Original Paper

Prevalence of Cardiovascular Diseases Risk Factors among Border Guard Bangladesh Personnel

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Abstract

Introduction: The prevalence of cardiovascular diseases (CVDs) is rapidly increasing at an alarming rate worldwide and is currently considered as the leading cause of death. List of both modifiable and non-modifiable risk factors for CVDs are long and no particular group of people is immune from it.

Objectives: To determine the prevalence of CVDs risk factors among the Border Guard Bangladesh (BGB) personnel.

Materials and Methods: This descriptive cross-sectional study was conducted from January to December 2017 among 1225 BGB personnel aged over forty years and working in Chattogram Hill Tracts (CHT) of Bangladesh. Respondents' socio-demographic characteristics, health history and physical activities were collected in a pre-tested questionnaire. Blood pressure (BP), anthropometric and laboratory parameters were measured and categorized as per the standard procedure.

Results: Study subjects' positive family history of hypertension (HTN), ischemic heart disease, diabetes mellitus and bronchial asthma was 9.6%, 1.8%, 7.9% and 14.2% and positive personal history was 11.5%, 2.5%, 9.7% and 5.6% respectively. A positive history of smoking, using Jorda, Gull and extra salt was 20.4%, 8.9%, 3.5% and 16.3% respectively. Among the respondents by systolic BP; elevated BP, stage1 and stage2 HTN was found 41.5%, 17.6% and 5.7% and by diastolic BP it was 20.9%, 10.3% and 6.8% respectively. Nutritional status by body mass index was; obese 1.2% and overweight 52.5% but by waist-hip ratio only 1.7% was obese. Diabetic and pre-diabetic by 'Fasting plasma glucose' was 7.5% and 16% in contrary to 'Oral glucose tolerance test' was 8.7% and 17.5% subjects respectively. Very high, high and borderline high total cholesterol was found among 5.5%, 15.1% and 37.8%; triacylglycerol was 2.2%, 32.7% and 29.6% and LDL-cholesterol was 6.5%, 8.5% and 22.7% respondents respectively. HDL-cholesterol was found low in 12.9% study subjects.

Conclusion: High prevalence of both modifiable and non-modifiable risk factors of CVDs was found among BGB members. Targeted interventions are needed to reduce modifiable risk factors and prevent CVDs.

Key-words: Risk Factors, Cardiovascular Diseases, Border Guard Personnel.

Introduction

The incidence of cardiovascular diseases (CVDs) is rapidly increasing at an alarming rate worldwide and is now considered as the leading cause of death in both developed and developing countries[1,2]. CVDs are rising in developing countries, particularly low and middle-income countries (LMICs), creating a major challenge for the health sector. According to the World Health Organization (WHO), CVDs were the cause of 31% of deaths and 85% of disabilities around the world in 2015, of which 80% ensued in LMICs[1,2]. CVDs and its associated known risk factors account for loss of 13.4% of disability-adjusted life years in Bangladesh[3]. The major non-modifiable CVDs risk factors such as abnormal glucose metabolism, high blood pressure, dyslipidemia along with increasing age are wellestablished[2,4]. Other modifiable behavioural risk factors like unhealthy diet (rich in salt, fat and sugars), poor physical inactivity, obesity, raised body mass index (BMI), waist-hip ratio and harmful use various forms of tobacco are well-known risk factors of CVDs[4].

A study by Chowdhury et al[5] reported that after China and India, Bangladesh has the highest prevalence (5%) of CVDs among LMICs and the prevalence can increase by 8% within 2030. According to the INTER-HEART study[6], Bangladeshis had the highest prevalence of CVD risk factors among five South-Asian countries with the prevalence of self-reported history of hypertension (14.3%), abdominal obesity (43.3%), current and former smoking (59.9%) and the lowest prevalence for regular physical activity (1.3%) and daily intake of fruits and vegetables (8.6%).The rapid economic development and increasing westernized lifestyle of the past few decades have led to increased prevalence of these diseases and has

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attained alarming proportions among Bangladeshi in the recent years[7].

In Bangladesh, 99.6% male and 97.9% females are exposed to at least one of the established risks of CVDs at a younger age[3,8,9]. As paramilitary forces members, Border Guard Bangladesh (BGB) personnel lead a healthy lifestyle which includes regular physical exercise, good nutrition and easy access to preventive healthcare and are thus expected to be healthier than the native population. However, their nature of service is also inherently associated with long hours of work, strong disciplinary mechanisms, stress of separation from family, uncongenial climatic and terrain conditions and the impending fear of enemy action leading to increased risk of CVDs. As per the new rule of BGB, all the members over forty years of age have to maintain a health card and need to come to nearest BGB hospital for a biannual health checkup. This study was conducted among BGB personnel aged over forty years who were working in different units in CHTs to find out the prevalence of CVDs risk factors.

Materials and Methods

This cross-sectional observational study was conducted at BGB hospital, Guimara, Khagrachari from January to December 2017 among 1225 BGB personnel aged over forty years and came for their health checkup. Written informed consent was obtained from all the participants and the study protocol was approved by the hospital authority before starting the study. Data regarding socio-demographic characteristics and health history-related information was collected and anthropometric profile and blood pressure (BP) was measured by trained medical assistants which were recorded in a pre-tested questionnaire. Calibration of all the instruments used in the study was carried out prior to the commencement of the study.

