

## Prevalence of Risk Factors of Coronary Heart Diseases among Tribal Population of Bangladesh

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### Abstract

**Introduction:** Coronary heart diseases (CHDs) are considered as the leading cause of death. List of both modifiable and non-modifiable risk factors for CHDs are long and no particular group of people is immune from it. Tribal populations of Bangladesh are group of people having their own customs and traditions.

**Objectives:** To determine the prevalence of risk factors of CHDs among the tribal population of Chattagram Hill Tracts, Bangladesh.

**Materials and Methods:** This descriptive cross-sectional study was conducted from July to December 2017 among 190 Tribal personnel aged over forty years and living 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:** Respondents' positive history of HTN, IHD and DM among male was 22.1%, 17.2% and 20.7% respectively and among female was 18.6%, 14.5% and 15.9% respectively. BP status was; stage2 HTN, Stage1 HTN and elevated BP among male respondents was 6.9%, 9.7% and 11.7% respectively; in contrary among female respondents it was 4.8%, 6.9% and 9.0% respectively. According to BMI status, 3.4% male and 4.8% female was obese and 15.9% male and 19.3% female was overweight. Regarding biochemical risk factors; by FPG value 9.0% male and 11.7% female respondents were diabetic and 18.6% male and 14.5% female respondents were pre-diabetic. Total cholesterol level was very high, high and borderline high among male respondents was 5.5%, 9.6% and 22.1% respectively and among female respondents 7.6%, 13.1% and 25.5% respectively. TAG level was very high, high and borderline high among male respondents was 6.2%, 9.0% and 17.9% respectively and among female respondents 7.6%, 11.0% and 15.9% respectively. LDL cholesterol level was very high, high and borderline high among male respondents was 6.9%, 11.0% and 18.6% respectively and among female respondents 4.8%, 7.6% and 15.2% respectively. HDL cholesterol level was lower than normal among 10.3% male respondents and 5.5% among female respondents.

**Conclusion:** Prevalence of both modifiable and non-modifiable risk factors of CHDs was less among tribal population. Tribal people's lifestyle and food habits might have positive impact. Targeted interventions can be implemented to reduce modifiable risk factors and prevent CHDs.

**Key-words:** Risk factors, Coronary heart diseases, Tribal population, Chattagram hill tracts.

### Introduction

The incidence of coronary heart diseases (CHDs) are rapidly increasing at an alarming rate worldwide and is now considered as the leading cause of death in both developed and developing countries<sup>1-3</sup>. CHDs are rising in developing countries and creating a major challenge for the health sector<sup>4</sup>. According to the World Health Organization (WHO), CHDs were the cause of 31% of deaths and 85% of disabilities around the world in 2015, of which 80% ensued in developing countries<sup>1,5</sup>. The major non-modifiable CHDs risk factors such as abnormal glucose metabolism, high blood pressure, dyslipidemia along with increasing age are well established<sup>2,6,7</sup>. Other modifiable behavioral risk factors like unhealthy diet, physical inactivity, obesity, and harmful use various forms of tobacco are well-known risk factors of CHDs<sup>4,8</sup>.

Study by world bank<sup>6</sup> on tackling of non-communicable disease found Bangladeshis had the highest prevalence of CHD 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 attained alarming proportions among Bangladeshi in the recent years<sup>7,9,10</sup>.

In Bangladesh, 99.6% male and 97.9% females are exposed to at least one of the established risks of CHDs at a younger age<sup>11-14</sup>. Tribal population of Khagrachari, Bangladesh lives in a hilly terrain. For geographical region they lead a healthy lifestyle including regular physical activities, on the other hand they have lack of education and limited health care facilities. However, they have their own customs and traditions. As part of pacification program border guard hospital Guimara, Khagrachari provides health care support to the locals. Since CHDs are leading cause of death and study among tribal population is very less so this study was designed to see the prevalence of CHDs' risk factors among tribal population of Guimara, Khagrachari of Chattogram Hill Tracts (CHT).

### Materials and Methods

This cross-sectional observational study was conducted at BGB hospital, Guimara, Khagrachari from July to December 2017 among 190 Tribal personnel aged over forty years and living in CHT of Bangladesh. All the study subjects came to Border Guard Bangladesh (BGB) hospital for outdoor treatment as part of pacification program. Informed written consent was obtained from all the participants and the study protocol was approved by the hospital authority before starting the study. Respondents' socio-demographic characteristics and health history-related information

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was collected and anthropometric profile and blood pressure (BP) and laboratory parameters were measured and categorized as per the standard procedure and recorded in a pre-tested questionnaire.

