



**STUDY ON THE DEMOGRAPHIC CHARACTERISTICS WITH THE LIPID PROFILE OF THE CARDIOVASCULAR PATIENTS IN DINAJPUR DISTRICT OF BANGLADESH**

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**ABSTRACT**

Cardiovascular disease (CVD) is increasingly causes of morbidity and mortality in people of Bangladesh. The incidence of CVD has a strong relation with the sociodemographic characters of the people but varying from place to place. The investigation assessed the effects of life style, biochemical parameters (lipid profile) and socio-environmental factors on the incidence of CVDs at Dinajpur district of Bangladesh and accordingly sociodemographic information and lipid profile of the cardiac patients of Dinajpur have been interpreted. The demographic information revealed that the cardiac patients (71%) were lived in the urban area; 70% were male; age of 41% patients ranged from 50 to 59 years, weight of 48% patients from 70 to 79 kg, 58% had only primary education, and 32% patients were farmers. The walking habit of 44% patients was 1 to 3 days per week, 70 % patients smoked, 54 % consumed alcohol, and 61% patients had CVD positive history in their families. The lipid profile results indicated that 86% cardiac patients had upper-level low-density lipoprotein followed by triglyceride (81%) and 65% patients had normal high-density lipoprotein and total cholesterol. The change in lipid profile had a significant relation with age, weight, occupation, physical activity, smoking, alcohol consumption, food habit and family history of the CVD patients. These findings could be used to bring a change in the patient's lifestyle and thereby reducing the CVD risk factors and severity in the people living in Dinajpur district of Bangladesh.

**Key words:** Cardiovascular disease, lipid profile, lipoprotein, triglyceride, total cholesterol

**INTRODUCTION**

Cardiovascular diseases (CVDs) cannot be passed from one person to another, mostly cause 17.9 million deaths annually, representing 31% of global deaths followed by cancers (9.0 million), and diabetes (1.6 million), (WHO 2018). It is a condition affecting the heart or blood vessels, associated with the deposition of fats inside the arteries with increasing risk of blood clots. The diseases frequently cause adult death in the world; 80% percent of CVD deaths take place in low to middle income countries (WHO 2017). CVD kills 2.56 lakh people in Bangladesh annually accounting for 30 per cent of deaths caused by non-communicable diseases (WHO 2018).

The epidemiological transition patterns of the diseases results increasing prevalence of CVD, diabetes, obesity, and cancers, are now a common scenario of the developing countries (Turin *et al.* 2013). The CVD prevalence is gradually rising among the adults in Bangladesh. There are so many risk factors for heart diseases. The demographic factors like age, physical in activity, genetic disorders, alcohol addiction, tobacco using habit, obesity, high blood pressure, diabetes mellitus along with minimum educationa significantly increase the risk of CVD (Kivimaki *et al.* 2006). Higher incidences

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of CVD in the developing countries observe mostly due to rapid urbanization, dietary changes, increased consumption of tobacco, and limited physical activity (Joshi *et al.* 2007). However, up to 90% of cardiovascular diseases are preventable if the risk factors are avoided.

There are three types of CVDs such as hypertension (HT), angina pectoris (AP), and myocardial infarction (MI); HT is a long-term medical condition in which blood pressure in the arteries is persistently elevated; AP is usually a chest pain due to lack of blood flow from heart to muscle; MI is also known as a heart attack, occurs when blood flow decreases or stops because damage of heart muscle. The incidence of CVD is an alarming situation in Bangladesh. Therefore, data have been accumulated to assess the incidence of HT, MI, and AP in affected people of Dinajpur, Bangladesh.

Lipid levels are the prominent prevalent risk factors of CVD (Celermajer *et al.* 2012, Koene *et al.*, 2016); lipoprotein abnormalities play a role in the progression of CVD (Chrysohoou *et al.* 2004). Elevated concentrations of total cholesterol (TC) and low-density lipoproteins (LDL) in the blood are potent risk factors for coronary heart disease (Law *et al.* 1994). This study was also conducted to assess the changes in the lipid profile of cardiac patients. The highest prevalence of CVD risk factors are present in Bangladesh among South Asian countries. In the country, 99.6% males and 97.9% females are exposed to at least one of the established CVD risk factors (NIPORT 2013). However, the level of awareness among the Bangladeshi people about CVD risk factors is very low. In recent years, the people of the Dinajpur district have brought a significant change in their lifestyle. The adult and middle-aged residents are now suffering from variable types of CVDs. So, the present study was taken into consideration to evaluate the predictive risk of CVDs among different socioeconomic groups of people living in Dinajpur.

