METABOLIC SYNDROME IN SOLDIERS OF ARMED FORCES

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ABSTRACT

Objective: To determine frequency of metabolic syndrome and its components amongst soldiers of Armed Forces.

Study Design: Descriptive cross sectional.

Place and Duration of Study: Medical department, Okara CMH, October 2012to March 2013.

Patients and Methods: Our study included 2187 male soldiers. Age ranged from 20 to 52 years. Detailed history and examination of all the participants was done. Body mass index (BMI), waist circumference (WC) and blood pressure (BP) of each subject were recorded. BMI > 25 kg/m² and WC > 90 cm was considered obesity and abdominal obesity respectively. BP > 130/85 mmHg defined as hypertension. Blood glucose fasting, HDL cholesterol and triglycerides levels were checked in all participants. SPSS version 16 was used to analyzethe data. *p* value of less than 0.05 was considered statistically significant.

Results: In our study, 783 participants (35.8%) were found to have abdominal obesity.Overall 491 (22.5%) soldiers had metabolic syndrome out of which 438 (89%) were physically inactive. Frequency of metabolic syndrome was 31.7% (156 out of 491) in age group 20 to 36 years while 68.3%(335 out of 491) in 37 to 52 years of age. Hypertriglyceredemia was present in 504 (23%), low HDL cholesterol in 496(22.6%), hypertension in 210 (9.6%) and abnormal glycemic control in 197 subjects (9%).

Conclusion: A large number of Army soldiers are suffering from metabolic syndrome. Its frequency is increased with increasing age, weight and physical inactivity.Patientswith previous history of diabetes or hypertension were 4 times at risk of developing Metabolic Syndrome as compared to others.

Keywords: Abdominal obesity, Diabetes Mellitus, Body Mass index, Hypertension.

INTRODUCTION

Metabolic Syndrome (MetS) is the name given to a constellate of risk factors which when present together increases the risk of Ischemic heart disease, stroke, and type-II diabetes[1,2]. These risk factors include obesity, hypertension, abnormal glycemic control and dyslipidemia[3]. Central obesity is the central cause of MetS as evidenced by different studies[4].Its frequency worldwide is 17% to 25%[5]. South Asia represents one fifth of the world population and it is considered as home of MetS having a frequency of about 33% in urban population of India[6] and 34.8% in urban population of Karachi[7] when defined in accordance with International Diabetes Federation (IDF) criteria.In Pakistan both obesity and hypertension are also on the rise. National health survey of Pakistan conducted in 2006 concluded that 25% of Pakistani population was overweight/obese[8]. Similarly In Pakistan one in three individuals over the age of 45 years is hypertensive as evidenced by the National Health Survey (NHS)[9]. Diabetes Mellitus (DM) incidence is also increasing in Pakistan. At present 10% of Pakistani population is suffering from DM and it is ranking sixth in the world with an increasing trend[10]. Dyslipidemia is also strongly associated with obesity, hypertension and DM. MetS is age dependant as its frequency has been shown to increase with increasing age[14]. Soldiers are generally considered to be fit and being obese is often considered as a military stigma. The aim of this study is to find out the frequency of MetS in soldiers of Pakistan Army.

PATIENTS AND METHODS

We conducted this cross sectional study in medical department, Combined Military Hospital Okara, from Oct 2012 to Mar 2013. Consent was taken from all study participants

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Received: 05 Apr 2013; revised received: 25 Mar 2014; accepted: 04 Apr 2014

and permission was sought from hospital ethical committee. Our study recruited 2187 adult male soldiers with age range of 20 years to 52 years. Patients were selected by consecutive sampling. For purpose of study, soldier was defined as any individual who was inducted in Armed forces through recruitment centers and issued uniform irrespective of his allotted trade afterwards like cooks, munshi, clerks, painters etc. Diagnosis of MetS was based on the 2004. The International Diabetes Federation (IDF) proposed criteria. Presence of Central obesity was considered essential element with waist circumference more than 90 cm (for south Asians) plus any two of the following: Triglycerides >150 mg/dL (1.7 mmol/L), HDL cholesterol <40 mg/dL (1.03 mmol/l); Systolic blood pressure >130, diastolic blood pressure >85, or treatment for hypertension; Fasting plasma glucose >100 mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes. We took detailed history and performed clinical examination of each individual and data entered in pre designed Performa. Patients with endocrinopathies, secondary causes of obesity were excluded from study. Physical activity level was judged by profession of the soldiers. Clerks, munshi, painters, drivers, laboratory workers, Khateebs, Vehicle mechanics (VMs) and cooks were considered physically inactive. We measured body weight in light clothing using a SALTER 920 digital weighing scale (Salter Ltd, Tonbridge, UK). We measured Waist midway between iliac crest and lower rib margin at the end of normal expiration , it was measured using a plastic flexible tape .WC >90 cm was considered abnormal for the purpose of study.Blood pressure was recorded by asking each patient to sit quietly in a chair with his or her back supported for 5 minutes in a private, quiet and warm room. Blood pressure was checked three times by the same physician with a table sphygmomanometer at interval of 24 hours in between. Mean of the three measured values was taken. We ensured to keep width of cuff to at least 40% of arm circumference. Rate of deflation was fixed at 2 mmHg/sec. All the participants of study underwent blood glucose fasting, serum, triglycerides, and HDL-C levels using automated analyzers. Results were duly verified by pathologist. Mean and standard deviation was used for continuous variables while categorical variables were described in percentages/frequencies. We used t test and Pearson chi square test as appropriate to the nature and distribution of the variables. The data was analyzed using SPSS version 16. *p* value of less than 0.05 was considered statistically significant.

