

## Prevalence and Pattern of Dyslipidemia among Patients Attending in a Tertiary Care Hospital in Bangladesh

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### Abstract

### Original Research Article

**Background:** Dyslipidemia was defined according to the third report of the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III, USA, 2001), TC level  $\geq 200$  mg/dl, HDL-C level  $< 40$  mg/dl, LDL-C level  $\geq 130$  mg/dl, TG  $\geq 150$  mg/dl. Dyslipidemia was defined as having at least one of the following: high TC, high LDL-C, low HDL-C and high TG. Dyslipidemia is considered as a major risk factor for several life-threatening diseases. **Aim of the study:** The aim of this study was to assess the prevalence and pattern of dyslipidemia among patients attending in a tertiary care hospital in Bangladesh. **Methods:** This cross-sectional analytical study was conducted at the Department of Biochemistry and Molecular Biology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. The study duration was one year from March 2016 to February 2017. Non-probability sampling method was used in study subject selection. In total 510 patients underwent lipid profile analysis as the diagnostic procedure of several diseases was finalized as the study population. Fasting blood samples were collected from study subjects to estimate the serum TC, TG, and HDL-C. LDL cholesterol was calculated using the Friedewald equation [LDL-C = (TC - HDL-C) - (TG/5)]. Collected data was checked, edited and then processed with the help of the software Statistical Package for Social Sciences (SPSS) version 23 program. **Results:** In this study, among total 510 participants 245 were with dyslipidemia and the rest 265 were with normo-lipidemia. So, prevalence of dyslipidemia was found as 48% among total patients. As per the distribution of study subjects according to lipid disorder pattern we observed that, 19.4%, 15.3% and 13.3% of our dyslipidemia patients were with isolated hypercholesterolemia, isolated hypertriglyceridemia and mixed hyperlipidemia respectively. In assessing the pattern of dyslipidemia according to age in considering mean levels of isolated hypercholesterolemia, isolated hypertriglyceridemia and mixed hyperlipidemia we found significant correlations between the age groups of 20-40 and 40-60 years and sex groups of male and female where the P values were  $< 0.05$ . **Conclusion:** About fifty percent prevalence of dyslipidemia among attended patients in a hospital is a potential health issue for health professionals as well as for the health policy makers of a country. Correlations of presence and degrees of dyslipidemia between ages and sexes may indicate important clues to the health sector specialists.

**Keywords:** Prevalence, Pattern, Dyslipidemia, HDL-C, LDL-C, TG.

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## INTRODUCTION

Abnormal level of circulating lipids refers to dyslipidemia [1]. It is recognized as a prominent risk factor for cardiovascular disease [2]. The South Asian countries like Bangladesh, India, Pakistan, Sri Lanka and Nepal contribute the highest proportion of the

burden of cardiovascular disease compared to any other region globally [3]. Changing dietary habits and lifestyle, rapid urbanization, growth of commuting, tobacco use, uncontrolled growth and consumption of processed foods and beverages, indoor air pollution, road-traffic injuries, lack of awareness about healthful behavioral patterns, and psychological pressure are

