

## Prevalence of Metabolic Syndrome among Border Guard Bangladesh Personnel

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DOI: <https://doi.org/10.3329/jafmc.v14i2.45883>

### Abstract

**Introduction:** Metabolic syndrome (MetS) is a multifaceted syndrome comprises a cluster of metabolic abnormalities including hypertension, central obesity, insulin resistance, dyslipidemia, and is strongly associated with developing diabetes mellitus and cardiovascular diseases. Prevalence of MetS differs in different ethnic population by using different definition.

**Objectives:** To determine the prevalence of the MetS and its component risk factors among Border Guard Bangladesh (BGB) personnel working in Chattagram Hill Tract (CHT).

**Materials & Methods:** This descriptive cross-sectional study was conducted from October 2016 to February 2018 among 1455 male BGB personnel aged between 40 to 59 years and working in CHT of Bangladesh. Study subjects were selected at BGB hospital, Guimara, Khagrachari. The new International Diabetes Federation (IDF) guidelines were used to identify MetS. Detail history, clinical examination, anthropometry and blood pressure (BP) were measured and fasting plasma glucose (FPG) and lipid profile were assessed.

**Results:** Among the 1455 respondents' BMI, waist circumference, systolic and diastolic BP were found more than normal in 34.1, 37.7, 16.4% and 12.3% respectively. Biochemical parameters including FPG, TC, TG, and LDL-C was raised in 28.7%, 49.8%, 52.2% and 37.7% of respondents respectively. HDL-C was found decreased in 26.9% respondents. Age wise prevalence of MetS for age group 40-44, 45-49, 50-54 and 55-59 years were found 21.3%, 21.7%, 24.1% and 26.1% of the respondents respectively. The overall prevalence of MetS was found 22.4%.

**Conclusion:** The prevalence of the MetS in BGB personnel was found 22.4%. Appropriate measure should be taken to lower the MetS cases.

**Key-words:** Metabolic syndrome, International diabetic federation, Border guard Bangladesh.

### Introduction

The Metabolic Syndrome (MetS) is a constellation of an interconnected physiological, biochemical, clinical, and metabolic factors that directly increases the risk of atherosclerotic cardiovascular disease (CVD) and Type 2 Diabetes Mellitus (DM)<sup>1-3</sup>. The concept of MetS was first introduced in 1988 by Gerald Reaven<sup>4</sup>. The diabetes consultation group of the World Health Organization (WHO) created the first internationally recognized definition of MetS in 1998. They defined MetS as the presence of insulin resistance (impaired fasting glucose, impaired glucose tolerance, or type 2 diabetes mellitus) in addition to two of the following risk factors: obesity by waist-hip ratio or body mass index (BMI), dyslipidemia, hypertension or microalbuminuria<sup>1,5</sup>.

MetS is now considered as a global epidemic<sup>6</sup>, with current estimates of International Diabetes Federation (IDF)<sup>7</sup> estimates that one-quarter of the world's adult population has the MetS. The prevalence of MetS based on National Cholesterol Education Program modified Adult Treatment Panel III (NCEP/ATPIII)<sup>8</sup> criteria, 2001 varied from 8% to 43% in men and from 7% to 56% in women around the world. The prevalence of MetS among South Asians, a community that represents one-fifth of the global population is on the rising trend<sup>9,10</sup>. The prevalence rates of MetS were reported to be higher than 40% in India<sup>11</sup>. Higher socioeconomic status, sedentary lifestyle, and high BMI were significantly associated with MetS<sup>12</sup>. Very few studies have done to find the prevalence of MetS in Bangladesh. Two studies conducted in Bangladesh and prevalence of MetS was 20.7% in total population<sup>13</sup> and 31.25% among menopausal women<sup>14</sup>. To find out the prevalence of the MetS and its components among BGB personnel, working in Chattagram Hill Tract (CHT) of Bangladesh.

