with a BMI of 25-29.9 kg / m2 and> 30 kg / m2 were classified as overweight and obese. Blood pressure was measured with a mercury sphygmomanometer after the participant rested for at least 05 minutes in a sitting position. While it is recommended that a diagnosis of hypertension be made only after an elevation was recorded on three readings on different occasions over a period of several months, the purpose of this study was to compare the BP of people with different BMI ranges and not to be diagnosed with hypertension, so we relied on one reading. Initially, the entire study population was divided according to the BMI index into a control group, overweight and obese. In the next step, we divided the subjects into categories according to gender and BMI. Group I included fifty-four (54) men. This group included 18 controls, 18 overweight and 18 obese. Group II included twenty-seven (27) women. This group included 09 controls, 09 overweight and 09 obese (Table 1).

Table 1: Distribution of Control, Over Weight and Obese subjects among Group I (Males) and Group II (Females)

	Control	Over weight	Obese	Total
Group I (Male)	18	18	18	54
Group II (Female)	09	09	09	27
	27	27	27	81

Statistical analysis: Data was entered and analyzed using SPSS 15.0. Means, standard deviation (SD), and standard error of the mean (SEM) were calculated for the systolic and diastolic BP of overweight and obese controls, controls, overweight and obese men, control women, overweight women and obese women. Student's t-test for pairs was used to compare the group means. A p value of less than 0.05 (5%) was considered significant.

RESULTS:

Means, SD and SEM for systolic and diastolic BP for the entire study population (Group I + Group II) are given in Table 2.

Table 2:

Total study population (Group I + Group II)	Mean	SD	SEM
Control Systolic	117.59	9.74	1.87
Control Diastolic	76.67	5.71	1.10
Over weight Systolic	124.07	9.71	1.86
Over weight Diastolic	84.81	8.93	1.71
Obese Systolic	132.59	11.63	2.23
Obese Diastolic	90.00	7.46	1.43

Means, SD and SEM for systolic and diastolic BP for people in Group I are given in Table 3.

Table 3:

Group I	Mean	SD	SEM
Control Systolic	121.11	9.00	2.12
Control Diastolic	78.06	4.58	1.08
Over weight Systolic	125.00	9.85	2.32
Over weight Diastolic	85.00	9.85	2.32
Obese Systolic	134.44	10.41	2.45
Obese Diastolic	91.11	6.76	1.59

Mean, SD a SEM for systolic and diastolic blood pressure for patients from group II is given in Table 4.

Table 4:

Group II	Mean	SD	SEM
Control Systolic	110.56	7.26	2.42
Control Diastolic	73.89	6.97	2.32
Over weight Systolic	122.22	9.71	3.23
Over weight Diastolic	84.44	7.26	2.42
Obese Systolic	128.89	13.64	4.54
Obese Diastolic	87.78	8.70	2.90

In the whole study population (groups I and II) we compared the systolic and diastolic blood pressure in overweight and obese subjects. There was a significant difference between the mean BP systolic control group and overweight (117.59 ± 9.74 vs. 124.07 ± 9.71, p <0.05). Similarly, there was a significant difference between the mean BP diastolic control group and overweight (76.67 ± 5.71 vs 84.81 ± 8.93, p <0.05). There was a significant difference between the mean BP systolic control group and obesity (117.59 ± 9.74 vs. 132.59 ± 11.63, p <0.05). Similarly, a significant difference was found between the mean BP diastolic control group and obesity (76.67 ± 5.71 vs. 90.00 ± 7.46, p <0.05) (Fig. 1).

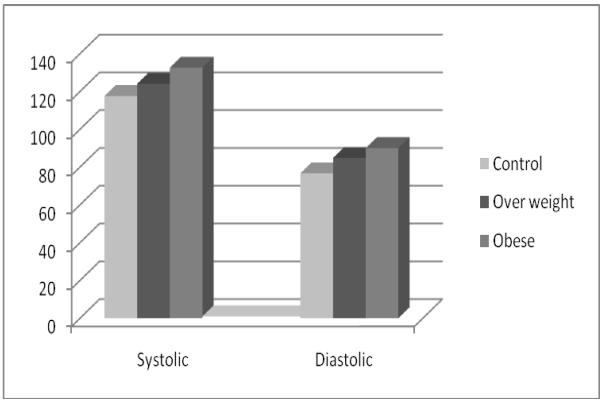

Fig. 1: Comparison of Mean Systolic and Diastolic B.P of control, overweight and obese in total study population

To account for gender differences, we also made group comparisons. In group I, there was no significant difference between the mean BP systolic control group and overweight (121.11 ± 9.00 vs. 125.00 ± 9.85, p> 0.05). However, there was a significant difference between the mean BP diastolic control group and overweight (78.06 ± 4.58 vs. 85.00 ± 9.85, p <0.05). There was a significant difference between the mean BP systolic control group and obesity (121.11 ± 9.00 vs. 134.44 ± 10.41, p <0.05). Similarly, a significant difference was found between the mean BP diastolic control group and obesity (78.06 ± 4.58 vs 91.11 ± 6.76, p <0.05) (Fig. 2)

