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Do obesity, hypertension and dyslipidemia pose significant risks for coronary artery disease among Bangladeshi diabetics?

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Abstract

Background and objectives: For decades the global population has been experiencing diabetic epidemic. The risks related to obesity, diabetes mellitus (DM) and coronary artery diseases (CAD) are well known. This study aimed to assess the prevalence of coronary artery disease (CAD) and its related risks in Bangladeshi diabetics.

Materials and methods: The study was conducted at Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM), a largest referral center for diabetes in Bangladesh. Socio-demographic and clinical history including biochemical investigation report were collected from the BIRDEM registry. The eligible criteria of study participants were: age 30 – 60 year, having DM, non-smoker, free from retinopathy, nephropathy and neuropathy. The prevalence of CAD, systolic hypertension (SHTN) and diastolic hypertension (DHTN) in the registered diabetic patients were estimated. Additionally, the study addressed the risk and predictors of CAD among those with DM.

Investigations included – anthropometry, blood pressure, blood glucose, serum lipids and electrocardiogram (ECG). CAD was diagnosed on: (a) history of angina plus positive ECG - either on rest or on stress, post-myocardial infarction (MI) with Q-wave MI or non-Q-MI or echocardiographic evidences. Lipids namely triglycerides (TG), total cholesterol (T-Chol), high density lipoproteins (HDL) and low-density lipoproteins (LDL) were estimated by Hitachi-704 auto-analyzer using enzymatic method.

Results: A total of 693 (M /W =295/398) participants volunteered. The prevalence of CAD, SHTN, DHTN and mean arterial hypertension (MAH) were 18.6%, 23.2%, 13.6% and 17.7%, respectively. Their mean (±SD) values of age, body mass index (BMI - kg/m^2), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR) and mean arterial pressure (MAP) were 47 (8.6) years, 24.6 (3.5), 0.98(0.05), 0.56(0.06) and 101(11.3) mmHg, respectively. The mean (±SD) of FBG (mmol/L), T-Chol, TG and HDL (mg/dl) were 10.2 ± 4.0, 206 ± 44, 218 ± 86 and 47.5 ± 9.3 respectively. The women had significantly higher BMI ($p<0.001$), WHtR ($p<0.001$), SBP (<0.001), MAP ($p<0.001$), T-Chol ($p<0.001$) and TG ($p=0.043$) than men. The risk variables were categorized into quartiles and Chi-sq trend determined whether the increasing prevalence of CAD were significant. Higher quartile of age was found consistently significant ($p<0.001$). Of the obesity indices, only higher quartile of WHtR was significant ($p< 0.05$). For BP measures, higher MAP quartiles showed the trend significant ($p<0.001$). Likewise, for lipids, higher quartiles of TG ($p<0.001$) and lower quartile of HDL ($p<0.001$) were significant.

Finally, logistic regression estimated the risk related to CAD. The highest age-quintile (>55y:

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95% CI: 1.09 - 43.7) and highest TG-quintile (281mg/dl: 95% CI: 1.45-59.7) were proved to be significant predictor of CAD and HDL highest quintile (>54mg/dl) was proved to be significant protecting factor for CAD (95% CI: 0.005-0.583).

Conclusion: The study observed the importance of MAP, TG, HDL, T-Chol/HDLR (T-Chol -to HDL ratio) and TG/HDLR (triglycerides-to HDL ratio) as risks for CAD among diabetics. Further study with investigations of echocardiogram, ETT, coronary angiogram and coronary calcium scoring would be helpful in confirming these findings related to CAD risks.

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Introduction

According to World Health Organization (WHO) cardiovascular diseases (CVDs) are the leading cause of death, taking approximately 18 million lives annually globally [1]. There have been many newer published reports highlighting high arterial pressure and dyslipidemia as important risk for coronary artery disease (CAD) [2,3]. Four out of five CVD deaths are due to heart attacks and strokes [1]. One third of these deaths occur prematurely below (<70y). Several risk factors are shared between Type2 diabetes (T2D) and CAD, including obesity, insulin resistance and dyslipidemia [4,5]. CAD can precede type 2 diabetes (T2D), which is a major risk factor for CVD [6]. It may be recalled that 1in 10 adults of the world are now living with diabetes [7]. For Bangladeshi diabetic population the findings of coronary risks were reported mainly on age, sex, geographical site, occupation, obesity, hypertension, and glycemic control [8]. This study revisited the published report comparing the risk of CAD related to obesity, elevated mean arterial hypertension and dyslipidemia. It also showed the effect of high total cholesterol (T-Chol), high triglyceride (TG) and low high-density lipoprotein (HDL) on CAD separately. Additionally, it demonstrated the effect of T-Chol-to-HDL ration (T-Chol/ HDLR) and TG-to-HDL ratio (TG/HDLR) on CAD.