Bodyweight to nearest 0.5 kg was measured by a digital weighing scale. Height to nearest 0.5 cm was measured by using a wall-mounted meter scale. Waist and hip circumference to nearest 0.5 cm was measured by using a standard measuring tape. BMI was calculated by standard formula as [weight in Kg/ (height in m)^2]. Waist-hip ratio was calculated by standard formula as (waist circumference in cm/hip circumference in cm). Nutritional status was categorized by BMI as normal: <25, overweight: 25-29.9 and obese: ≥30, by waist circumference as; normal: <94, moderately obese: 94-101 and severe obese: ≥102 and by waist-hip ratio; normal: <1 and obese: >1. BP status was categorized as per New American College of Cardiology (ACC) and American Heart Association (AHA)[10] guidelines-2017; Normal: (SBP<120 and/or DBP<80 mm Hg), Elevated BP: (SBP 120-129 and/or DBP 80-85 mm Hg), Stage1 HTN: (SBP 130-139 and/or DBP 85-89 mm Hg) and Stage2 HTN: (SBP ≥140 and/or DBP ≥90 mm Hg). Blood samples and urine samples were collected by trained laboratory technician maintaining asepsis and all precautions. Fasting plasma glucose (FPG), oral glucose tolerance test (OGTT), lipid profile levels were measured on the same day of sample collection using standard procedure by a semi-auto analyzer. FPG and OGTT value was expressed in mmol/L and categorized FPG as; normal: <6.1, impaired fasting glucose (IFG): 6.1-6.9 and DM: ≥7.0 and OGTT as; normal: <7.8, impaired glucose tolerance (IGT): 7.8-11.1 and DM: >11.1 mmol/L. In lipid profile total cholesterol (TC), triacylglycerol (TAG) low-density lipoprotein cholesterol (LDL-C) and high-density lipoprotein cholesterol (HDL-C) was expressed in mg/dl. TC was categorized as; normal: <200, borderline high (BLH): 200-239, high: 240-289 and very high: ≥ 290 mg/dl.TAG was categorized as; normal: <150, BLH: 150-199, high: 200-499 and very high: ≥ 500 mg/dl. LDL-C was categorized as; normal: <130, BLH: 130-159, high: 160-189 and very high: ≥ 190 mg/dl. HDL-C was categorized as; low: <40, normal: 40-60 and high: > 60 mg/dl. Urinary sugar was determined by Benedict's qualitative test and categorized as absent or present. Urinary protein was determined by the heat coagulation test and categorized as absent or present. The collected data were assembled in a pre-structured checklist and analyzed using SPSS-21.0 for Windows. The categorical data were expressed in frequency and percentage and numerical data as mean±SD.

Results

All 1225 study subjects were over 40 years old and among them, 348 (28.4%) were above 50 years of age. Table-I shows study subjects' rank, blood group, medical category and monthly family income. Positive family history of HTN, IHD, DM and bronchial asthma was found among 9.6%, 1.8%, 7.9% and 14.2% subjects respectively (Table-II). Positive personal history of HTN, IHD, DM and bronchial asthma was among 11.5%, 2.5%, 9.7% and 5.6% subjects respectively (Table-III). A positive history of smoking, using Jorda, Gull and taking extra salt was among 20.4%, 8.9%, 3.5% and 16.3% respectively (Table-III). By systolic BP; stage2 HTN, Stage1 HTN and elevated BP was found among 5.7%, 17.6% and 41.5% respectively; in contrary by diastoloci BP; it was among 6.9%, 10.3% and 20.9% of respondents respectively. According to BMI status, 1.2% of participants were obese and 52.5% were overweight, by waist circumference 1% was severely obese and 15.5% were moderately obese in contrast by waist-hip ratio only 1.7% was obese (Table-IV).

Table-I: Socio-demographic characteristics of respondents (n=1225)

Characteristics		Frequency	Percentage
Age	40-49	877	71.6
	50-59	348	28.4
Rank	JCO	126	10.3
	NCO	974	79.5
	Sepoy	92	7.5
	Civilian	33	2.7
Blood group	O+ve	366	29.9
	O-ve	16	1.3
	A+ve	327	26.7
	A-ve	11	0.9
	B+ve	396	32.3
	B-ve	16	1.3
	AB+ve	91	7.5
	AB-ve	2	0.1
Medical Category	A	1143	93.3
	B	27	2.2
	C	55	4.5
Monthly family income (BDT)	< 20000	80	6.5
	20000-40000	953	77.8
	> 40000	192	15.7

Table-II: Respondents' family history of CVD risk factors (n=1225)

Family History		Frequency	Percentage
HTN	Yes	118	9.6
	No	1107	90.4
IHD	Yes	22	1.8
	No	1203	97.2
DM	Yes	97	7.9
	No	1128	92.1
Bronchial Asthma	Yes	173	14.1
	No	1052	85.9

Table-III: History of CVD risk factors among respondents (n=1225)

