FREQUENCY OF OBESITY AND HYPERTENSION IN ARMED FORCES: IT IS TIME TO FACE REALITY

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ABSTRACT

Objective: To determine the frequency of obesity and hypertension in healthy soldiers of Pakistan Army.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: Medical Department Combined Military Hospital Okara, August 2012 to December 2012.

Material and Methods: A total of 2215 adult healthy males were selected. Age ranged from 18 to 52 years with mean age of 34.69 (± 7.501) years were selected by consecutive sampling from units of Okara Garrison. Weight, waist circumference (WC) and height measurement of each subject recorded. BMI (kg/m²) was calculated for each individual using formula weight / height². BMI between 18-22.9 kg/m² was taken to be normal. Individuals having BMI of 23-24.9 kg/m² were labeled as overweight while those having BMI more than 25 were considered obese. BP was taken in sitting position in left arm in a quiet warm room after five minutes of rest. BP >140/90 mmHg defined as hypertension. All the data was analyzed using SPSS version 16.

Results: BMI ranged from 16.9 to 32.9 kg/m² with mean of 23.7 ± 5.114 kg/m². Out of study group 763 subjects (34.4%) were overweight and 785 (35.4%) were obese. Out of study population 217 subjects (9.8%) were found to be hypertensive.

Conclusion: A large number of our apparently healthy soldiers are suffering from obesity and hypertension.

Keywords: Body mass index, Hypertension, Obesity.

INTRODUCTION

The term overweight means an excess of body weight, whereas "obesity" refers to deposition of fat in excess in the body. Obesity is now declared as a chronic disease and is increasing in prevalence in adults. There is global epidemic of obesity especially over the past 20 years. 50% of American population is prone to become overweight and 25% to become obese during their life. Measuring body mass index (BMI) is the first step to determine the degree of fat in the body. The BMI is easy to measure, dependable, and reciprocate well with percentage of body adipose tissue and body fat mass. For Asians, overweight is a BMI between 23 and 24.9 kg/m², obesity is a BMI >25 kg/m² and abdominal obesity is WC >90 cm irrespective of BMI. In general, greater BMI is associated with increased rate of death from all causes and from cardiovascular diseases. Hypertension is one of the leading causes of morbidity and mortality among obese people. In one study, overweight and obesity accounted for 26% cases of hypertension in men who followed up to 44 years of age. Hypertension is a deluging global challenge which is third most common cause of disability-adjusted life-years. Hypertension is linearly associated increase risk of death from Ischemic Heart Disease (IHD) and stroke. For every 20 mm Hg systolic or 10 mm Hg diastolic increase in BP, there is a two times rise in mortality from both ischemic heart disease and stroke. Framingham Heart Study in 2001 even...
showed that a high normal BP having values from 130-139/85-89 mmHg increased relative risk of IHD by more than two folds when compared with BP<120/80 mmHg. According to JNC-7 report, BP<120,80mmHg is normal, BP 120-139,80-89mmHg is prehypertension, BP 140-159,90-99mmHg is stage I hypertension and BP≥160/100mmHg is stage II hypertension.

With significant increase in obesity in last decade, prevalence of hypertension has also increased significantly. These obese hypertensives are not only at risk of complications of hypertension but also associated illnesses like diabetes mellitus, Hyperlipidemia and coronary artery disease. These patients are also at risk of developing resistant hypertension. In Pakistan both obesity and hypertension are at large. National health survey of Pakistan conducted in 2006 concluded that 25% of Pakistani population was overweight/obese whereas according to WHO 25.5 % of women and 18.8% of men in Pakistan have BMI ≥ 25 and 3.6% of women and 1 % of men have BMI ≥ 30. Similarly Pakistan is one of such countries where one in three individuals over the age of 45 years is hypertensive as revealed by the National Health Survey (NHS). Different studies have shown a linear relationship between weight gain and blood pressure. In these patients, weight reduction not only improves blood pressure control but also causes considerable reduction in incidence of above mentioned complications. A reduction in the global burden of overweight and obesity will lead to overall decrease in incidence of hypertension, cardiovascular diseases and other associated complications. The purpose of this study was to find out association of body mass index with hypertension in adult males of Pakistan Army.

### MATERIAL AND METHODS

We conducted this cross sectional study in medical department, Combined Military Hospital Okara, from August 2012 to December 2012. Garrison headquarter Okara was