## MATERIALS AND METHODS

**Data source:** The data were collected from 100 cardiac patients admitted at the Cardiac Unit of M. Abdur Rahim Medical College Hospital, Dinajpur, Bangladesh to explore the overall socio-demographic situations and the risk factors of the cardiac patients. Persons taking lipid-lowering drugs and suffering from liver and renal diseases, and thyroid disorders were excluded from the study because these drugs and diseases could regulate the lipid profile. As we assessed the effects of demographic factors and lipid profile on CVDs, therefore, we avoided such internal causes those could regulate the incidence of CVDs.

**Data collection:** Two types data were collected from each of the patients. Socioeconomic and demographic information were collected through face-to-face interviews of the patients by a structured questionnaire. The demographic parameters like age, sex, weight, location, educational status, annual income, and occupation, level of walking, smoking behavior, alcohol consumption, dietary patterns, and family history were collected. The lipid profile (biochemical data) of the patients such as triglycerides (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), and total cholesterol (TC) were measured by enzymatic method using “Evolution 3300 semi-auto biochemistry analyzer and reagent ‘Randox Diagnostic 1 tali’”. The comparison of demographic data with lipid profile was assessed by the Chi-square test (Table 2 and 4). The demographic factors were location, age, gender, weight, education, occupation, level of walking, smoking behavior, alcohol consumption, food habit, and family history.

## RESULTS AND DISCUSSION

Twelve demographic parameters were considered to identify the possible risk factors of CVDs. The percentages of the subcategories of all the demographic parameters were calculated and presented in

Table 1 which revealed that 71% patients were lived in urban areas and 29% in the rural areas of Dinajpur. About 41% of patients of 50-59 years old were more susceptible to CVD followed by 60-69 years old (32%). The reports suggested that increasing age was associated with increased cardiovascular risk due to acceleration of atherosclerosis (Zhang *et al.* 2011); 70% patients were male and 30% were female. It is reported that gender played a vital role in the incidence of CVD in individuals having a greater risk of heart attack (Mosca *et al.* 2011). Most of the patients (48%) were obese (70-79kg) and only 7% were found normal weight (50-59kg). The primary educated patients (58%) were more prone to CVD compared to higher educated patients. Analysis of occupation data showed that 32% patients were farmers followed by businessmen (29%), housewives (25%), and service holders (14%). Everyday walking patients suffered less (14%) from CVD than the patients (16%) who walked 4-6 days per week. The smoker male patients (70%) and drinkers with mild alcohol made down physical activity and eventually associated with CVD, consistent with the results of Khuwaja *et al.* (2010) and Vikram *et al.* (2006). Most of the patients (72%) ate red meat and entangle with oil-based food and not only that 61% of CVD patients had a positive history in their families. The presence of CVD in family history has a strong influence on future CVD in family members.

CVDs resulted from HT, MI, and AP but the the major cause of CVD were MI (44%) followed by HT (43%). The CVD patients have been categorized according to different demographic factors (Table 2). The findings suggested that types of CVD were significantly varied with location, age, weight, educational status, occupation, physical activity, and food habit of the people. Moreover, it is found that HT and MI were the major risk factors for CVD. The rural patients were suffered more from HT but the urbans were from MI and HT was more at 40-49 years; MI at 60-69 years and AP at 50-59-years old patients. The farmers were more susceptible to MI and the service holders were more prone to HT. The patients who did not walk or walked 1-3 days/week were suffered more from all types of CVDs. The smokers, alcohol drinkers, and red meat takers were also suffered more from MI followed by HT.