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among the important factors responsible for non-communicable diseases (Health Bulletin, 2015). Almost one third of the population of developed countries is detected to be having dyslipidemia [4]. The overall prevalence of dyslipidemia in India in various studies ranges from 10% to 73% [5]. The prevalence of hypertriglyceridemia varied from 73% in obese and 61% in non-obese Asian Indians in urban areas, the levels were relatively lower in rural areas but still higher than white Caucasians [6]. Again HDL-C levels are lower in South Asians than in White Caucasian as shown consistently in several comparative studies [7]. Considering BMI of the patients, dyslipidemia is observed in 84.1% obese patients and the non-obese patient also had the high prevalence (76.6%) of deranged lipids [8]. Islam, *et al.*, (2012) [9] depicted 16.9% had high TC, 8.8% had low HDL C, 15.7% had high LDL-C. In addition, 17.8% had high TG and 2% had very high TG in sub-urban Bangladeshi population. Dyslipidemia plays a crucial role in the development of cardiovascular diseases, which has become the leading cause of death in most developed countries as well as in developing countries including Bangladesh (World Health Report, 2002) [10]. To evaluate dyslipidemia, we have to know about lipid profile which consists of TC, LDL-C, HDL-C and TG. An elevated cholesterol level is known to play a role in both the initiation and progression of atherosclerosis as well as results in the clinical consequences such as myocardial infarction, stroke, peripheral vascular disease and heart failure [11]. LDL cholesterol typically makes up 60-70% of total serum cholesterol. It contains a single apolipoprotein, namely apo B-100. It is often called “Bad Cholesterol” because it deposits excess cholesterol in walls of blood vessels, which can contribute to atherosclerosis. Usually, the amount of LDL cholesterol is calculated frequently and in expensively using the Friedewald equation [ $LDL-C = (TC - HDL-C) - (TG/5)$ ]. This method is valid only for values obtained during the fasting state. It becomes increasingly inaccurate when triglyceride levels are greater than 200 mg/dL, and the equation is no longer valid when triglyceride levels are greater than 400 mg/dL [12]. Therefore, a more precise method should be used to assess LDL-C in certain high-risk patients, such as those with diabetes or known vascular disease considering the benefits and potential drawback of direct LDL-C measurement [13]. Increasing dyslipidemia in South Asian is primarily driven by nutrition, lifestyle, demographic transitions, increasingly faulty diets and physical inactivity [7]. Diet rich in fat, carbohydrate and high calorie intake is main associated factors for dyslipidemia. Sedentary lifestyle, physical inactivity due to technological advances play crucial role in dyslipidemia development. Smoking also has a substantial negative effect on HDL-C levels. Altered day night sleep pattern and day to day stress also provoke dyslipidemia [9].

## METHODOLOGY

This cross-sectional analytical study was conducted at the Department of Biochemistry and Molecular Biology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. The study duration was one year from March 2016 to February 2017. Non-probability sampling method was used in study subject selection. In total 510 patients underwent lipid profile analysis as the diagnostic procedure of several diseases was finalized as the study population. The whole intervention was conducted in accordance with the principles of human research specified in the Helsinki Declaration [14] and executed in compliance with currently applicable regulations and the provisions of the General Data Protection Regulation (GDPR) [15]. The participants were selected following the inclusion and exclusion criteria:

### Inclusion Criteria

- Age between 20-60 years.
- Patients who had given consent to participate in the study.

### Exclusion Criteria

- Mentally ill.
- Unable to answer the criteria question.
- Chronic liver disease.
- Chronic renal disease.
- Regular medication for dyslipidemia for the last 3 months.
- Acute or chronic infection.
- Pregnancy.
- Malignancy.

Informed written consent was obtained from each participant prior to their admission to the study. Ethical approval was also obtained from the ethical review committee of the study hospital. Dyslipidemia was defined as having at least one of the following: high TC, high LDL-C, low HDL-C, and high TG. A structured questionnaire and data collection sheet were prepared for the purpose of the study, which included all the variables of interest. Fasting blood samples were collected from study subjects to estimate the serum TC, TG, and HDL-C. Collected data was checked, edited and then processed with the help of the software Statistical Package for Social Sciences (SPSS) version 23.0.

## RESULTS

In this study, all the participants were adult individuals attending BSMMU outpatient department. With all appropriate measures fasting blood samples were taken and serum lipid profile was measured. After getting the reports of lipid profile the individuals were categorized firstly into two groups-individual with normo-lipidemia and individual with dyslipidemia. Dyslipidemia was again categorized into isolated

hypercholesterolemia, isolated hypertriglyceridemia and mixed hyperlipidemia. In this study, among total 510 participants 245 were with dyslipidemia and the rest 265 were with normo-lipidemia. So, prevalence of dyslipidemia was found as 48% among total patients. As per the distribution of study subjects according to lipid disorder pattern we observed that, 19.4%, 15.3% and 13.3% of our dyslipidemia patients were with isolated hypercholesterolemia, isolated hypertriglyceridemia and mixed hyperlipidemia respectively. In assessing the pattern of hyperlipidemia

according to age in considering mean levels of isolated hypercholesterolemia, isolated hypertriglyceridemia and mixed hyperlipidemia we found significant correlations between the age groups of 20-40 and 40-60 years where the P values were <0.05. On the other hand, in evaluating the pattern of dyslipidemia according to sex in considering mean levels of isolated hypercholesterolemia, isolated hypertriglyceridemia and mixed hyperlipidemia we found significant correlations between the sex groups of male and female where the P values were <0.05.