Bodyweight to nearest to 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. BMI was calculated by standard formula as [weight in Kg/ (height in m)<sup>2</sup>]. Nutritional status was categorized by BMI as normal: <25, overweight: 25-29.9 and obese: ≥30. BP status was categorized as per New American College of Cardiology (ACC) and American Heart Association (AHA) 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 were collected by trained laboratory technician maintaining asepsis and all precautions. Fasting plasma glucose (FPG), lipid profile levels were measured on the same day of sample collection using standard procedure by a semi-auto analyzer. FPG value was expressed in mmol/L and categorized as; normal: <6.1, impaired fasting glucose (IFG): 6.1-6.9 and DM: ≥7.0. 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. 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

A Total of 290 tribal populations from Khagrachari district of Chattagram hill tract were study subjects among them 145 were male and 145 were female. All of the study subjects were over 40 years old and among them, 16(11.0%) male and 18(12.4%) female were above 60 years of age. Education status found most of the respondents 76(52.4%) male and 82(56.6%) female was illiterate. Most of the respondents' 78(53.8%) male and 97(66.9%) occupation was farming and their family income was less than 10000 Taka (Table-I). Positive family history of HTN, IHD, and DM was found 44(30.3%), 39(26.9%) and 48(33.1%) among male respondents and 37(25.5%), 34(23.4%) and 36(24.8%) among female respondents respectively (Table-II). Positive history of smoking, and taking extra salt was 123(84.8%) and 119(82.1%) among male and 131(90.3%) and 124(85.5%) among female. Positive history of HTN, IHD and DM among male respondents was 32(22.1%), 25(17.2%) and 30(20.7%) respectively and among female respondents 27(18.6%), 21(14.5%) and 23(15.9%) respectively (Table-III). BP status was; stage2 HTN, Stage1 HTN and elevated BP among male respondents was 10(6.9%), 14(9.7%) and 17(11.7%) respectively; in contrary among female respondents it was 7(4.8%), 10(6.9%) and 13(9.0%) respectively. According to BMI status, 5(3.4%) male and 7(4.8%) female was obese and 23(15.9%) male and 28(19.3%) female was overweight (Table-IV).

Regarding biochemical risk factors; by FPG value 13(9.0%) male and 17(11.7%) female respondents were diabetic and 27(18.6%) male and 21(14.5%) female respondents were pre-diabetic (IFG).

Total cholesterol level was very high, high and borderline high among male respondents was 8(5.5%), 14(9.6%) and 32(22.1%) respectively and among female respondents 11(7.6%), 19(13.1%) and 37(25.5%) respectively. TAG level was very high, high and borderline high among male respondents was 9(6.2%), 13(9.0%) and 26(17.9%) respectively and among female respondents 11(7.6%), 16(11.0%) and 23(15.9%) respectively.

LDL cholesterol level was very high, high and borderline high among male respondents was 10(6.9%), 16(11.0%) and 27(18.6%) respectively and among female respondents 7(4.8%), 11(7.6%) and 22(15.2%) respectively. HDL cholesterol level was lower than normal among 15(10.3%) male respondents and 8(5.5%) among female respondents (Table-V).

**Table-I:** Socio-demographic characteristics of respondents

Characteristics		Male n(%)	Female n(%)
Age in years	41-50	82(56.6)	86(59.3)
	51-60	47(32.4)	41(28.3)
	≥60	16(11.0)	18(12.4)
Education status	Illiterate	76(52.4)	82(56.6)
	Primary	43(29.7)	35(24.1)
	Secondary	21(14.5)	18(12.4)
	≥Higher secondary	5(3.4)	10(6.9)
Occupation status	Farming	78(53.8)	97(66.9)
	Business	32(22.1)	25(17.2)
	Services	22(15.2)	09(6.2)
	Others	13(8.9)	14(9.7)
Monthly family income (BDT)	< 10000	89(61.4)	95(65.5)
	10000-20000	41(28.3)	38(26.2)
	> 20000	15(10.3)	12(8.3)

**Table-II:** Respondents' family history of CHD risk factors

Family History of		Male n(%)	Female n(%)
HTN	Yes	44(30.3)	37(25.5)
	No	101(69.7)	108(74.5)
IHD	Yes	39(26.9)	34(23.4)
	No	106(73.1)	111(76.6)
DM	Yes	48(33.1)	36(24.8)
	No	97(66.9)	109(75.2)