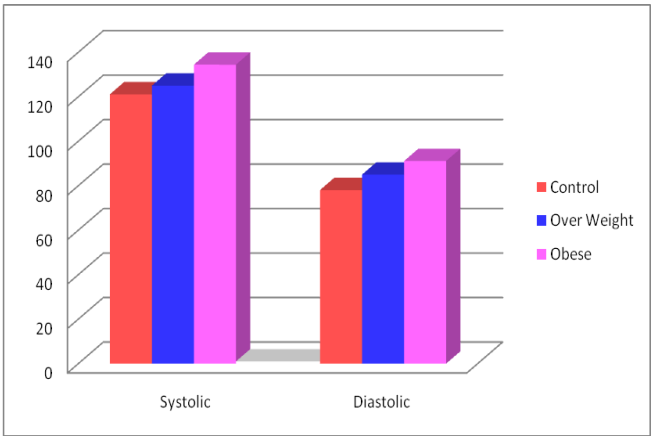

Fig 2: Comparison of Mean systolic and Diastolic B.P of control, overweight and obese in Group l

In group II, there was a significant difference between the mean BP systolic control group and overweight (110.56 ± 7.26 vs 122.22 ± 9.71, p <0.05). Similarly, there was a significant difference between the mean BP diastolic control group and overweight (73.89 ± 6.97 vs. 84.44 ± 7.26, p <0.05). There was a significant difference between the mean BP systolic control group and obesity (110.56 ± 7.26 vs 128.89 ± 13.64, p <0.05). Similarly, there was a significant difference between the mean BP diastolic control group and obesity (73.89 ± 6.97 vs. 87.78 ± 8.70 p <0.05) (Fig. 3).

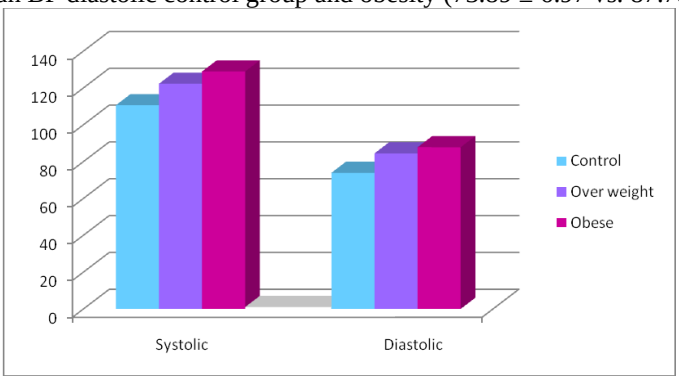

Fig 3: Comparison of Mean Systolic and Diastolic B.P of control, overweight and obese in Group ll

DISCUSSION:

Obesity is associated with an increase in systemic B.P, however the exact mechanisms linking obesity to hypertension are not fully understood. Obesity-related hypertension can be attributed to the production of several vasoactive factors from adipose tissue, increased activity of the sympathetic nervous system due to the action of leptin on the central nervous system, and low concentrations of atrial natriuretic factor (ANF) leading to sodium retention and an increase in volume. The results of this study indicate significantly higher systolic and diastolic B.P. in overweight and obese subjects compared to the control group, except for men in the control group and overweight men, who had a statistically insignificant difference in systolic B.P. Consequently, we can conclude that the increase in body weight seems to be associated with an increase in systolic and diastolic B.P. Similar findings are described by Leenen et al., Mohsen A. et al. and Bramlage et al. In addition to the increasing prevalence of hypertension in obese people, pharmacological treatment of obesity-related hypertension is also a challenge. On the one hand, many workers suggested the pathophysiological effect of weight gain on the increase in B.P, while on the other hand it was found to be the opposite as well. It has been observed that people of equal weight who had a higher initial B.P. gain more weight in the future. The coexistence of hypertension and obesity can be attributed to a primary increase in sympathetic tone. Moreover, the combination of obesity and high blood pressure increases the risk of cardiovascular disease. Weight loss is often accompanied by a decrease in B.P., supporting the hypothesis that an increase in BMI contributes to the higher incidence of hypertension. Accordingly, lifestyle modifications, including weight loss and increased physical activity, should be considered as early stages in the treatment of obesity-related hypertension. In addition, public health strategies to reduce the obesity epidemic are also expected to significantly reduce the burden of hypertension. Moreover, it is suggested that the effect

of weight gain on B.P must be confirmed with future longitudinal studies.

CONCLUSION:

We conclude that the increase in body weight seems to be related to the increase in systolic and diastolic B.P.

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