RESULTS

Out of total 2187 participants in the study, age ranged from 20 yrs to 52 yrs with mean age of 29.6 yrs (±7.51), 1315 patients (59.36%) belonged to age group 20 to 36 years and rest of 900 (40.64%) from 37 to 52 years. Considering diagnostic criteria of >90 cm for threshold of abdominal obesity, 783 participants (35.8%) were found to have abdominal obesity out of which 45 (5.7%) were normal weight, 269 (34.35%) were overweight and 469 (59.89%) were obese. BMI 23 to 24.9 kg/m2 were present in 30.1% (658 soldiers) and> 25 kg/m² was present in 32.4% (708 soldiers). In our study hypertriglyceredemia was present in 504 individuals (23%), HDL cholesterol was low in 496 participants (22.6%), hypertension was present in 210 (9.6%) and abnormal glycemic control in 197 subjects (9%)(table-1). Overall frequency of metabolic syndrome was 22.5% in our study, 491 out of 2187 participants. Out of these 491 individuals with metabolic syndrome, 139 patients (28.3%) had abdominal obesity plus all the four criteria of metabolic syndrome; 168 participants (34.2%) had abdominal obesity and three out of four criteria meeting metabolic syndrome while rest of 184 participants (37.4%) had two out of four criteria. Frequency of individual risk factors in those with or without MetS is summarized (table 2). Mean BMI was 23.73 (±2.39), mean BMI in patients with metabolic syndrome was 26.1 (±.89). Patientswith past history of diabetes or hypertension were 4 times at risk of developing Metabolic Syndrome as compared to others when adjusted for other variables in the model (95% CI: 1.7–4.5) and relationship was highly significant with *p* value <0.0001. Out of our study group 610 participants (27.8%) were

having sedentary jobs with physical inactivity and frequency of metabolic syndrome in this group was 72% (438 out of 610) with highly significant p value(*p* value 0.0001). Total 491 soldiers were diagnosed with Metabolic Syndrome. Out of our study group 610 participants (27.8%) were having sedentary jobs with physical inactivity and frequency of metabolic syndrome in this group was 72% (438 out of 610) with highly significant p value(p value 0.0001). In those who were active physically, frequency was 53 out of 1577 (3.3%) . Frequency of metabolic syndrome was 31.7% (156 out of 491) in age group 20 to 36 years while 68.3%(335 out of 491) in 37 to 52 years of age.

Table-1. Frequency of metabolic abnormalities in study group n= 2187.

Variable	Number (n)	Frequency (%)
Abdominal obesity	539	24.6%
Hypertriglyceredemia	504	23%
Low HDL cholesterol	496	22.6%
Blood pressure Systolic > 130mmHg Diastolic > 85mmHg	210	9.6 %
Blood glucose > 5.6 mmol/l	197	9 %

Table-2: Frequency of metabolic syndrome risk factors in study group (n = 2187).

Risk factors	Metabolic syndrome positive n=491	Metabolic syndrome negative n=1696	*p*-value
Abdominal obesity	491 (100%)	48 (2.8%)	<0.001
Hypertriglyceredemia	419 (85.3%)	85 (5%)	<0.001
Low HDL cholesterol	407 (82.8%)	89 (52.4%)	0.02
Blood pressure Systolic > 130mmHg Diastolic > 85mmHg	210 (42.7%)	75(4.4%)	0.01
Blood glucose > 5.6 mmol/l / hx of DM	197 (40.1%)	22 (1.2%)	0.001