**Table-III:** History of CVD risk factors among respondents

CVD risk factors		Male n(%)	Female n(%)
HTN	Yes	32(22.1)	27(18.6)
	No	113(77.9)	118(81.4)
IHD	Yes	25(17.2)	21(14.5)
	No	120(82.8)	124(85.5)
DM	Yes	30(20.7)	23(15.9)
	No	115(79.3)	122(84.1)
Smoking	Yes	123(84.8)	131(90.3)
	No	22(15.2)	14(9.7)
Extra salt	Yes	119(82.1)	124(85.5)
	No	26(17.9)	21(14.5)

Table-IV: Anthropometric measurement of study subjects

Anthropometric Measurement		Male n(%)	Female n(%)
Blood pressure (mm of Hg)	<b>Normal:</b> SBP<120 and/or DBP< 80	104(71.7)	115(79.3)
	<b>Elevated:</b> SBP=120-129 and/or DBP= 81-84	17(11.7)	13(9.0)
	<b>Stage1 HTN:</b> SBP=130-139 and/or DBP= 85-89	14(9.7)	10(6.9)
	<b>Stage2 HTN:</b> SBP≥ 140 and/or DBP≥ 90	10(6.9)	7(4.8)
BMI (kg/m <sup>2</sup> )	<b>Normal:</b> < 25	117(80.7)	110(75.9)
	<b>Overweight:</b> 25-29.9	23(15.9)	28(19.3)
	<b>Obese:</b> ≥ 30	5(3.4)	7(4.8)

Table-V: Biochemical parameters of CVD risk factors

Biochemical parameters		Male n(%)	Female n(%)
Fasting plasma glucose (mmol/L)	Normal (<6.1)	105(72.4)	107(73.8)
	IFG (6.1-6.9)	27(18.6)	21(14.5)
	DM(≥ 7.0)	13(9.0)	17(11.7)
Total Cholesterol (mg/dl)	Normal (<200)	91(62.8)	78(53.8)
	Border line High (200-239)	32(22.1)	37(25.5)
	High (240-289)	14(9.6)	19(13.1)
	Very high (≥ 290)	8(5.5)	11(7.6)
Triacylglycerol (mg/dl)	Normal (<150)	97(66.9)	95(65.5)
	Border line High (150-199)	26(17.9)	23(15.9)
	High (200-499)	13(9.0)	16(11.0)
	Very high (≥ 500)	9(6.2)	11(7.6)
LDL Cholesterol (mg/dl)	Normal (<130)	92(63.4)	105(72.4)
	Border line High (130-159)	27(18.6)	22(15.2)
	High (160-189)	16(11.0)	11(7.6)
	Very high (≥ 190)	10(6.9)	7(4.8)
HDL Cholesterol (mg/dl)	Less(<40)	15(10.3)	8(5.5)
	Normal (40-60)	83(57.2)	78(53.8)
	High >60	47(32.4)	59(40.7)

## Discussion

This study revealed a lower prevalence of positive family history and personal history of CHDs risk factors among study subjects. The prevalence of obesity was 3.4% among male and 4.8% among female which is lower than the WHO statistics for Bangladesh<sup>3</sup> revealed in 2017. The prevalence of stage1 and stage2 HTN was 9.7% and 6.9% among male and 6.9% and 4.8% among female respectively which was also lower than the same WHO statistics<sup>11</sup>. These variations from WHO data and present study can probably be explained on the basis of regular physical activity and healthy lifestyle of tribal population. However, the findings are consistent with nationwide statistics available from Biswas T et al<sup>12</sup> in 2017 and Fatema K et al<sup>13</sup>, in 2016.

Prevalence of DM was 9.0% among male and 11.7% among female population. Prevalence of high biochemical risk factors like FPG, TC, TAG and LDL-C was much lower than the estimates available from a national study by Zaman MM et al<sup>10</sup>, in 2016 but consistent with the other national<sup>14,15</sup> and international studies<sup>15,16</sup>. CHDs are both a life-course and lifestyle disease, subjects of the present study were

aged over forty years with a higher risk of developing CHDs and a 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

Prevalence of modifiable and non-modifiable risk factors of CHDs was relatively less among tribal population. Targeted interventions like regular motivation for controlling modifiable risk factors, early diagnosis and treatment of HTN and DM are needed to prevent CHDs.

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