Materials and methods

Study design: Subjects and methods have been detailed in the previous published report [8]. Briefly the selection procedure is elaborated in the Figure-1. The duration of diabetes (mean ±S.D.) was 13.6 ± 3.6 (range 2–18) months. Informed consent was taken and they were interviewed for the clinical history related to initial investigations and diagnosis, smoking habits, family history of diabetes, HTN and atherosclerotic cardiovascular events and their drug history (if any). They were also interviewed for past illness about HTN and CAD followed by general and systemic examination.

Then, based on clinical findings, relevant investigations were undertaken in BIRDEM for confirmation ofthe diagnosis. The subjects with secondary HTN, cerebrovascular stroke, foot ulcer, nephropathy and retinopathy were excluded from the study. Those who were using corticosteroid and contraceptive pills were also excluded.

Anthropometric assessment included body mass index (BMI), waist-to-hip ration (WHR) and waist-to-height ration (WHtR). Mean arterial pressure (MAP) was estimated as (MAP = dbp + 1/3(sbp – dbp) [9]. For this study elevated (>110mmHg) MAP was considered. Systolic (SHTN) and diastolic (DHTN) hypertension were taken as SBP ≥140 and DBP ≥90 mmHg, respectively. Hypertensive subjects previously diagnosed were also included. Their BP was taken 2 days after cessation of anti-hypertensive drugs. World Health Organization (WHO) diagnostic criteria were used to diagnose diabetes mellitus.

The measurements of plasma glucose were done by glucose-oxydase peroxydase method using Technicon M-II autoanalyzer. All subjects underwent ECG-tracing except those with recent ECG reports. The diagnosis of CAD was based on: (a) history of angina plus positive ECG either on rest or on stress, post-myocardial infarction (MI) with Q-wave MI or non-Q-MI in echocardigraphic evidences. Lipids (TG, Chol, HDL, LDL) were estimated by Hitachi-704 auto-analyzer using enzymatic method. LDL-cholesterol (LDL) was measured using formula: LDL-C = 0.9 TC- (0.9 TG/5)-28 [18].

BIRDEM Diabetes Registry from 1991 to 1995			
Year	**Registered Patient**	**Men**	**Women**
1991	11240	7097	4143
1992	12881	8024	4857
1993	12180	7591	4589
1994	12562	7700	4862
1995	11642	7045	4597