DISCUSSION

No study is yet carried out in Armed forces of Pakistan to estimate frequency of MetSin soldiers so this would the first report on the frequency of MetS among our soldiers. Moreover our study based on an apparently healthy group in contrast to most studies in which Hospital admitted patients were used. Moreover, large sample size was the forte of our study. There is a contrast in the frequency of MetS in Pakistan. In different studies it is as low as 20% to as high as 85%[7,13,17]. In our study frequency of MetS was found to be 22.5% which is much lower than expected especially when we consider other studies in Indian urban population[6], Karachi urban population[7]and Ali SN et al1[8] study. In Mohsin J et al[17] study very high frequency of 85% was found due to only selection type II diabetic patients while in Ali SN et al study 63.7% frequency was due to selection of more elder sample population with two third of the sample size having abnormal Glycemic control in contrast to our study where only 9% had IFG/DM. However considering the fact that soldiers belong to physically fit segment of the society, a frequency of 22.5% is somewhat higher than expected. It is even higher than soldiers of Saudi army[s] and Royal Jordanian Air force[20] although NCEP ATP III criteria were used in these studies. Another study carried out over 614 healthy Indian soldiers[21] which showed much lower frequency of Mets as compared to our soldiers although more aged group was selected. Similarly frequency in our soldiers is much higher than civilians of other Asian countries like Singapore

(17.7%)[22], Taiwan (13.9%)[23], Japan (7.8%)24 and China (18.3%)[25]. In our study Dyslipidemia was most prevalent among soldiers of MetS followed by high Blood pressure which is in contrast to other studies where abnormal Glycemic control was the most frequent finding[6,7,17,18]. As in international and large scale studies frequency of MetS in our study also increased with increasing age, BMI and physical inactivity. Tremendous increase in use computers after installation of Officer automated System (OAS) and mechanization in workplaces is leading to a sedentary lifestyle and decrease caloric consumption.On other hand, high energy containing imbalanced foods (high calories, carbohydrates, saturated fats, and low fiber) are being used increasingly in the soldiers menu tilting the balance towards weight gain and obesity. However our study had many Limitations. Our study was exclusive for male gender although females are more prone to obesity. Frequency of MetS in females is found lower than males in some studies[26] and higher in other[27]. Secondly blood pressure was measured three times, but only on one occasion, which might overestimated the frequency of hypertension. Thirdly we did not exclude many important confounders like cigarette smoking, alcohol drinking and birth weight history which directly or indirectly associated with development of hypertension, obesity and MetS. Fourthly 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 did not take family history of DM in the parents as it also predisposes to Mets. A large study on US adults showed a meaningful and positive association between family history of diabetes and MetS components[28]. Another recent cross-sectional study carried out by Das et al[29]in Kolkata, India, on 448 adults has concluded that those individuals whose parents and cognates had history of T2DM had more frequency of MetS components as compared to their counterparts.

CONCLUSION

The frequency of metabolic syndrome in the soldiers is high enough to be a matter of medical concern, especially since soldiers of Armed forces are generally considered as healthy and fit its frequency is increased with increasing age, weight and physical inactivity.Those soldiers who had past history of diabetes or hypertension were 4 times at risk of developing Metabolic Syndrome as compared to others. The presence of such factors among apparently healthy individuals is a matterof concern and ask for urgent interventions in order to prevent and control MetS and its associated risk factors such as type- II DM and CAD.A multipronged approach by health care authorities is essential, which should include modification of behaviour, diet and increase in physical activities. Awareness sessions by media should also be held to educate the masses. Nevertheless, further research is required to explore this vital issue in detail and to develop and test the interventions.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

1. World Health Organization. Global recommendations on physical activity for health. World Health Organization, Geneva.; 2010.
2. World Health Organization. Global health risks: mortality and burden of disease attributable to selected major risks. World Health Organization, Geneva; 2009.
3. Grundy SM. Inflammation, hypertension, and the metabolic syndrome. JAMA. 2003; 290: 3000–2. doi: 10.1001/jama. 290.22.3000
4. Tabak AG, Jokela M, Akbaraly TN, Brunner EJ, Kivimaki M, Witte DR. Trajectories of glycaemia, insulin sensitivity, and insulin secretion before diagnosis of type 2 diabetes: an analysis from the Whitehall II study. Lancet. 2009;373:2215–21. doi: 10.1016/S0140-6736(09) 60619-X.
5. Alsaraj F. McDermott JH, Cawood T. "Frequency of the metabolic syndrome in patients with diabetes mellitus," Irish Journal of Medical Science.2009; 178: 309–13.
6. Misra A, Misra R, Wijesuriya M, Banerjee D. The metabolic syndrome in South Asians: Continuing escalation and possible solutions. Indian J Med Res. 2007; 125: 345–54.
7. Hydrie MZ, Shera AS, Fawwad A, Basit A, Hussain A. Prevalence of metabolic syndrome in urban Pakistan (Karachi): Comparison of newly proposed International Diabetes Federation and Modified Adult Treatment Panel III criteria. MetabSyndrRelatDisord. 2009; 7: 119–24.
8. Jafar T H, Chaturvedi N, Pappas G. "Prevalence of overweight and obesity and their association with hypertension and diabetes mellitus in an Indo-Asian population," CMAJ. 2006; 175: 1071–7.
9. Ashfaq T, Anjum Q, Siddiqui H, Shaikh S, Vohra VA. Awareness of hypertension among patients attending primary health care centre and outpatient department of tertiary care hospital of Karachi. J Pak Med Assoc. 2007; 57: 396-9.
10. Nishtar S, Shera S, Raffique G, Mohamud KB, Ahmed A. "Diabetes prevention and control: national ActionPlan for NCD prevention, control and health promotion in Pakistan," Journal of the Pakistan Medical Association. 2004; 54: 26–30.
11. Shaikh MA, Qazi RA. Hypercholesterolemia in hypertensive patients. Ann Pak Inst Med Sci 2005; 1: 142–5.
12. Sattar RA, Ahmed S, Hussain S, Irtiaz Rizvi SM, Ara J. Frequency of lipid abnormalities in essential hypertension. J Surg Pak 2002; 4: 2–4.

