Original article:

Pattern of lipid levels of subjects seeking laboratory services in an established laboratory in the Dhaka city

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Abstract:

Background: Dyslipidemia is linked to the risk for coronary ischemic and cardiovascular disease. Considering the absence of national reference level for lipids in Bangladesh the present study was undertaken to look into the pattern of lipid levels among patients seeking laboratory services in a private medical college hospital. ***Materials and Methods***: This cross sectional study was carried out in Ibn Sina Medical College Hospital in Dhaka city. Patients with antilipid and other medication which might affect the outcome were excluded. Consenting and eligible subjects seeking laboratory services were included in the study. Total 970 subjects finally entered in the study. Total cholesterol [TC], triglyceride and HDL-cholesterol [HDL-c] were measured by enzymatic colorimetric method. LDL-cholesterol [LDL-c] was derived using Friedewald equation. Data were expressed mean±SD, number (percent) as appropriate. Statistical analyses were carried out using SPSS version 17 tool. A p value <0.05 was taken as level of significance. *Results*: Male female ratio of the total subjects was 53.9:46.1. Of the total participants 27.1% were between 41-50 age group and 71% were between 31-60 years. Mean (SD) triglyceride, total cholesterol, HDL-c and LDL-c level for all participants was 182±134, 194±44, 38.4±11.5 and 119±37 respectively. Mean value of HDL-c for all subjects was 38.4mg/dl where as it's cut-off value is 40 mg/dl and 50 mg/dl for male and female respectively suggesting relatively large number of subjects had HDL-c dyslipidemia of the study subjects. Percent subjects with isolated abnormal lipid component were 51%, 41%, 73.2% and 33.3% for triglyceride, total cholesterol, HDL-c and LDL-c respectively. Of the total subjects 22% had abnormal level of lipid for all four components. *Conclusions*: The data showed pattern of lipid levels of the subjects seeking laboratory services of a tertiary care hospital which might be taken a trend in the Bangladeshi population. Dyslipidemia appeared to be relatively high among the subjects studied of which HDL-c dyslipidemia was more prominent.

Background

Non-communicable diseases have become the major threat to the human health of the 21st century. Ischemic heart disease and the cardiovascular disease constitute its major bulk[1-2]. Relationship of dyslipidemia with cardiovascular and ischemic heart disease has been an established fact[3-5]. It has been found that 1% rise in serum total cholesterol (TC) level leads to 2% increase in the ischemic heart disease (IHD)[6]. It was also found that raised total cholesterol level is directly linked to development of atherosclerosis[7]. Blood lipid levels, however, show tremendous variation in respect to the ethnic origin of the population and so is their dietary habit. A cut-off value for blood lipid levels has been proposed by different professional bodies taking in consideration the ethnicity of the population[8-11]. Neighboring Indian national consists of people originating from

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different ethnicity. Studies have been undertaken to set a cut-off levels for lipids in these populations as well[7,12-13]. In the absence of any national data often values are adapted from closely related population data. This, however, sometime puzzle researchers in interpreting their finding(s). In the absence of population data regarding lipid levels the present study was undertaken to explore pattern of lipid levels among the Bangladeshi subjects attending for determination of lipid levels in laboratory service division of a tertiary care hospital in the Dhaka city following the guidelines suggested by National Cholesterol Education Program (NCEP) of USA[14].

Materials and Methods

This was a prospective study. We selected the subjects of this study from the individuals who attended the Out-patient department (OPD), Ibn Sina Medical College Hospital (ISMCH) from 1st October 2013 to 30th September 2014. ISMCH is a 250 bedded tertiary hospital; it is located at Kallyanpur, western side of Dhaka city. People living in the adjacent area belong to lower middle to upper middle class families. Standard facilities in ISMCH also attract rich people living in and around the area. Reserved free indoor beds (around 15%) for poor patients and their free consultation created opportunity in seeking service from this hospital which ensures the accumulation of service seeking people from all walks of life substantiate the claim that the patient bank of this hospital represents a cross section of Bangladeshi population. We took this opportunity to get an idea about pattern of blood lipids in Bangladeshi population.

Out of 21154 subjects attended in the Medicine OPD within the mentioned period a total number of 970 subjects, following the ethical guidelines of the institution, enrolled in the study. Consecutive subjects seeking the laboratory services fulfilling the recruitment criteria were enrolled in the study. Subjects under antilipid therapy, having medical condition might derange the lipid homeostasis were excluded. Triacylglycerol, total cholesterol and HDL-c were measured by enzymatic colorimetric method standardized in the laboratory. Inter-assay and intra-assay coefficient of variation were <5%. LDLc level was worked out using Friedewald equation [15]. Statistical package for social science (SPSS) for Widows Version 17 was used for statistical calculation. A P value <0.05 was taken as level of significance.