**Table 1.** Sociodemographic characteristics of the surveyed cardiac patients

Characteristics		%	Characteristics		%
Location	Urban	71	Smoking	Smoker	70
	Rural	29		Never smoke	30
Age (years)	40-49	16	Walking	Everyday	14
	50-59	41		4-6 days/week	16
	60-69	36		1-3 days/week	44
	70-79	7		No walk	26
Gender	Male	70	Family history	Positive	61
	Female	30		Negative	39
Education	Primary	58	Food habit	Red meat & oily food	72
	Secondary	20		Normal food	19
	≥Bachelor	22		Vegetarian	9
Weight (Kg)	50-59	7	Occupation	Businessman	29
	60-69	31		Job (office)	14
	70-79	48		Housewife	25
	80-89	14		Farmer	32
Alcohol consumption			CVD types	Hypertension	43
	Sometimes	54		Myocardial infarction	44
	Never	46		Angina pectoris	13

*CVD, cardiovascular disease*

**Table 2.** Relationship between the demographic characteristics and types of CVD

Characteristics		Types of CVD (n%)			Total	Chi-square value
		HT	MI	AP		
<i>Location</i>	Urban	18(25.4)	44(62)	9(12.6)	71	**35.724
	Rural	25 (86)	0(0)	4(14)	29	
<i>Age (years)</i>	40-49	16(100)	0(0)	0(0)	16	**56.734
	50-59	7 (17.1)	21(51.2)	13(31.7)	41	
	60-69	13(36.1)	23(63.9)	0(0)	36	
	70-79	7(100)	0(0)	0(0)	7	
<i>Gender</i>	Male	29(41.4)	32(45.7)	9(12.9)	70	NS0.294
	Female	14(46.7)	12(40)	4(13.3)	30	
<i>Weight (Kg)</i>	50-59	7(100)	0(0)	0(0)	7	**16.869
	60-69	13(42)	14(45.2)	4(12.9)	31	
	70-79	21(43.8)	19(39.6)	8(16.7)	48	
	80-89	2(14.3)	11(78.6)	1(7.1)	14	
<i>Education</i>	Primary	30(51.7)	15(25.9)	13(22.4)	58	**26.651
	Secondary	3(15)	17(85)	0(0)	20	
	≥Bachelor	10(45.5)	12(54.5)	0(0)	22	
<i>Occupation</i>	Businessman	10(34.5)	13(44.8)	6(20.7)	29	*13.126
	Job (office)	11(78.6)	3(21.4)	0(0)	14	
	Housewife	12(48)	9(36)	4(16)	25	
	Farmer	10(31.2)	19(59.4)	3(9.4)	32	
<i>Walking</i>	Everyday	9(64.3)	2(14.3)	3(21.4)	14	**17.513
	4-6 days/wk.	5(31.2)	8(50)	3(18.8)	16	
	1-3 days/wk.	5(19.2)	19(73.1)	2(7.7)	26	
	No walk	24(54.5)	15(34.1)	5(11.4)	44	
<i>Smoking</i>	Smoker	29(41.4)	32(45.7)	9(12.9)	70	NS.294
	Never smoke	14(46.7)	12(40)	4(13.3)	30	
<i>Alcohol consumption</i>	Sometimes	20(37)	25(46.3)	9(16.7)	54	NS2.325
	Never	23(50)	19(41.3)	4(8.7)	46	
<i>Food habit</i>	Red meat	23(32)	42(58.3)	7(9.7)	72	**14.473
	Normal food	12(63.2)	1(5.3)	6(31.5)	19	
	Vegetarian	8(88.9)	1(11.1)	0(0)	9	

\*= Significant at  $p$  0.05, \*\* = Significant at  $p$  0.01, NS=Not significant; HT, hypertension; MI, myocardial infarction; AP, angina pectoris

Lipid profile is the most important parameter related to coronary heart disease and serum TG, TC, and LDL were directly associated with CVD whereas HDL was inversely associated with CVD (Davison, 2006). The changes in the lipid profile (Table 3) of coronary heart disease patients were observed. The results revealed that 19% patients had normal, 44% had borderline and 37% had a high risk of TG. It also showed that 14% patients had normal, 38% had high risk and 48% had borderline high LDL. About 65% patients had normal, 23% had average and 12% had lower HDL as well as, 65% patients had normal, 33% had borderline high and 2% had high TC level. Among the four parameters, most of the cardiac patients had upper level of LDL followed by TG of estimates.