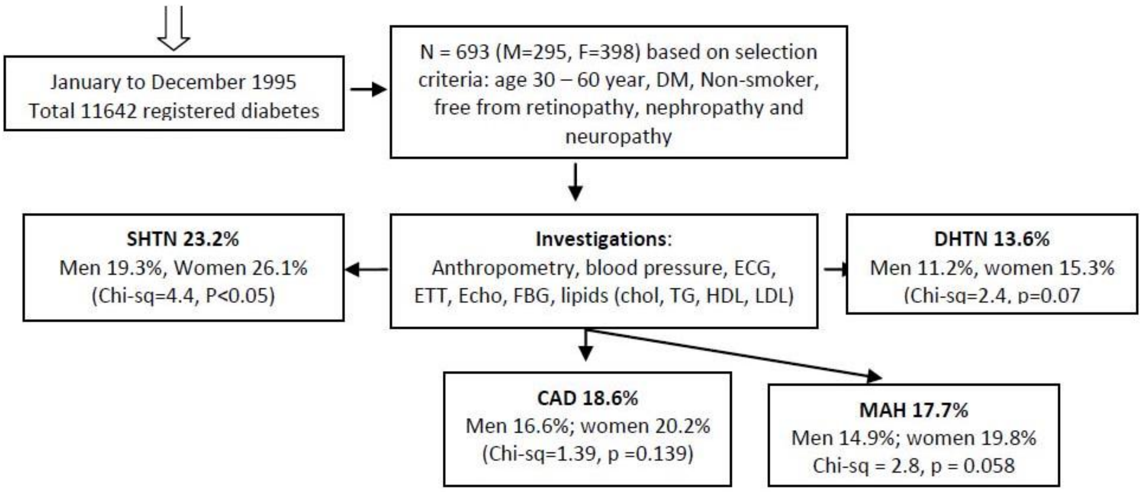

Figure-1: *Selection of study participants from the BIRDEM diabetes registry. CAD-coronary artery disease; SHTN-systolic hypertension; DHTN-diastolic hypertension; MAH-mean arterial hypertension (MAP >110mmHg)*

Statistical analysis: The prevalence rates (qualitative variables) were given in percentages. The quantitative variables were presented in means with standard deviation (SD). The comparisons between groups were estimated by unpaired t-test. The associations between anthropometrics and lipid fractions were estimated by Pearson's correlations co-efficient. The prevalence trends (increasing / decreasing) were estimated by Chi-sq. Binary logistic regression analysis showed the effects of independent variables (obesity, blood pressure, lipids) on the dependent variables CAD. The significance levels of all statistical tests were taken at 0.05.

Results

A total of 693 (M=295, F=398) registered diabetic patients of age 30 – 60 year volunteered the study (Figure1). The prevalence of CAD was 18.6% (men vs. women = 16.6 vs. 20.2%; p = 0.139). The prevalence of systolic hypertension (SHTN) was 23.2% (men vs. women = 19.3 vs. 26.1%, p<0.05) and prevalence of diastolic hypertension (DHTN) was 13.6% (men vs. women = 11.2 vs. 15.3%, p =0.07). The prevalence of mean arterial hypertension (MAH) was 17.7% (men vs. women = 14.9 vs. 19.8, p = 0.058).

The biophysical characteristics of all participants were shown in Table-1a. The comparisons of these characteristics between men and women were shown in Table-1b. The comparison between age-matched 295 men and 398 women showed that the women had significantly higher BMI (p<0.001), WHtR (p<0.001), SBP (p<0.001), MAP (p = 0.002), T-Chol (p<0.001) and TG (p<0.05) than their male counterpart. Thus, most of the obesity and blood pressure related variables were higher in women than men, except WHR, which was significantly higher (p<0.001) in men.

Table-1a: *Biophysical characteristics of the total participants*

Variables	n	Mean ± SD	95% CI
Age (y)	693	47.0 ± 8.6	46.4 – 47.72
BMI	693	24.5 ± 3.4	24.3 –24.9
WHR	693	0.98 ± 0.05	0.976 – 0.984
WHTR	693	0.55 ± 0.06	0.555 –0.564
SBP mmHg	693	136.2 ± 19.2	134.8 –137.6
DBP mmHg	693	83.3 ± 8.8	82.73 – 84.05
MAP mmHg	693	101.0 ± 11.3	100.1 –101.8
FBG mmol/ L	693	10.1 ± 3.9	9.8 –10.45
Chol mg/dl	693	206.8 ± 44.2	203.5 –210.1
TG mg/dl	123	218.1 85.5	202.8 –233.4
HDL mg/dl	123	47.5 ± 9.2	45.8 –49.18
LDL mg/dl	123	133.9 ± 41.2	126.5 – 141.2

Note: (n =693; for lipid fractions [T-Chol, TG, HDL, LDL] randomized sample n=123)

Table-1b: *Comparison of biophysical characteristics between men and women*

Variables	Men Mean ± SD	Women Mean ± SD	*p*
Age (yr)	47.2 ± 8.2	46.9 ± 8.9	0.599
BMI	23.7 ± 2.80	25.2 ± 3.75	0.000
WHR	0.99 ± 0.05	0.97 ± 0.05	0.000
WHtR	0.52 ± 0.03	0.58 ± .057	0.000
SBP (mmHg)	132 ± 17.6	139 ± 19.8	0.000
DBP (mmHg)	83.1 ± 8.6	83.6 ± 8.9	0.431
MAP (mmHg)	99.4 ± 10.6	102 ± 11.6	0.002
FBG (mmol/L)	10.1 ± 4.11	10.2 ± 3.8	0.698
Chol (mg/dl)	198.4 ± 41.4	213.0 ± 45.2	0.000
TG (mg/dl)	192.4 ± 70.7	227.0 ± 88.9	0.043
HDL (mg/dl)	47.7 ± 8.9	47.4 ± 9.4	0.864
LDL (mg/dl)	130.9 ± 45.0	135 ± 39.9	0.64

Note: (M / W = 295 / 398; for lipid fractions [T-Chol, TG, HDL, LDL] randomized sample M/W =33 / 90); SD – standard deviation; p– after unpaired t-test.