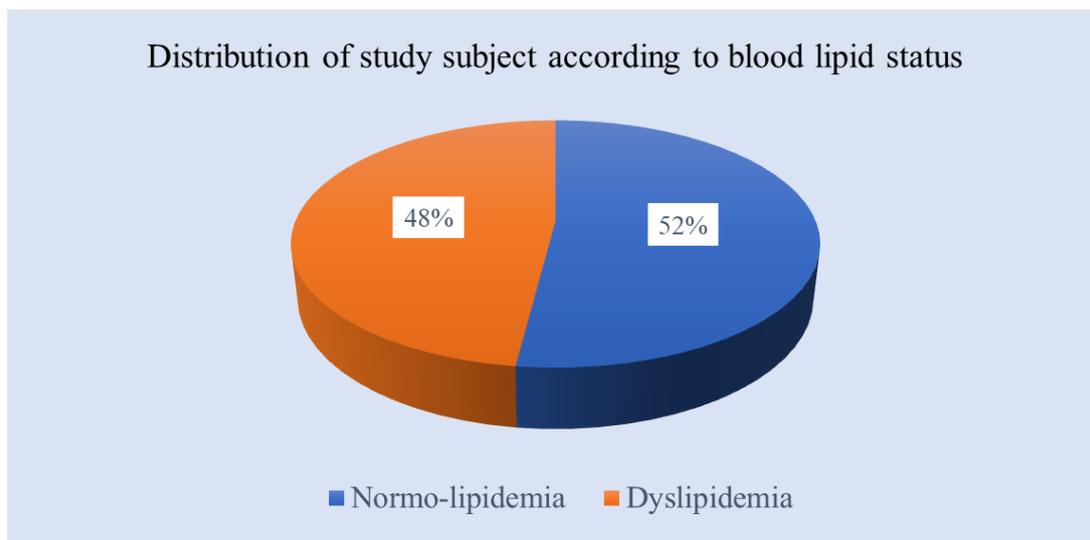


Figure 1: Pie chart showed blood lipid status of the study subject (N=510)

Table 1: Distribution of study subjects according to lipid disorder pattern (n=245)

Pattern of dyslipidemia	n	%
Isolated hypercholesterolemia	99	19.4
Isolated hypertriglyceridemia	78	15.3
Mixed hyperlipidemia	68	13.3

