Original Paper

PREVALENCE OF METABOLIC SYNDROME IN ARMY PERSONNEL RESIDING IN BOGRA CANTONMENT

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Abstract

Background: The prevalence of metabolic syndrome (MS) differs in different ethnic population by using different definition. MS is a strong predictor of cardiovascular disease (CVD).

Objective : The aim of this study was to determine the prevalence of the metabolic syndrome (MS) and its component risk factors among army personnel living in Bogra Cantonment aged between 30-50 years.

Methods: A cross sectional study was conducted from 10th Feb '2011 to 15th June 2011 on 250 adult males of age between 30 to 50 years were selected from different units located in Majhira, Bogra Cantonment. The National Cholesterol Education Program modified Adult treatment Panel III (NCEP/ATPIII) and new International Diabetes Federation (IDF) guidelines were used to identify adults who met their criteria for metabolic syndrome. Fasting blood glucose (FBG), Lipid profile (Total cholesterol, triglyceride. HDL-C, LDL-C) were assessed and anthropometry and blood pressure were measured in all the subjects.

Result : The average age was 38.5 years and all the participants were male. The prevalence of metabolic syndrome according to the IDF definition and modified ATP III criteria was 14.8% and 18.4% respectively. Thirty two percent (32%) had highest waist circumferences (n=81), 77% had low HDL-C (n-193), 43% had elevated triglycerides (n-108), 7.6% had elevated fasting glucose (n-19). 6.8% had elevated BP (n-17).

The most common metabolic syndrome phenotype is low HDL-C with elevated triglycerides.

Conclusion: The prevalence of the metabolic syndrome in army personnel was found to be lower than the other countries in South Asia. Still there is enough scope to lowering down the present prevalence rate of metabolic syndrome in the Armed Forces.

Key-words: Metabolic Syndrome, Adult treatment panel III, International Diabetic Federation, fasting blood glucose, total cholesterol.

Introduction:

Metabolic Syndrome is defined as a clustering of key cardiovascular risk factors, namely abdominal obesity, dyslipidaemia, hyperglycaemia and hypertension in a single individual[1]. The concept of metabolic syndrome was first introduced in 1988 by Gerald Reaven[2]. Metabolic Syndrome is now considered as a global epidemic[3], with current estimates revealing that about 20-30% of the adult population world wide is affected by this syndrome[4]. The prevalence of this disorder among South Asians[5], a community that represents one-fifth of the global population[6] is on the rising trend.

In India, the prevalence rates of metabolic syndrome were reported to be higher than 40%.[7] Very few studies have looked at the prevalence of metabolic syndrome in the general population of Bangladesh to identify the potential for prevention of life threatening disease like diabetes and cardiovascular disease.

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However two studies have been conducted in rural areas of Bangladesh and prevalence rate in one study[8] was of 20.7% and another study[9] showed the prevalence rate of MS among rural Bangladeshi women to be 31.25%. The aim of this study was to define the prevalence of the metabolic syndrome and its components among army personnel living in Majhira, Bogra Cantonment.

Materials and methods
Design
A total 250 army persons from 04 units in Majhira, Bogra Cantonment were randomly selected without any medical illness like DM, Hypertension, Bronchial Asthma, Ischaemic Heart disease and other chronic illness.

Measurements
Anthropometric measurements including weight, height, waist circumference were measured with the participants in standing position wearing trouser without shoes. The weight was taken to the nearest 0.1kg by a modern digital bathroom scale. Waist circumference was measured at the minimum circumference between the lower border of ribs and iliac crest on the mid axillary line and the measurement was taken in cm. The blood pressure was recorded in the sitting position, in the right arm to the nearest 2mm Hg using the mercury sphygmomanometer. Two reading were taken, ten minutes apart and their mean was taken as the blood pressure.

After eight to ten hours of overnight fasting blood sample was taken to estimate the plasma glucose and serum lipids. Total cholesterol (TC), HDL-C, triglycerides were measured by auto analyzer. Low-density lipoprotein cholesterol (LDL-C) was calculated using the Friedewald formula[10].