The Pearson's correlation test, controlling age and sex, was used to determine the associations between obesity related variables (BMI, WHR, WHtR) and lipid fractions (T-Chol, TG, HDL, LDL) [Table-2]. Significant correlations of lipid-fractions were neither found with general (BMI) nor with central obesity (WHR, WHtR). The correlations of lipid fractions with BP measures (SBP, DBP and MAP) were shown in Table-3. Of the lipids, TG showed significant positive and HDL significant negative correlations with all BP measures though these correlations with T-Chol and LDL were not significant.

Table-4 depicted correlations (controlling for age and sex) between blood pressure and metabolic variables (T-Chol, TG, HDL, LDL, FBG). All BP measures (SBP, DBP and MAP) correlated significantly with T-Chol/HDLR and TG/HDLR, but not with FBG.

Table-2: *Correlations (controlling for age and sex) between obesity and lipids related variables*

		CHOL	**LDL**	**TG**	**HDL**
BMI	*r*	.044	.033	.048	-.025
	p	*.631*	*.716*	*.603*	*.788*
	df	119	119	119	119
WHR	*r*	.021	.017	.028	-.025
	p	*.815*	*.851*	*.762*	*.783*
	df	119	119	119	119
WHTR	*r*	.046	.045	.081	-.131
	p	*.613*	*.623*	*.377*	*.152*
	df	119	119	119	119

Note: BMI – body mass index, WHR – waist-to-height ration, WHtR-Waist-to-height ratio; r – Correlation coefficient; p – level of significance (two-tail); df – degree of freedom.

Table-3*: Correlations of lipid related variables (T-Chol, TG, HDL, LDL) with SBP, DBP and MAP (controlling for age and sex).*

Variables		**SBP**	**DBP**	**MAP**	**TG**	**HDL**	**CHOL**	**LDL**
SBP	r	1.000	.730	.931	.217	-.302	.126	-.009
	p	.	.000	.000	.017	.001	.168	.922
	df	0	119	119	119	119	119	119
DBP	r		1.000	.929	.199	-.287	.099	.021
	p		.	.000	.029	.001	.280	.823
	df		0	119	119	119	119	119
MAP	r			1.000	.224	-.317	.121	.006
	p			.	.014	.000	.186	.947
	df			0	119	119	119	119
TG	r				1.000	-.319	.269	-.065
	p				.	.000	.003	.475
	df				0	119	119	119
HDL	r					1.000	.042	.017
	p					.	.648	.856
	df					0	119	119
CHOL	r						1.000	.822
	p						.	.000
	df						0	119
LDL	r							1.000
	p							.
	df							0

Note: SBP– systolic BP, DBP – diastolic BP, MAP – mean arterial pressure. r – Correlation coefficient, p – level of significance (two-tail), df – degree of freedom.

Table-4: *Correlations of BP measures with metabolic variables like ratios of lipid fractions (CHOL/HDLR, TG/HDLR) and FBG.*

Variables		CHOL/HDLR	TG/HDLR	SBP	DBP	MAP	FBG
CHOL/HDLR	r	1.000	.577	.266	.241	.272	-.010
	p	.	*.000*	*.003*	*.008*	*.003*	*.914*
	df	0	119	119	119	119	119
TG/HDLR	r		1.000	.270	.240	.274	.082
	p		.	*.003*	*.008*	*.002*	*.374*
	df		0	119	119	119	119
SBP	r			1.000	.730	.931	-.013
	p			.	*.000*	*.000*	*.887*
	df			0	119	119	119
DBP	r				1.000	.929	-.092
	p				.	*.000*	*.317*
	df				0	119	119
MAP	r					1.000	-.056
	p					.	*.541*
	df					0	119

Note: CHOL/HDLR - cholesterol-to-HDL; TG/HDLR - TG-to HDL ratio; FBG - fasting blood glucose; SBP & DBP- systolic and diastolic blood pressure; MAP - mean arterial pressure; r - correlation coefficient, p - level of significance (two-tail); df - degree of freedom.