Results and discussion:

Of the total enrolled subjects 53.9% were male and 46.1% female (Figure 1). Male female ratio of the total subjects was 53.9:46.1.

Frequency distribution of subjects on the basis of age was demonstrated in figure 2. Of the total participants 27.1% were between 41-50 age group and 71% were between 31-60 years. About 80% of the subjects were between 21-60 years of age.

Mean (±SD) age of the study subjects was 47.6±13.7. Below this age range people usually do not check their blood lipids, above this age range number of population in the adjacent area may be less.

Mean (±SD) lipid levels of all the study subjects by age and also by gender were shown in table I. Mean (±SD) total cholesterol and HDL-c level was significantly higher among female compared to the male. Triglyceride and LDL-c did not show any difference (Table I). Mean (±SD) lipid levels (mg/dl) in different age ranges and by male and female were demonstrated in table II. Total cholesterol (mean±SD) in male was significantly lower of the age groups 41-50 and 51-60 yrs compared to the women counterpart (p=0.014 and 0.015 respectively (Table I). HDL-c (mean±SD) in male of age group 21-30, 51-60 and 61-70 was significantly lower compared to the women (p<0.001, 0.007 and 0.041 respectively). Mean (±SD) triglyceride (mg/dl) was significantly higher in male of the age group 21-30 and 30-40 (p=0.001 and 0.011 respectively). Mean (±SD) LDL-c (mg/dl) between male and female did not show any significant difference.

Of the total 51% (495 out of 970) subjects had triglyceride above the cut off. Among these subjects male female distribution was 57.4% vs 47.2%. Hypercholesteromia was present in 41% (404 out of 970) subjects which was similar for male and female (50.2% vs 49.2%). Low HDL cholesterol was present in 73.2% subjects. Presence of low HDL cholesterol in almost equal proportion of male and female subjects (49.3% vs 50.3%). High LDL cholesterol was present in 33.3% (323 out of 970) of subjects. Of the total subjects with high LDLc 53.6% was male and 46.4% female. Of the total subjects 22.0% (231 out of 970) had isolated low HDLc. Of the total subjects with abnormal lipid levels male female proportion was 51.9% vs 48.1% (Figure 3). It was interesting to note that around 75% subjects with dyslipidemia for the individual components and all the components together were in age group 31-50 years (Table I).

When compared with data of some studies on Indian population there was almost no difference[13,16-18]. There was a study involving 3044 elderly Japanese-

American men which showed lipid pattern as follows TC 189, HDL-c 51, LDL-c 109, and TG 147 mg/dl[19]. Bangladeshi subjects in our study shows similar total cholesterol but differing in HDL-c, LDL-c and TG levels. Genetic and ethnic influence as well as differing food and lifestyle habit have role in such dissimilarities. It is alarming that our populations HDL-c is lower on the other hand LDL-c and TG are higher. This should be rechecked carefully in future involving more population based studies. It is to be noted that for the last few decades incidence of CAD (coronary artery disease) were halved in the West whereas it was doubled in Indo-Pak subcontinent on the same period[16].

The lipid values obtained in this study can be taken as a base parameters and clinical evaluation can be made on the basis of these findings.
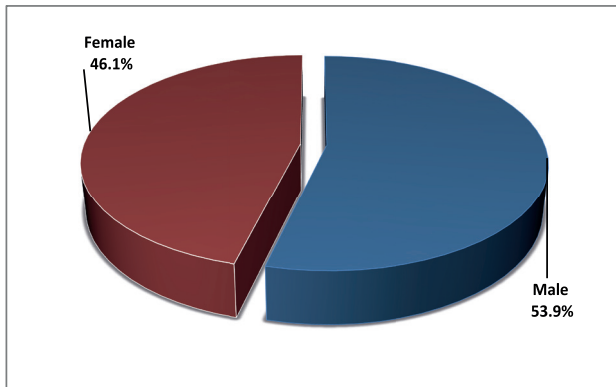
Conflict of interest: None declared

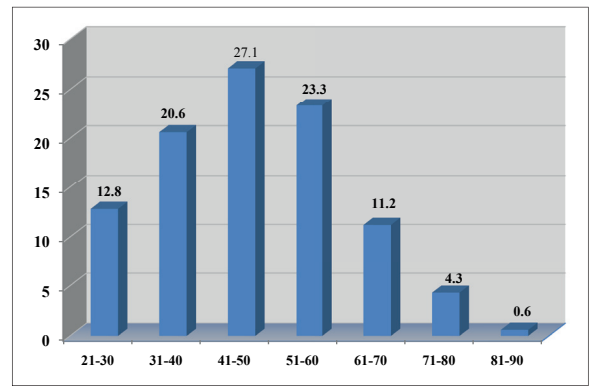Figure 1: Distribution of respondents by their sex (n=970)