### Materials and Methods

This descriptive cross-sectional study was conducted from October 2016 to February 2018 among 1455 male BGB personnel aged between 40 to 59 years and working in CHT of Bangladesh. Study subjects were selected at BGB hospital, Guimara, Khagrachari from the BGB personnel who came for biannual health check-up under newly introduced 'Health

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Card' project. New IDF7 guidelines were used to identify MetS. Detail history, clinical examination, anthropometry and blood pressure (BP) were measured. Laboratory investigations like fasting plasma glucose (FPG) and lipid profile including total cholesterol (TC), triglyceride (TG), high density lipoprotein cholesterol (HDL-C) and low density lipoprotein cholesterol (LDL-C) were assessed to all the subjects.

Anthropometric measurements including weight, height, and waist circumference of the participants were measured in standing position with minimum clothing and without shoes. Height was measured with a wall-mounted meter scale nearest to 0.5 centimeter (cm) and the weight was taken to the nearest 0.1kg by calibrated 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 by a measuring tape and the measurement was taken nearest to 0.5 cm. BMI was calculated by standard formula as [weight in Kg/ (height in m)<sup>2</sup>]. BP was recorded in sitting position, in the right arm to the nearest 2 mm of Hg using the mercury sphygmomanometer. Two readings were taken in ten minutes apart and their average value was taken as BP. After overnight (8-10 hours) fasting blood samples were taken to estimate the FPG and serum lipid profile. TC, TG, and HDL-C, were measured by auto analyzer and LDL-C was calculated using the Friedewald formula<sup>15</sup>. All the collected data were assembled in a pre-structured checklist and analyzed by using SPSS-21.0 for Windows. The categorical data were expressed in frequency and percentage and for statistical significance  $\chi^2$  test was done and  $p < 0.05$  considered as significance.

Diagnosis of MetS: Diagnosis of MetS was performed on the basis of new IDF diagnostic criteria<sup>7</sup>. According to 2005 IDF definition for a person to be defined as having the MetS must have central obesity with ethnicity specific values for different groups<sup>16</sup>. We use waist circumference (WC)  $\geq 90$  cm in men which is recommended for South Asian countries plus any two or more of the following four factors:

- Raised TG levels  $\geq 150$  mg/dl or specific treatment for this lipid abnormality
- Reduced HDL-C  $< 40$ mg/dl in men or specific treatment for this lipid abnormality
- Raised blood pressure: Systolic BP  $\geq 130$  mm of Hg or diastolic BP  $\geq 85$  mm of Hg or treatment of previously diagnosed hypertension and
- Raised fasting blood glucose  $> 5.6$ mmol/L or previously diagnosed diabetes mellitus.

## Results

Respondents socio-demographic characteristics presented in table-I. BMI, WC, systolic and diastolic BP were more than normal in 34.1, 37.7, 16.4% and 12.3% of respondents respectively (Table-II). Respondents' biochemical parameters found FPG, TC, TG, and LDL-C was raised in 28.7%, 49.8%, 57.2% and 37.7% of respondents respectively. HDL-C was found decreased in 26.9% respondents (Table-III). Prevalence of DM (FPG  $\geq 7.0$  mmol/L) was 7.5%. Age wise prevalence of MetS for age group 40-44, 45-49, 50-54 and 55-59 years were found 21.3%, 21.7%, 24.1% and 26.1% of the respondents respectively. Age wise prevalence of MetS found increasing trends with age but was not statistically significant ( $p > 0.05$ ). The overall prevalence of MetS was found 22.4% according to IDF criteria (Table-IV).

**Table-I:** Socio-demographic characteristics of respondents (n=1455)

Characteristics	Frequency	Percentage	
Age group	40-44	554	38.1
	45-49	457	31.4
	50-54	348	23.9
	55-59	96	6.6
Rank	JCO	143	9.8
	NCO	1079	74.2
	Sepoy	144	9.9
	Civilian	89	6.1
Medical Category	A	1314	90.3
	B	54	3.7
	C	87	6.0
Monthly family income (BDT)	< 20000	113	7.8
	20000-40000	1097	75.4
	> 40000	245	16.8