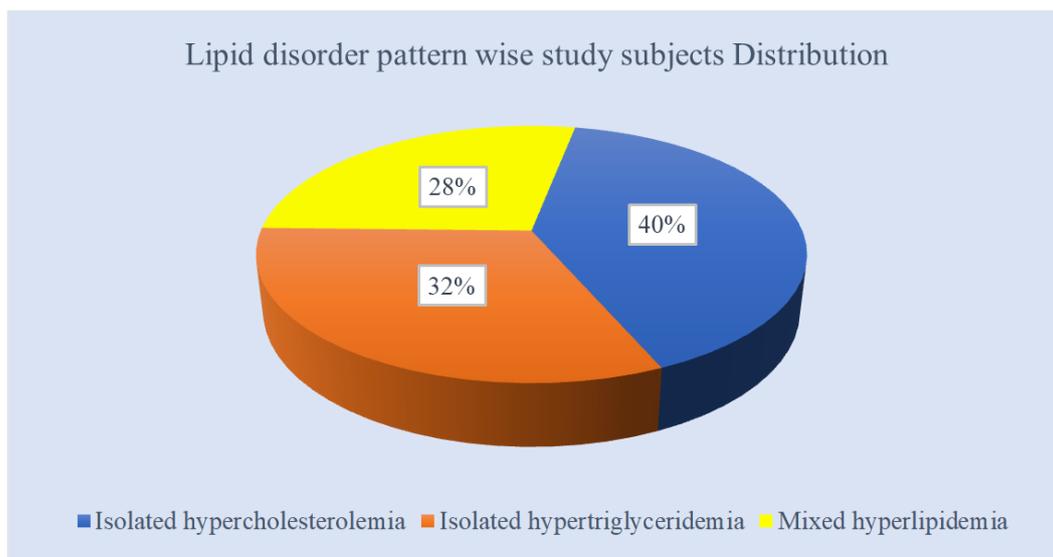


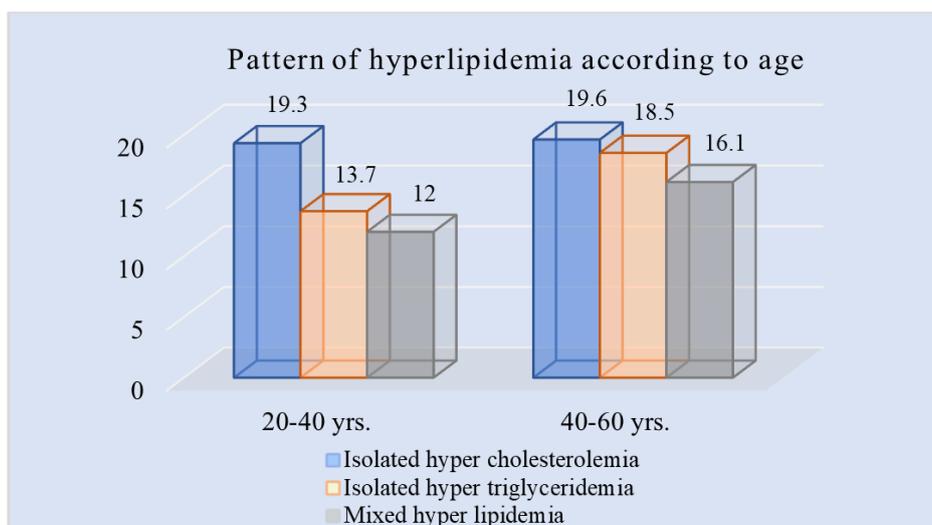
Figure II: Pie chart showed lipid disorder pattern of the study subjects. (n=245)

**Table 2: Distribution of study subjects according to lipid disorder pattern (n=245)**

Age(in years)	Isolated hyper cholesterolemia	Isolated hyper triglyceridemia	Mixed hyper lipidemia	P value
	%	%	%	
20-40 yrs.	19.3	13.7	12	0.325
40-60 yrs.	19.6	18.5	16.1	

**Table 3: Pattern of hyperlipidemia according to age (n=245)**

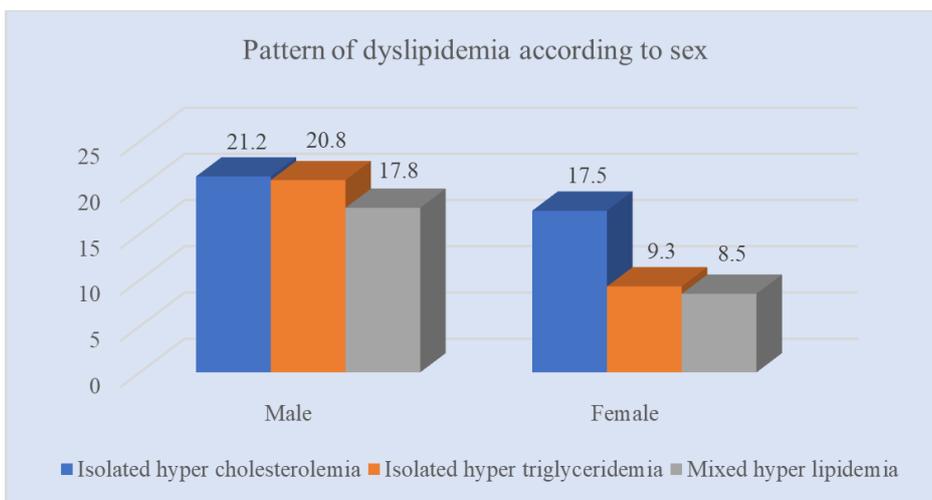
Age(in years)	Isolated hyper cholesterolemia	P value	Isolated hyper triglyceridemia	P value	Mixed hyper lipidemia	P value
	%		%		(%)	
20-40 yrs.	19.3	>0.05	13.7	<0.05	12	<0.05
40-60 yrs.	19.6		18.5		16.1	