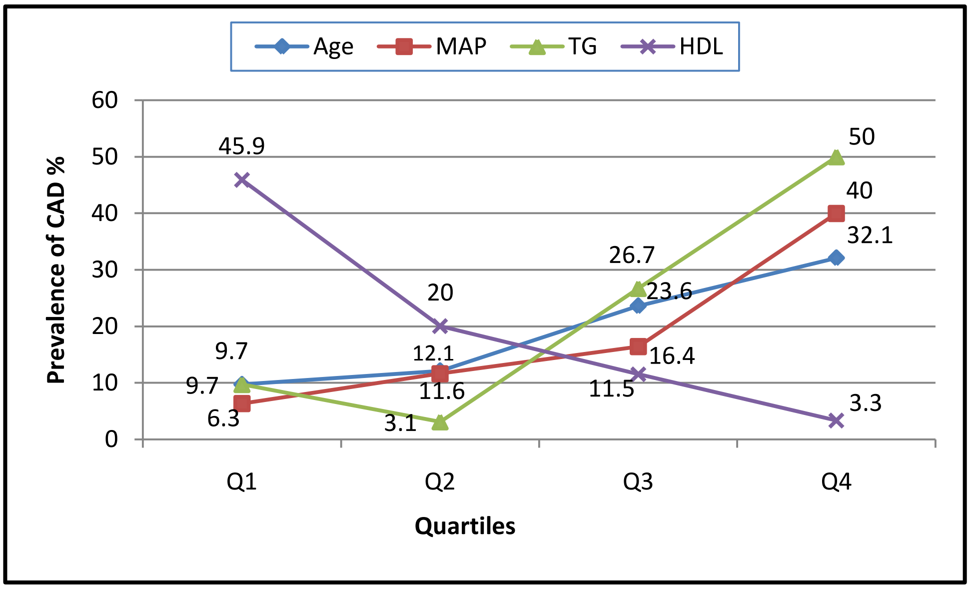

Figure-2: *Prevalence (%) of CAD according to quartiles (Q1, Q2, Q3, Q4) of age, MAP, TG and HDL. Age (y): Q1<40, Q2 41- 47, Q3 48-55, Q4 >55; HDL mg /dl: Q1 <41, Q2 41-48, Q3 48-53, Q4 >53; MAP mmHg: Q1 <93, Q2 94-100, Q3 101- 106, Q4 >106.*

Whether the prevalence of CAD was related to advancing age, increasing mean arterial pressure (MAP), TG and decreasing with increasing HDL level are shown in Figure-2. The prevalence of CAD according to quartiles of age, MAP, TG and HDL were estimated by chi-sq trend with level of