**Table-II:** Distribution of respondents by BP, waist circumference and BMI (n=1455)

Biochemical parameters	Frequency	Percentage		
BP in mm of Hg	Systolic	< 130	1217	83.6
		$\geq 130$	238	16.4
	Diastolic	< 85	1276	87.7
		$\geq 85$	179	12.3
BMI (kg/m <sup>2</sup> )	< 25	959	65.9	
	$\geq 25$	496	34.1	
Waist Circumference (cm)	< 90	906	62.3	
	$\geq 90$	549	37.7	

**Table-III:** Biochemical parameters of respondents (n=1455)

Biochemical parameters	Frequency	Percentage	
Fasting plasma glucose (mmol/L)	< 5.6	1038	71.3
	$\geq 5.6$	417	28.7
	$\geq 7.0$	109	7.5
Total Cholesterol (mg/dl)	< 200	730	50.2
	$\geq 200$	725	49.8
Triglyceride (mg/dl)	< 150	623	42.8
	$\geq 150$	832	57.2
LDL Cholesterol (mg/dl)	< 130	906	62.3
	$\geq 130$	549	37.7
HDL Cholesterol (mg/dl)	< 40	391	26.9
	$\geq 40$	1064	73.1

**Table-IV:** Age stratified prevalence of metabolic syndrome (n=326)

Age group in years	Total Population	Prevalence of MetS		Statistics
		Yes n (%)	No n (%)	
40-44	554	118 (21.3)	436 (78.7)	$\chi^2 = 1.866$ df = 3 $p > 0.05$
45-49	457	99 (21.7)	358 (78.3)	
50-54	348	84 (24.1)	264 (75.9)	
55-59	96	25 (26.0)	71 (74.0)	
Total	1455	326 (22.4)	1129 (77.6)	

## Discussion

In this study among the dyslipidemia high serum TG levels was found to be the most common component of MetS which was observed in 57.2% followed by high TC, which was found 49.8% of the target population. This observation in our target population is critical considering that epidemiological studies<sup>9,10</sup> have established a strong association between high TG concentrations with increased risk of CVD. But other studies found low HDL-C is the most common dyslipidemia<sup>17,18</sup>. This difference might be due to different food habit and regular exercise of target population. The overall prevalence of hypertension in this target population was 16.4% which was lower than previously reported Meta analysis<sup>18</sup> of 61 prospective studies in which prevalence of hypertension was 18.2%. This study showed prevalence of raised FPG was 28.7% respondents among them 7.5% had diabetes mellitus. This finding was also lower than the other similar study<sup>17</sup> and the reason might be the same.

The overall prevalence of MetS by new IDF criteria was 22.4% among the BGB personnel working in CHT of Bangladesh. The prevalence increased with age in our population. The prevalence rate was relatively lower than that of other South Asian studies where prevalence rates of MetS showed 35.2% to 41% in this subcontinent<sup>9,10</sup>. An Indian urban study showed high prevalence of MetS (41.1%) using the modified ATP III criteria<sup>19</sup>. A study conducted in Pakistan aged 40 years and above showed a prevalence rate of MetS 45.9% in males and 57.2% in females<sup>20</sup>. A cross sectional study<sup>17</sup> on newly diagnosed diabetes mellitus subjects from BIRDEM hospital has shown the prevalence of MetS 39.6%. This difference among different studies might be due to using different criteria for diagnosis of MetS and different group of population and geographical region. Prevalence of MetS in this study was lower than similar studies in home and abroad that might be due to that this study was performed on a special group of population. BGB members have to strict discipline in their life including regular physical activities.

Result of this study found lower prevalence of MetS in target BGB population by which might be because of their disciplined lifestyle, mandatory participation in physical exercise and games, taking healthy balanced diet and overall strict supervision for preventing over weight. As the population was specific group of population so it may not represent the prevalence of MetS of Bangladesh.

## Conclusion

The prevalence of MetS in BGB personnel working in CHT of Bangladesh was found 22.4% by new IDF criteria. The burden of non communicable disease such as CVD and DM in our region is increasing as a consequence of higher MetS in this population. Appropriate measure should be taken to lower the emerging threat of MetS cases by adopting effective health care and preventive program.

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