Criteria for metabolic syndrome.
Diagnostic criteria for the metabolic syndrome were from the International Diabetic Federation (IDF) and National Cholesterol Education Program, Adult treatment panel III (NCEP, ATP III).

New IDF Criteria
According to the new (2005) IDF definition for a person to be defined as having the metabolic syndrome must have central obesity with ethnicity specific values for different groups[11]. We use waist circumference (WC) ≥ 90cm in men which is recommended for South Asian countries plus any two or more of the following four factors:

- Raised TG levels ≥ 150 mg / dl (1.7 mmol/L) or specific treatment for this lipid abnormality.
- Reduced HDL − Cholesterol < 40mg/dl (1.03 mmol/L) in males and < 50mg/dl (1.29 mmol/L) in females or specific treatment for this lipid abnormality.
- Raised blood pressure: Systolic BP≥130 mm of Hg or diastolic BP ≥ 85 mm of Hg or treatment of previously diagnosed hypertension and
- Raised fasting blood glucose ≥ 100mg /dl (>5.6mmol/L) or previously diagnosed diabetes.

Modified NCEP, ATP III Criteria [12]
Modified NCEP, ATP III definition required at least three of the following:

- Waist circumference (≥ 90 cm in men and ≥ 80 cm in women for Asians).
- High triglyceride ≥ 150mg / dl (1.7 mmol/L)
- Low HDL − Cholesterol <40mg / dl (1.03 mmol/L) in men and <50mg / dl (1.29mmol/L) in Women.
- Blood pressure≥ 130/85mm of Hg or current antihypertensive medication.
- Fasting blood glucose ≥ 100mg / dl (≥ 5.6mmol/L)

Results
The overall prevalence of metabolic syndrome was found to be 18.4% and 14.8% according to modified ATP III and IDF criteria respectively. The most common component of metabolic syndrome (MS) observed in the present study was low levels of serum HDL Cholesterol (77.2%) (Table-ll).

This was immediately followed by elevated TG level (43.2%) then high waist circumference levels (32.4%), elevated fasting blood glucose levels (7.6%) and elevated blood pressure (6.8%). More than 25% of the subjects had higher total cholesterol (27.2%) and LDL levels (25.6%) (Table-ll).

The highest prevalence of MS was 25% for the age group between 45-50 yrs. The incidence of MS was found to increasing with age e.g 12.96% in those between 30 to 34 years of age compared to 25% for the age group between 45 and 50 years (Table-l).

Table-l: Age stratified prevalence of metabolic syndrome (n-250)

Age (yrs)	Total Number	Metabolic Syndrome	Percentage
30 – 34	(n-54)	(7)	12.96%
35 – 39	(n-89)	(14)	15.73%
40 – 44	(n-87)	(20)	22.98%
45 – 50	(n-20)	(5)	25%

Table-ll: Proportion of participants with abnormal clinical characteristic

Characteristic	n %
TC>200mg/dl	68(27.2%)
LDL-C> 130 mg/dl	64(25.6%)
HDL-C <40mg/dl (men)	193 (77.2%)
TG> 150 mg/dl	108 (43.2%)
FBG ≥ 5.6mmol /l	19 (7.6%)
Blood pressure≥ 130 / 85mm of Hg	17 (6.8%)
Waist Circumference ≥ 90 cm men	 81 (32.4%)
Metabolic Syndrome Modified ATP III Criteria New IDF Criteria	 46 (18.4%) 37 (14.8%)

Abbreviation: TC, total cholesterol; LDL-C, low density lipoprotein cholesterol; HDL-C, high density lipoprotein cholesterol; TG, triglycerides; ATP, Adult treatment panel; IDF, International Diabetic Federation.