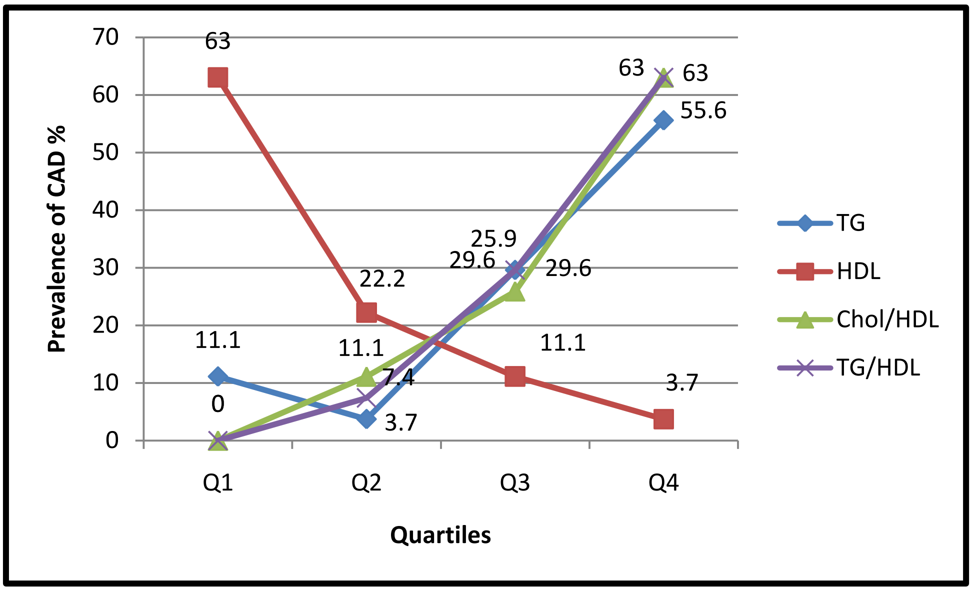

Figure-3: *Prevalence (%) of CAD according to quartiles (Q1, Q2, Q3, Q4) of TG, HDL, T-Chol / HDL ratio and TG / HDL ratio. The trends were significant (chi Sq, P) for increasing quartiles of TG (23.5, <0.001) and decreasing HDL (20.2, <0.001), T-Chol/HDL ratio (30.7<0.001) and TG/HDL ratio (30.7, <0.001). Quartile values of TG, mg / dl: Q1 <153, Q2 154 - 201, Q3 202 - 280, Q4 >280; Quartile values of HDL mg / dl: Q1 <41, Q2 41 - 48, Q3 48 - 53, Q4 >53; Quartile values of TG/HDL; Q1 <3.03, Q2 3.04 - 4.23, Q3 4.24 - 6.77, Q4 >6.77; and Quartile values of T-Chol/HDL ratio: Q1 <3.75, Q2 3.76-4.83, Q3 4.84-5.63 and Q4 >5.63. * Values for HDL, cholesterol and TG, and ratios were estimated in mg/dL.*

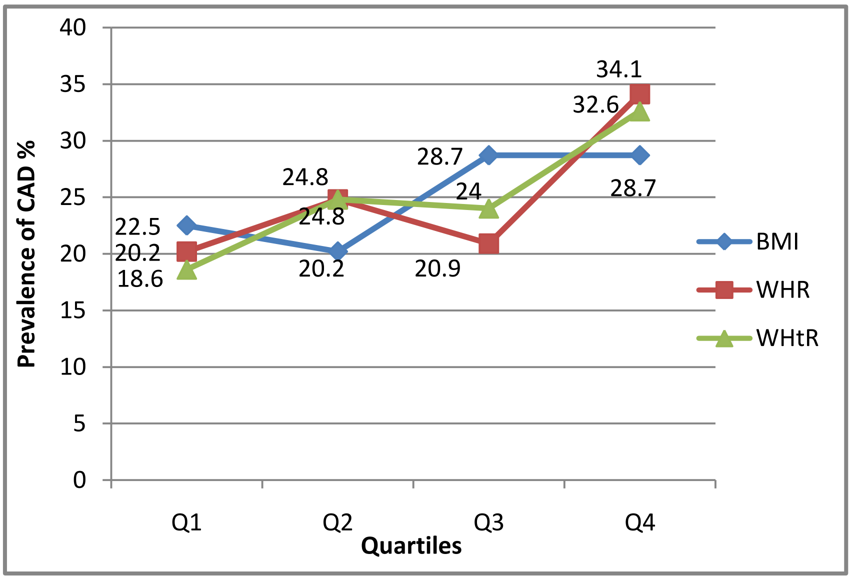

Figure-4: *Prevalence (%) of CAD according to quartiles (Q1, Q2, Q3, Q4) of BMI, WHR and WHtR.. Quartile values of BMI: Q1 <22.2, Q2 22.3 - 24.3, Q3 24.4 - 26.5, Q4 >26.5; Quartile values of WHR: Q1 <0.95, Q2 0.96 - 0.98, Q3 0.99 -1.01, Q4 >1.01; Quartile values of WHtR Q1 <0.52, Q2 0.53 - 0.55, Q3 0.56 - 0.6, Q4 >0.6.*

significance *(chi-sq, p)*. The trends were significant for the quartiles of age (33.6, <0.001), (MAP: 75.7, p<0.0001), TG (23.5, <0.001). As expected, HDL had inverse association with CAD prevalence (20.2, <0.001), which indicated that low HDL level had higher risk of developing CAD.