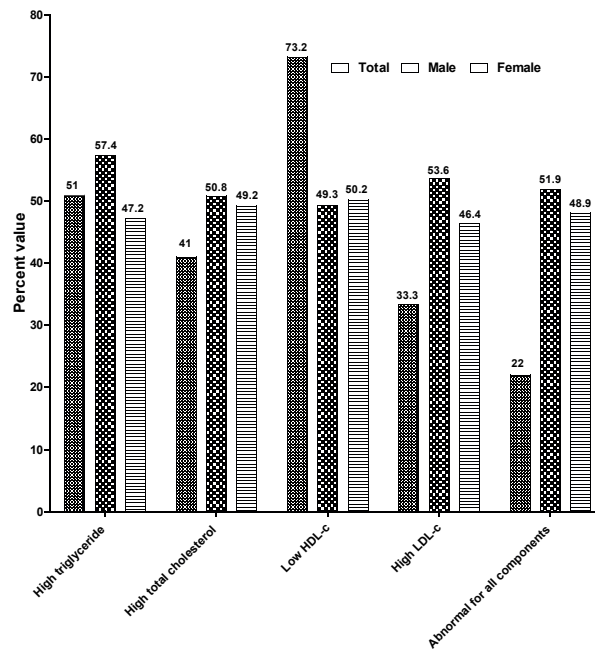Figure 2: Distribution of patients by their age (n=970)

Figure 3: Percent dyslipidemics of the total and male and female subjects.

Table I: Lipid profile in different age groups between male and female (n= 970)

Age (years)	Sex	No	TC (ml/dl)	HDL (ml/dl)	LDL (ml/dl)	TG (ml/dl)
21-30	Male	66	197.7± 36.4	34.9±8.4	120.9±31.3	209.7±54.1
	Female	50	192.7±36.6	42.8±11.5	122.4±35.1	135.4±49.2
	p-value		0.466	<0.001	0.808	0.001
31-40	Male	111	195.2±43.7	34.4±9.2	120.6±38.0	228.6±171.6
	Female	89	191.4 ± 40.0	40.9±10.5	112.9±32.8	175.3±103.2
	p-value		0.528	<0.001	0.132	0.011
41-50	Male	125	190.6±39.7	36.1±8.7	119.2± 32.2	177.3±99.6
	Female	138	203.5±45.0	40.7±15.4	124.2± 37.3	188.2±88.6
	p-value		0.014	0.004	0.248	0.565
51-60	Male	128	189.2±43.2	36.9±8.7	115.2± 35.7	162.8±87.8
	Female	98	203.6±44.2	40.5± 11.6	120.1±36.9	191.3±132.7
	p-value		0.015	0.007	0.3.9	0.054
61-70	Male	57	180.7±52.4	37.2±8.6	110.4± 40.3	168.6±53.7
	Female	52	195.4±55.3	41.2± 11.6	123.3 ± 44.6	165.1± 119.1
	p-value		0.156	0.041	0.116	0.895
71-80	**Male**	**28**	**176.8±41.8**	**41.1±20.9**	**105.5±37.7**	**170.7±85.5**
	Female	**14**	**187.8±48.6**	**36.1±10.3**	**124.2± 60.3**	**150.1±83.1**
	p-value		**0.453**	**0.410**	**0.224**	**0.463**
81-90	**Male**	**5**	**152.6±21.1**	**34.6±7.1**	**81.4±24.9**	**156.6±85.6**
	Female	**1**	**146.0**	**51.0**	**64.0**	**58.0**
	p-value		**0.835**	**0.102**	**0.559**	**0.352**
Total	Male	523	189.9±43.0	36.1±9.9	116.8±35.7	187.1±130.5
	Female	447	198.0±44.6	40.8±12.6	120.4±37.9	176.4±39.7
	p-value		0.004	<0.001	0.120	0.219

Unpaired student's t-test was performed to calculate statistical difference between age groups of the study variables

P <0.05 was taken as level of significance

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References:

1. O'Flaherty, Ford E, Allender S, Scarborough P, Capewell S; Coronary heart disease trends in England and Wales from 1984 to 2004: concealed leveling of mortality rates among young adults. *Heart* 2008; **94:** 178-181.5.https://doi.org/10.1136/hrt.2007.118323