Table-lll: Distribution of components in pre-metabolic and metabolic syndrome

A. Pre-metabolic syndrome

One Risk Factor	WC = 81 (32.4%)
Two Risk Factors	WC + HTN = 6 (2.4%)
	WC + HDL-C = 69 (27.6%)
	WC + TG =55 (22%)
	WC + FBG=10 (4%)

B. Metabolic syndrome

Three Risk Factors	WC + HTN + HDL- C = 2 (.8%)
	WC + HTN + FBG = 2 (.8%)
	WC + HDL-C+TG = 24(9.6%)
	WC + TG + FBG – 2 (.8%)
	WC + FBG + HDL- C = 2 (.8%)
	FBG + TG + HDL- C = 5(2%)
	HTN + TG + HDL- C= 2 (.8%)
Four Risk Factors	WC + HTN + HDL-C + TG = 2 (.8%)
	WC + HDL – C + FBG + TG = 3 (1.2%)
	HTN + HDL – C + TG + FBG = 2 (.8%)
Five Risk Factor	None

Abbreviation: WC, Waist circumference (cm); HTN, hypertension (mm of Hg) HDL – C, high density lipoprotein cholesterol (mg / dl); FBG, Fasting plasma glucose (mg / dl); TG, triglycerides (mg / dl)

Discussion

The principal finding was 18.4% and 14.8% rates of prevalence of metabolic syndrome according to Modified ATP III and IDF criteria respectively among the persons living in Majhira Cantonment, Bogra. The prevalence increased with age in our population. The prevalence rate was relatively lower than that of other studies in this subcontinent. Other studies in this South Asian region showed higher prevalence rates ranging from (35.2% to 41%) rates[7,13]. An Indian urban study showed high prevalence of metabolic syndrome (41.1%) using the modified ATPIII criteria[14]. A study conducted on older subjects in Pakistan aged 40 years and above showed a prevalence rate of 45.9% in males and 57.2% in females [15]. The reported prevalence rate was 26% at Chennai in India[16] and a study done in rural Pakistan showed 40% of a prevalence rate[17]. The prevalence of the MS in rural women of India was 36.4% using NCEP ATP III criteria[18].

A cross sectional study on newly diagnosed one hundred diabetes mellitus and forty four impaired glucose tolerance subjects from BIRDEM hospital has shown that 39.6% of the subjects were having metabolic syndrome using EGIR(European group for the study of Insulin Resistance 1999) criteria[19].

Dyslipidaemia is common with abnormal levels of HDL – C and triglycerides in addition to elevated total cholesterol and LDL – C, closely reflecting the metabolic syndrome phenotype. In the present study low serum HDL levels was found to be the most common component of MS i.e it was observed in 77.2% of the target population. This observation in our target population is critical considering that epidemiological studies have established a strong inverse association between HDL concentrations with increased risk of coronary artery disease. The risk for Coronary Artery Disease (CAD) increases by 2–3% for every 1 mg/dl decrease in HDL[20]. The overall prevalence of hypertension in this target population is 6.8% which is much lower than previously reported meta analysis of 61 prospective studies[21] i.e prevalence rate was 18.2%. Our study showed prevalence of impaired fasting glucose (IFG) was 7.6% and none was found to have diabetes mellitus.

Our result suggests modestly lower prevalence of MS in this population by any proposed definitions which may be because of their disciplined lifestyle, mandatory participation in physical exercise & games, taking healthy balanced meal and overall strict supervision for preventing over weight. The highest prevalence was observed in ATP III compared to IDF. As the sample size comprised of small number of personnel so it cannot be generalized for army personnel as a whole and thus the result should be interpreted with caution.

Conclusion
A diagnosis of the metabolic syndrome increases the relative risk of a subsequent cardiovascular disease by 65% and increases the risk of developing type 2 diabetes mellitus by three fold.

In our study the prevalence rate of metabolic syndrome among the army personnel residing in Majhira canmonment,Bogra is 18.4% and 14.8% according to Modified ATPIII and IDF criteria respectively which is lower than that of other countries in South Asia.The burden of non communicable disease such as cardiovascular disease and diabetes in our region is increasing as a consequence of higher metabolic syndrome seen in this population. The cornerstones of treatment are the management of weight and ensuring appropriate levels of physical activity. Education and training should be critical to ensure that health care providers have the necessary knowledge and skills necessary to treat patients with the metabolic syndrome properly. Every effort should be made to curb the emerging threat of MS by adopting effective health policies and preventive program.

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JAFMC Bangladesh. Vol 8, No 2 (December) 2012

50

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JAFMC Bangladesh. Vol 8, No 2 (December) 2012

51