13. Basit A, Shera AS. Prevalence of metabolic syndrome in Pakistan. Metab Syndr Relat Disord. 2008; 6: 171–5.
14. Fezeu L, Balkau B, Kengne AP, Sobngwi E, Mbanya J C. "Metabolic syndrome in a sub-Saharan African setting: central obesity may be the key determinant," Atherosclerosis. 2007; 193: 70–6.
15. Misra A, Khurana L. Obesity and the metabolic syndrome in developing countries. J Clin Endocrinol Metab. 2008; 93: 29–30.
16. Dodani S. Excess coronary artery disease risk in South Asian immigrants: can dysfunctional high-density lipoprotein explain increased risk? Vasc Health Risk Manag. 2008; 4: 953–61.
17. Mohsin, Zafar J, Nisar YB. "Frequency of themetabolic syndrome in adult type2 diabetics presenting to Pakistan Institute of Medical Sciences," Journal of the Pakistan Medical Association. 2007; 57: 235-8.
18. Ali NS, Khuwaja AK, Rahman A, Nanji K. "Retrospective analysis of metabolic syndrome: Prevalence and distribution in executive population in urban Pakistan," International Journal of Family Medicine. 2012; 1155-61.
19. QahtaniA, Dhafer A, Mohammed L. Prevalence of metabolic syndrome in Saudi adult soldiers. Saudi medJ. 2005:26; 1360-6.
20. Khazale NS, Haddad F. Prevalence and characteristics of metabolic syndrome in 111 Royal Jordanian Air Force pilots. Aviat Space Environ Med 2007; 78: 968-72.
21. Bhalwar R, Ohri VC, Somani BL, Kastsuri AS. Differentials and determinants of Syndrome X and its role as coronary risk among healthy middle aged Indian Army personnel. MJAFI 2006: 62:146-52.
22. Lee J, Ma S, Heng D, Tan CE, Chew SK, Hughes K,et al. Should central obesity be an optional or essential component of the metabolic syndrome? Ischemic heart disease risk in the Singapore Cardiovascular Cohort Study. Diabetes Care. 2007; 30: 343–7.
23. Huang KC, Lee LT, Chen CY, Sung PK. All-cause and cardiovascular disease mortality increased with metabolic syndrome in Taiwanese. Obesity . 2008; 16: 684–9.
24. Arai H, Yamamoto A, Matsuzawa Y, Saito Y, Yamada N, Oikawa S. Prevalence of metabolic syndrome in the general Japanese population in 2000. J AtherosclerThromb. 2006; 13: 202–8.
25. Villegas R, Xiang YB, Yang G, Cai Q, Fazio S, Linton MF, et al. Prevalence and determinants of metabolic syndrome according to three definitions in middle-aged Chinese men. Metab Syndr Relat Disord. 2009; 7: 37–45.
26. Wilson PW, D'Agostino RB, Parise H. Metabolic syndrome as a precursor of cardiovascular disease and type 2 diabetes mellitus. Circulation 2005; 112: 3066.
27. SumnerA, ZhouJ., DoumateyA.Low HDL-cholesterol with normal triglyceride levels is the most common lipid pattern in West Africans and African Americans with Metabolic Syndrome: implications for cardiovascular disease prevention," CVD Prevention and Control. 2010; 5: 75–80.
28. Ghosh A, Liu T, Khoury MJ. ValdezR. "Family history of diabetes and prevalence of the metabolic syndrome in U.S. adults without diabetes: 6-year results fromthe national health and nutrition examination survey (1999-2004)," Public Health Genomics. 2010; 13: 353–9.
29. Das M, Pal S, Ghosh A, "Family history of type 2 diabetes and prevalence of metabolic syndrome in adult Asian Indians. Journal of Cardiovascular Dis Research. 2012; 32: 104–8.