CVD risk factors		Frequency	Percentage
HTN	Yes	141	11.5
	No	1084	88.5
IHD	Yes	31	2.5
	No	1194	97.5
DM	Yes	119	9.7
	No	1106	90.3
Asthma	Yes	69	5.6
	No	1156	94.4
Smoking	Yes	250	20.4
	No	975	79.6
Jorda	Yes	109	8.9
	No	1116	91.1
Gull	Yes	43	3.5
	No	1182	96.5
Extra salt	Yes	200	16.3
	No	1025	83.7

Regarding biochemical parameters; by FPG value 7.5% of subjects were diabetic and 16% were pre-diabetic (IFG), in contrast, by OGTT value, 8.7% were diabetic and 17.5% were pre-diabetic (IGT). Total cholesterol level was very high, high and borderline high among 5.5%, 15.1% and 37.8% of study subjects respectively. TAG level was very high, high and borderline high among 2.2%, 32.7% and 29.6% of respondents respectively. LDL-cholesterol level was very high, high and borderline high among 6.5%, 8.5% and 22.7% of respondents respectively. HDL-cholesterol level found low in 12.9% study subjects. Urinary sugar and protein was positive among 7.7% and 1.3% of study subjects respectively (Table-V)

Table-IV: Anthropometric measurement of study subjects (n=1225)

Anthropometric Measurement		Frequency	Percentage
Systolic BP (mm of Hg)	Normal: < 120	432	35.3
	Elevated SBP: 120-129	508	41.5
	Stage1 HTN:130-139	215	17.6
	Stage2 HTN: ≥ 140	70	5.7
Diastolic BP (mm of Hg)	Normal: < 80	758	61.9
	Elevated DBP: 81-84	257	20.9
	Stage1 HTN: 85-89	126	10.3
	Stage2 HTN: ≥ 90	84	6.9
BMI (kg/m^2)	Normal: < 25	567	46.3
	Overweight: 25-29.9	643	52.5
	Obese: ≥ 30	15	1.2
Waist circumference (in cm)	Normal: < 94	1023	83.5
	Moderate obese: 94-101	190	15.5
	Severe obese: ≥ 102 cm	12	1.0
Waist- Hip ratio	Normal: <1	1204	98.3
	Obese: ≥ 1	21	1.7

Table-V: Biochemical parameters of CVD risk factors (n=1225)

Biochemical parameters		Frequency	Percentage
Fasting plasma glucose (mmol/L)	Normal (<6.1)	937	76.5
	IFG (6.1-6.9)	196	16.0
	DM(≥ 7.0)	92	7.5
OGTT value (mmol/L)	Normal (<7.8)	905	73.8
	IGT (7.8-11.1)	213	17.5
	DM (>11.1)	107	8.7
Total Cholesterol (mg/dl)	Normal (<200)	510	41.6
	Borderline High (200-239)	463	37.8
	High (240-289)	184	15.1
	Very high (≥ 290)	68	5.5
Triacyl glycerol (mg/dl)	Normal (<150)	435	35.5
	Borderline High (150-199)	362	29.6
	High (200-499)	401	32.7
	Very high (≥ 500)	27	2.2
LDL Cholesterol (mg/dl)	Normal (<130)	763	62.3
	Borderline High (130-159)	278	22.7
	High (160-189)	104	8.5
	Very high (≥ 190)	80	6.5
HDL Cholesterol (mg/dl)	Less(<40)	158	12.9
	Normal (40-60)	919	75.0
	High >60	148	12.1
Urine Sugar	Absent	1131	92.3
	Present	94	7.7
Urine protein	Absent	1209	98.7
	Present	16	1.3

Discussion

This study revealed a lower prevalence of positive family history and personal history of CVDs risk factors among study subjects. The prevalence of obesity was 1.2% which is lower than the WHO statistics for Bangladesh[11] revealed in 2016 (3.0%). The prevalence of stage1 and stage2 HTN was also lower than the same WHO statistics[11]. These variations from WHO data and present study can probably be explained on the basis of regular physical activity and healthy lifestyle followed by BGB personnel. However, the findings are consistent with nationwide statistics available from Biswas T et al[12] in 2017 and Fatema K et al[13], in 2016. The various people have a different prevalence of CVDs risk factors due to genetic, socio-cultural and dietary habits. As members of BGB comprise a heterogeneous group of persons from across the country so it might be considered as more reliable data.

Prevalence of high biochemical risk factors like FPG, OGTT, TC, TAG and LDL-C was much higher than the estimates available from a national study by Zaman MM et al[7], in 2016 but consistent with the other national[14,15] and international studies[16,17]. CVDs are both a life-course and lifestyle disease, subjects of the present study were aged over forty years with a higher risk of developing CVDs and a large proportion of this study participants were found suffering from pre-obese, elevated BP, stage1 and stage2 hypertensive state and also high blood sugar and lipid profile status.

Conclusion

High prevalence of modifiable and non-modifiable risk factors of CVDs was found among BGB members. Targeted interventions like regular motivation for controlling modifiable risk factors, early diagnosis and treatment of HTN and DM are needed to prevent CVDs.

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