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total n=2215</th>
<th>Normotensive n=1998</th>
<th>Hypertensive n=217</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs) mean (SD)</td>
<td>34.69 (±7.50)</td>
<td>30.52 ±7.24</td>
<td>41.34 ± 5.29</td>
<td>0.003</td>
</tr>
<tr>
<td>Systolic BP mmHg mean (SD)</td>
<td>118 mmHg +10.43</td>
<td>116.72 +10.31</td>
<td>146.43 ±11.98</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diastolic BP mmHg mean (SD)</td>
<td>81 mmHg +9.522</td>
<td>74.42 ±9.11</td>
<td>95.67 ± 8.75</td>
<td>0.01</td>
</tr>
<tr>
<td>BMI (kg/m²) mean (SD)</td>
<td>23.7 +5.114</td>
<td>21.79 ±5.32</td>
<td>24.11 ± 3.61</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Waist circumference (cm) mean (SD)</td>
<td>85.43 ±8.244</td>
<td>83.67 ±8.97</td>
<td>90.38 ±8.12</td>
<td>0.03</td>
</tr>
<tr>
<td>Smoking (%)</td>
<td>18.2</td>
<td>17.3</td>
<td>19.1</td>
<td>0.78</td>
</tr>
</tbody>
</table>
approached to send all healthy uncategorized soldiers for record of their weight, WC and BP. Written consent was taken from all participants of study. As per inclusion criteria, we included 2215 adult healthy males in age range of 18 years to 52 years by consecutive sampling. Those with chronic kidney disease, NSAIDS use, endocrinopathies, on medication, and previous history of hypertension were excluded from study. Detailed history and examination of each individual done and data entered in predesigned Performa. Weight, WC and height measurement of each subject recorded. BMI (kg/m²) was calculated for each individual using formula weight / height². BMI between 18-22.9 kg/m² and WC < 90 cm were taken to be normal. Individuals having BMI of 23-24.9 kg/m² were considered as overweight while those having BMI more than 25 were considered obese. Reference point to measure waist circumference was midway between iliac crest and lower rib margin using a plastic flexible tape. We considered WC > 90 cm as abdominal obesity irrespective of BMI for purpose of study. To measure BP, each participant was made to sit quietly in a chair with his back supported for 5 minutes in quiet and warm room. Blood pressure was measured three times at 24 hour interval by the same physician with a table sphygmomanometer. We took mean of three values as BP recording. Width of cuff was kept equal to at least 40% of arm circumference. BP<120/80mmHg was considered normal. BP 120-139/80-89mmHg was defined as prehypertension, BP 140-159/90-99mmHg as stage I hypertension and BP≥160/100mmHg was labelled as stage II hypertension. Variables included in study were age, blood pressure recording, WC and BMI. We used mean and standard deviation for Continuous variables while categorical variables were expressed in percentages/frequencies. We applied Chi square test and student t test as appropriate to nature of variables. SPSS version 16 was used to analyse the data. p value of less than 0.05 was considered statistically significant.

RESULTS

Out of total 2215 subjects, age ranged from 18 years to 52 years with mean age 34.69 (±7.501) years. BMI ranged from 16.9 to 32.9

![Figure-1: Frequency of obesity among study group (n=2215).](image)

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kg/m² with mean of 23.7 kg/m² (±5.114). Out of study group 763 subjects (34.4%) were overweight and 785 (35.4%) were obese (fig-1). Mean systolic blood pressure of study group was 118 mmHg ± 10.431 and mean diastolic blood pressure was 81 mmHg ± 9.522. Out of study population 217 soldiers (9.8%) were found to be hypertensive, 4.4%(30 out of 667) were normal weight hypertensive whereas frequency of hypertension among over weight individuals was 8.9% (69 out of 763) and among obese population was 15.1% (119 out of 785) (table-1). Characteristics of study group are summarized in table-2.

DISCUSSION

Obesity is now considered a common chronic disease with significant morbidity and mortality, the fifth leading cause of death worldwide. Without active screening, the obese people may silently foster diseases like hypertension, diabetes mellitus and metabolic syndrome and will not receive counseling about health risks, lifestyle changes, obesity treatment options, and risk factor reduction. The one of the aims of current study was to detect frequency of hypertension in overweight and obese population as compared to normal weight BMI individuals. The rise in BP seen with obesity is associated with a relatively raised systemic vascular resistance (SVR) and increased activation of the renin-angiotensin aldoster one system. A directly proportional linear relationship between BMI and BP has been observed in current study that was independent of age. In this study 1548 male adults were found either overweight or obese (763 were overweight and 785 obese) which is quite alarming when we compare it with previous studies particularly NHS of Pakistan and WHO estimates. One of the reasons for this disparity may be the adoption of the more strict criteria of WHO for defining overweight and obesity in Asian countries in our study. The other reason may be a continuous upwards trend in obesity in our region. Similarly in our study relatively high proportion of overweight and obese population had high BP as compared to international studies like the Framingham experience published in 2002. The unique feature of our study includes its larger sample size and the relatively high proportion of participants who were of normal weight (BMI <23kg/m² as compared to other studies on this subject in Pakistan. Our results show that BMI was positively related to frequency of hypertension. The BMI effect on BP rise was statistically significant. Moreover further prospectively designed studies are needed to firmly establish this association and to determine effect of abdominal obesity in isolation over BP. Few studies are yet carried out in Pakistan to detect prevalence of hypertension in obese subjects. One of such study was carried out by Humayun A et al in Peshawar in 2009 with total subjects 1006 males and females and they found higher percentages of hypertension with increasing BMI. Higher percentage in Peshawar study may be due to presence of many aged subjects and higher stress factor in the region. Our study also supported the proven fact that BP increases with increasing age as showed by a large survey in USA. Our study was exclusive for male gender although females are more prone to obesity as reported in many studies. Secondly we did not exclude some confounders like cessation cigarette smoking, Alcohol drinking, birth weight history which directly or indirectly associated with development of hypertension and obesity. Moreover, the intake of sodium/salt, potassium and macronutrient factors that might have an impact on blood pressure was not measured in our study. Finally we also did not quantify physical activity levels of our subjects which are important confounder of our study as physical inactivity is strongly related with obesity whereas increased aerobic activity lowers blood pressure.
CONCLUSION

A significant proportion of our soldiers are suffering from obesity and hypertension. This epidemic is resulting in subsequently increased frequency of hypertension among obese and overweight male adults. Army training programs aimed at reducing the prevalence of overweight, obesity should be launched in all formations. The challenge of weight reduction combined with its costliness makes primary prevention of overweight and obesity a more feasible and cost-effective alternative for curbing the obesity epidemic.

CONFLICT OF INTEREST

The authors of this study reported no conflict of interest.

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17. Fact Sheet N 311, Chapter; obesity and Overweight. WHO media center, May 2012.