**Figure III: Bar chart showed age wise pattern of hyperlipidemia (n=245)**

**Table 4: Pattern of dyslipidemia according to sex (n=245)**

Sex	Isolated hyper cholesterolemia	P value	Isolated hyper triglyceridemia	P value	Mixed hyper lipidemia	P value
	%		%		(%)	
Male	21.2	<0.05	20.8	<0.05	17.8	<0.05
Female	17.5		9.3		8.5	



**Figure IV: Bar chart showed pattern of dyslipidemia. (n=245)**

**Table 5: Distribution of study subjects between sexes according to HDL-C level (n=245)**

Sex	Low HDL(<40mg/dl)	P value	High HDL(≥40mg/dl)	P value
Male	58.70%	<0.05	41.30%	<0.05
Female	26.80%		73.20%	

## DISCUSSION

The aim of this study was to assess the prevalence and pattern of dyslipidemia among patients attending in a tertiary care hospital in Bangladesh. In this study, the normolipidemic subjects were more frequent than the dyslipidemic subjects. This was almost consistent with the previous study done by Islam *et al.*, 2012 [9]. The rising trend of dyslipidemia was the resultant of changing life style. Dramatic changes in lifestyle from traditional to modern have led to physical inactivity due to technological advances. Rising affluence has modified the dietary pattern characterized by increased consumption of diet rich in fat, sugar and calories. All those cause more dyslipidemia than previous [9]. Our study showed prevalence of dyslipidemia according to clinical types of dyslipidemia. The isolated hypercholesterolemia was most frequent among all and mixed hyperlipidemia was least common of all hyperlipidemia. This result is consistent with previous study [9]. But Moghadasi *et al.*, 2010 [16] depicted study didn't correlate with our study where hypertriglyceridemia is the main hyperlipidemia in both sexes. This is because the lifestyle and food habit in our country. This study also showed age distribution of hyperlipidemic study subjects among different age groups. Isolated hypercholesterolemia did not show significant difference between two age groups but isolated hypertriglyceridemia and mixed hyperlipidemia was found more in older age group, which was significant. This finding was coherent to previous report depicted by Islam *et al.*, 2012 [9]. This is because older generation having less activity which leads to less calorie burn. Dietary habit is less important here. Different pattern of dyslipidemia: isolated hypercholesterolemia, isolated triglyceridemia and mixed hyperlipidemia were found significantly increase in male group. This was completely correlated with previous study [9]. Male are more dyslipidemic than female because mainly of their dietary habit. They intake large amount of food in comparison to female as well as high fat rich diet. For female before forty they are protected by female hormones, so less chance to be dyslipidemic. Our study also evaluated increased frequency of females in high HDL group, whereas frequency of males was found in low HDL group. In previous study, there was significant difference between male female in relation to HDL-C, consistent with our study [16].

### Limitation of the Study

This was a single centered study with small sample size. Moreover, the study was conducted at a

very short period of time. So, the findings of this study may not reflect the exact scenario of the whole country.

## CONCLUSION & RECOMMENDATION

About fifty percent prevalence of dyslipidemia among admitted patients in a hospital is a potential health issue for health professionals as well as for the health policy makers of a country. Correlations of presence and degrees of dyslipidemia between ages and sexes may indicate important clues to the health sector specialists. For getting more specific results, we would like to recommend for conducting similar more studies with larger sized samples.

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