2. British Heart Foundation; Coronary heart disease statistics. London: British Heart Foundation, 2007.

3. Ingelsson E, Schaefer EJ, Contois JH, McNamara JR, Sullivan L, Keyes MJ et al.; Lipid measures for prediction of coronary heart disease in men and women. *JAMA* 2007; **298:** 776-785. https://doi.org/10.1001/jama.298.7.776

4. Chien KL, Hsu HC, Su TC, Sung FC, Chen MF, Lee YT; Lipoprotein (a) and Cardiovascular Disease in Ethnic Chinese: The Chin-Shan Community Cardiovascular Cohort Study. *Clin Chem* 2008; **54**: 285-291. https://doi.org/10.1373/clinchem.2007.090969

5. Hippisley-Cox J, Coupland C, Vinogradova Y, Robson J, Minhas R, Sheikh A et al.; Predicting Cardiovascular risk in England and Wales: prospective derivation and validation of QRISK2. *Brit Med J* 2008; **336**:14751482. 11

6. Kannel WB, Castelli WP, Gordon T, McHamara PM. Serum cholesterol, lipoprotein and the risk of coronary heart disease. The Framingham study. *Ann Intern Med* 1971:**74**; 1-11. https://doi.org/10.7326/0003-4819-74-1-1

7. Arora,R.C. The enigma of cholesterol: some recent observations. *Cardiothoracic J.* 1997:**3**; 33.

8. Lewis H, Chait A, Wooton IDP, Canley CM, Kirkler DM, Sigurdsson G, February A, Maurer B, Brkhead J. Frequency of risk factors for ischaemic heart disease in a healthy British Population with particular reference to serum lipoproteins levels. *Lancet* 1974; **1**(7849): 141-6. https://doi.org/10.1016/S0140-6736(74)92438-6

9. Onitiri AC, Monica S, Boyo AE Serum lipids and lipoproteins in healthy Africans. *Clin Chim Acta* 1977; **81**: 57-62. https://doi.org/10.1016/0009-8981(77)90413-2

10. Jubb JB, Lorimer AR, Hawthorne VM, Morgan HC, Lawric TD. Lipoprotein levels apparently healthy men and women in the west of Scotland. *Br Heart J* 1976; **38**: 1138-1193.

11. https://doi.org/10.1136/hrt.38.11.1189

11. National Center for Health Statistics, Second National Health and Nutrition Examination Survey (NHANES) 1976-1980 and statistics fron the Centre for Disease Control and Prevention – Series I1. (1993) Serum lipid levels of adults, 20 to 74 years, United States. Public use data documentation, Public Health Service, 1-40.

12. Gandhi, B.M. Lipoprotein composition of normal healthy subjects in Northern India. *Indian J Med Res* 1982;**75**: 393 - 401.

13. Shanmugasundaram RK, Suresh S, Misra KP, Jaykrishnan, TK. Plasma lipoprotein cholestorol in India in healthy persons and those with coronary heart disease. *Atherosclerosis.* . 1993;**46** : 129-135. https://doi.org/10.1016/0021-9150(83)90171-5

14. National Cholesterol Education Program (NCEP) Executive summary of the third report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *Circulation* 2002;**106**(25): 3143-421.

15. Friedwald WT. Estimation of serum Low Density Lipoprotein. *Clin Chem* 1972;18:499.

16. Goswami K and Bandyopadhyay A. Lipid profile in middle class Bengali population of Kolkata. *Ind J Clin Biochem* 2003;**18**(2):127-130.https://doi.org/10.1007/BF02867378

17. Jhala CI, Shah UV, Shah TK, Naik BK and Dafda JD. A study of serum lipid profile part-1: Establishment of normal reference values of serum lipid levels in healthy vegetarian population of Gujarat. *Ind J Clin Biochem* 1998;**13**(1): 1-7. doi: 10.1007/BF02873435. https://doi.org/10.1007/BF02873435

18. Gupta R, Prakash H and Kaul V. Cholesterol lipoproteins, triglycerides, rural-urban differences and prevalence of dyslipidaemia among males in Rajasthan. *J Assoc Physicians India* 1997; **45**(4):275-9.

19. Burchfiel CM1, Abbott RD, Sharp DS, Curb JD, Rodriguez BL, Yano K. Distribution and correlates of lipids and lipoproteins in elderly Japanes-American men. The Honolulu Heart Program. Arterioscler *Thromb Vasc Bio* 1996 ;**16**(11):1356-64. https://doi.org/10.1161/01.ATV.16.11.1356