It is observed that sociodemographic characters regulated the lipid profile of cardiac patients. The results exhibited that smoking and alcohol consumption changed the lipid profile with corresponding increases of TG and LDL and decrease of HDL (Mammas *et al.* 2003). The different lipid components, blood pressure, smoking, less physical activity, obesity, and unhealthy food habits were linked to coronary heart disease (Mohanna *et al.* 2006, Campos *et al.* 2010). Therefore, relationship between the demographic characters with lipid profile of the cardiac patients have been presented in Table 4. The TG with all the demographic parameters was significantly related except location and education; LDL showed a significant relation with age, weight, income, occupation, physical inactivity, alcohol

consumption, food habit, and family history, whereas, relations with sex, location, smoking, educational status were insignificant; HDL with all the demographic parameters was insignificant except weight and physical inactivity; age, weight, and physical inactivity showed the maximum association with lipid profile, and TG was strongly regulated by the demographic parameters followed by LDL.

**Table 3.** Lipid profile of cardiac patients with frequencies and percentages

Lipids (mg/dl)	Subcategories	Frequency (%)
TG	Normal (upto 150 mg/dl)	19(19)
	Borderline high (150-200 mg/dl)	44(44)
	High (>200 mg/dl)	37(37)
HDL	Normal ( $\geq$ 30 mg/dl)	65(65)
	Average (20-29 mg/dl)	23(23)
	Bad (<20 mg/dl)	12(12)
LDL	Normal (upto 150 mg/dl)	14(14)
	Borderline high (150-200 mg/dl)	48(48)
	High (>200 mg/dl)	38(38)
TC	Normal (upto 150 mg/dl)	65(65)
	Borderline high (150-200 mg/dl)	33(33)
	High (>200 mg/dl)	2(2)

TG, triglycerides; HDL, high-density lipoprotein; LDL, low-density lipoprotein; TC, total cholesterol

**Table 4.** Demographic characteristics vs lipid profile of the CVD patients

Demographic characteristics	(Chi-square value)			
	TG (g/dl)	LDL (mg/dl)	HDL (mg/dl)	TC (mg/dl)
Location	NS4.155	NS.252	NS.287	NS3.155
Age	**33.655	** 27.742	NS11.065	*12.229
Weight (kg)	**39.012	*13.359	**19.423	NS4.006
Gender	*9.259	NS22.212	NS1.544	NS.401
Occupation	**24.811	**23.408	NS2.713	NS6.839
Walking	**55.292	**33.604	**15.595	NS7.295
Smoking	**9.259	NS2.212	NS1.544	NS.401
Alcohol consumption	**19.406	*8.172	NS1.975	NS3.186
Educational status	NS4.204	NS4.130	NS6.810	NS7.481
Food habit	**24.861	**17.589	NS4.042	NS2.551
Family history	**15.277	**7.928	NS1.165	NS1.037

\*, and \*\* indicate significant at  $p < 0.05$ ,  $p < 0.01$ , respectively. NS indicates nonsignificant  $p > 0.05$

Despite the given priorities to prevent non-communicable diseases, the health care system has been mainly designed to treat acute communicable diseases and nutrition-related disorders in Bangladesh (Mamun *et al.* 2016). The expensive treatments required for CVD are affordable by the elite families through private hospitals, though the Bangladesh Government has initiated small-scale CVD treatment in tertiary hospitals (Sulaiman *et al.* 2016). Moreover, detailed morbidity and mortality data are not available in Bangladesh. The present study has drawn a relationship between the different sociodemographic characters and the incidence of CVDs among the cardiac patients of Dinajpur and the generated information might be used to reduce risk factors and severity of CVD of people living in Dinajpur.

## CONCLUSION

A strong relation was found between the demographic characters and lipid profile. In lipid profile, triglyceride and low-density lipoprotein level has established a strong relationship. The living areas both in rural and urban did not influence the lipid profile of the cardiac patients. Age, weight, occupation, physical inactivity, smoking, alcohol consumption, food habits, and family history showed a positive relation with lipid profile. These findings might be used for planning preventive public health interventions to reduce CVD risk factors, lifestyle change and thereby reducing CVD incidence and severity in people of Dinajpur district.

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Chakraborty *et al.*/Status of cardiovascular patients at Dinajpur district

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