The trend of CAD prevalence according to the quartiles of TG, HDL, T-Chol/HDLR and TG/HDLR are shown in Figure-3 for comparison. Very high prevalence of CAD was found in the highest quartile of TG and lowest quartile of HDL (for both, p<0.001). Importantly, the increasing quartiles of T-Chol / HDL ratio and TG / HDL ratio showed significant increasing trend of CAD prevalence. The trend of CAD prevalence with increasing obesity (quartiles of BMI, WHR, WHtR) is shown in Figure-4. The trends were not significant for BMI and WHR. The highest quartile of WHtR (Q4 >0.6) was found significant (p = 0.02).

Some inconsistent findings emerged when we tried to determine the risks related to CAD among the our diabetic study population. The investigated variables were age, sex, sites (urban/rural), family history of NCDs, obesity, blood pressures and lipids. Of these risk factors, which were more significant remained unclear.

Table-5: *Binary logistic regression taking coronary artery disease (no =0, yes =1) as a dependent variable; and sex, area, age, BMI, WHR, WHtR as independent variables. The categorical variables are depicted below*

Independent variables	Odds Ratio [Exp(B)]	95% CI for EXP(B)	*p*
Sex: Female =0, Male=1	1.244	.704 – 2.196	.452
Area: Rural =0, urban=1	.827	.510 – 1.341	.441
Age (y) quartiles (Q)			
Q1: ≤40 (ref)	-	-	
Q2: 41 – 47	1.335	.672 – 2.650	.410
Q3: 47 – 55¶	2.781	1.553 – 4.983	.001
Q4: ≥56¶	4.417	2.381 – 8.192	.000
Obesity variables			
BMI quartiles (Q)			
Q1: ≤22.2 (ref)	-	-	
Q2: 22.3 – 24.3	0.845	.439 –1.626	.613
Q3: 24.4 – 26.5	1.236	.608 – 2.512	.558
Q4: ≥26.6	1.091	.478 – 2.493	.836
WHR quartiles (Q)			
Q1: ≤0.94 (ref)			.843
Q2: 0.95 – 0.98	1.187	.646 – 2.182	.580
Q3: 0.99 – 1.01	1.097	.568 – 2.119	.783
Q4: ≥1.02	1.339	.671 – 2.674	.408
WHtR quartiles (Q)			
Q1: ≤0.518 (ref)	-	-	-
Q2: 0.519 – 0.554	1.346	.666 – 2.720	.408
Q3: 0.555 – 0.596	1.123	.480 – 2.631	.789
Q4: ≥ 0.0.597	1.255	.435 – 3.619	.674

Note: ¶ - Higher quartiles (Q3 and Q4) of age were found significant risk for CAD. None of the obesity related variables (BMI, WHR, WHtR) were found significant for CAD.

Table -6: *Binary logistic regression taking coronary artery disease (no =0, yes =1) as a dependent variable and sex, age, cholesterol, TG, HDL as independent variables. The categorical variables are depicted below*.

Independent variables	**Odds Ratio [Exp(B)]**	**95% CI for EXP(B)**	***p***
Sex: Female =0, Male=1	2.876	.586 – 14.106	.193
Age (y) quartiles (Q)			
Q1: ≤40 (ref)	-	-	
Q2: 41 – 47	1.366	.157 – 11.879	.777
Q3: 47 – 55	5.334	.996 – 28.555	.050
Q4: ≥56¶	6.929	1.097 – 43.748	.040
Cholesterol quartil (Q)			.481
Q1: ≤178, mg/dl (ref)			
Q2: 179 – 202	.506	.058 – 4.378	.536
Q3: 203 – 231	.292	.037 – 2.320	.245
Q4: ≥ 232	.811	.124 – 5.292	.827
Triglyceride quartil (Q)			.016
Q1: ≤153, mg/dl (ref)			
Q2: 154 – 201	.260	.020 – 3.370	.303
Q3: 202 – 280	2.144	.333 – 13.806	.422
Q4: ≥281¶	9.316	1.453 – 59.734	.019
High-density lipoproteins (HDL) quartile (Q)			.024
Q1: ≤41, mg/dl (ref)			
Q2: 42 – 48	.548	.117 – 2.565	.445
Q3: 48 – 53¥	.163	.029 – .905	.038
Q4: ≥54¥	.055	.005 – .583	.016

Note: ¶ Triglycerides exceeding 281mg/dl showed significant risk for CAD. ¥ - For CAD protection, elevated HDL (>48mg/dl) was found significant (p = 0.038) and even more significant (p=0.016) when HDL exceeded 54mg/dl.

We used binary logistic regression taking the risk factors as independent and CAD as dependent variable. Of the independent variables (sex, area, age, BMI, WHR, WHtR) only higher age quartile (Q3 and Q4) was proved to be a significant risk for CAD [Table-5]. In Table-6, the independent variables were sex, age and lipid fractions. The highest quartile of age and TG, and the lowest quartile of HDL were found significant risk for CAD.

Discussions

The study was conducted on purposively selected registered diabetic patients of a referral center, BIRDEM. The prevalence of CAD was 18.6% [Figure-1], which was more or less consistent with the findings of the systemic review report published earlier [9]. In the review, 21.2% had coronary heart disease (42 articles, N = 3,833,200). Higher prevalence of cardiovascular disease in patients with type 2 DM was 37.4% (95% CI: 31.4-43.8) in Iran [10]. Another study from Bangladesh reported the prevalence of CAD as 17.2% [11]. The study found that it had no significant difference between gender and CAD. The present study observed higher prevalence of CAD in women than men (20.2% vs. 16.6 %) though not significant.

Interestingly, the age matched women had significantly higher BMI ($p<0.001$), WHtR ($p<0.001$), SBP ($p<0.001$), MAP ($p = 0.002$), T-Chol ($p<0.001$) and TG ($p<0.05$) than men. Only, WHR was significantly higher in men than women ($p<0.001$).

The measures of obesity (BMI, WHtR), blood pressure (SBP, DBP, MAP) and TG were higher in women than men and consistent with the higher prevalence of CAD in women, though the difference was not significant. Most of the cited studies reported higher CAD prevalence in men than women [5,7,10,11]. This contradictory finding could have been explained if in the study there were equal numbers of female participants from rural population. The BIRDEM diabetes registry revealed that more than 30% of women were occupationally urban housewives and they lack physical activity resulting obesity with dyslipidemia.

The associations between variables of obesity and lipids (Table-2), and lipids and blood pressures (Table-3) revealed that none of lipid fractions correlated with obesity significantly. Of the lipid fractions, TG and HDL (and not T-Chol and LDL) showed very significant association with SBP, DBP and MAP. This indicated that T-Chol and LDL were not related to blood pressure. These findings could not be compared with any published data that studied lipid fractions separately in relation to SBP, DBP and MAP. Anika et al showed significant correlation between total cholesterol and systolic blood pressure, also between triglyceride and diastolic blood pressure [12]. Other studies found total cholesterol was positively associated with IHD mortality in both middle and old age [13,14].

Interestingly, this study revealed that T-Chol/HDLR and TG/HDLR correlated with all types of BP measures (Table-4 and Figure-3). This observation is very much consistent with other Bangladeshi report [15]. Of the obesity indices only WHtR proved to have significant risk at Q4 (>0.6). This study proved WHtR to be a better obesity index for CAD. The highest quartile of mean arterial pressure (MAP >106mmHg) was found to be a significant risk for CAD. The importance of MAP was also emphasized by Gao et al [2]. The study showed the importance of T-Chol/HDLR and TG/HDLR for predicting CAD in diabetic population. This observation is very much consistent with the findings of other studies. [15-17].

The study had some limitations. Firstly, glycemic control could not be monitored for the follow-up period after registration. Secondly, the number of women was not proportionate to the geographical sites (urban/rural). Thirdly, physical activity of the study participants could not be graded. Lastly, the diagnosis of CAD was based on only on ECG findings.

Conclusions

The study revealed the prevalence of coronary artery disease (CAD), systolic hypertension and diastolic hypertension in the registered Bangladeshi diabetic patients. It identified the risk factors for developing CAD. Additionally, the study addressed the possible predictors of CAD among those with DM. The study observed the importance of MAP, TG, HDL, T-Chol/HDLR and TG/HDLR as predictors of CAD. Further study along with the investigation of echocardiography, ETT, coronary angiogram and coronary calcium scoring would be helpful in confirming these findings related to CAD risks.

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