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Prevalence and Pattern of Dyslipidemia in a Tertiary Care Center of Manipur

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Abstract: *Dyslipidemiais a major risk factor for atherosclerotic cardiovascular disease (ASCVD) and it has become a worldwide public health problem. In India, only limited number of large-scale studies exist on prevalence of dyslipidemia and the prevalence varies widely according to socioeconomic, ethnic and cultural differences. This was a cross-sectional hospital-based study done at the Biochemistry Department of Jawaharlal Nehru Institute of Medical Sciences, Imphal. Lipid Profile of subjects aged ≥20 years from May 2018 to April 2019 were consecutively studied. Serum total Cholesterol, Triglyceride, HDL-C, LDL-C were included in study to assess pattern and status of dyslipidemia in 940 individuals. In this study, we found high cholesterol level in 16% (64 males and 88 females), high triglycerides in 44% (184 males and 232 females), low HDL-C in 31% (114 males and 184 females) and high LDL-C in 28% (108 males and 160 females). The prevalence of dyslipidemia was observed to be higher in females than males and nearly 76% of the subjects had atleast one abnormal parameter. To prevent dyslipidemia, it is essential to conduct appropriate intervention programs aimed at risk factor reduction and implement routine screening programs for blood lipid levels in Manipur, India.*

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I. Introduction

Dyslipidemia is a major modifiable risk factor for the development of type 2 diabetes mellitus1, atherosclerosis2, stroke and cardiovascular diseases (CVDs)3. CVDs are responsible for death and disability in both developed as well as developing countries. Higher levels of cholesterol in blood has higher risk of cardiovascular disease and stroke4 and high cholesterol level in blood is accountable for one third of ischemic heart disease globally5. It is estimated that increased blood cholesterol levels are responsible for 2.6 million deaths (4.5% of total death) and 29.7 million disability-adjusted life year DALYS, (2% of total DALYS) globally6. Therefore, the National Cholesterol Education Program (NCEP) developed guidelines for the detection, evaluation and treatment of high blood cholesterol in adults7.

Proper control of the blood lipid levels reduced cardiovascular morbidity and mortality both in patients with established coronary heart disease (CHD) and in those at risk of developing CHD. And the lowering of the raised serum cholesterol reduces the risk of heart diseases. For example, a 10% reduction in serum cholesterol in 40-year old men has been reported to result in a 50% reduction in heart disease within five years and similarly 10% serum cholesterol reduction for 70-year old men can result in an average 20% reduction in heart disease occurrence within five years8. Hence the knowledge of the various aspects of the lipid profile and pattern and prevalence of dyslipidemia is essential part.

With rapid socioeconomic development and associated lifestyle changes, the prevalence of dylipidemia has increased dramatically over the past decade in India. This has contributed to increase in the number of people suffering from atherosclerotic cardiovascular diseases (ASCVD). Higher levels of cholesterol in blood are responsible higher risk of cardiovascular disease and stroke6 and high cholesterol is accountable for one third of ischemic heart disease globally. It is estimated that increased cholesterol levels are responsible for 2.6 million deaths (4.5% of total) and 29.7 million disability-adjusted life year DALYS, (2% of total DALYS) globally5.

Most dyslipidemia guidelines recognize LDL as the major atherogenic lipoprotein and consequently identify LDL-C as the primary target of therapy and also cholesterol levels >200 and triglyceride levels >150 are considered for therapy9. Besides cholesterol lowering, public health preventive measures are needed to identify and treat individuals with risk factors, especially obesity, physical inactivity, tobacco use and hypertension10.

In terms of plasma lipid levels from different populations, remarkable variations have been noted, which are mainly due to age, sex, food habits, life-style, socio-economic status, races, heredity etc. The estimation of the prevalence and pattern of dyslipidemia is essential for proper planning of health resources for both primary and secondary prevention of cardiovascular diseases. In this study, we report the prevalence and pattern of dyslipidemia and create a database that can be useful to the local health professionals concerned with controlling and managing dyslipidemia in Manipur.

II. Material And Methods

This was a cross sectional hospital-based study done at the Biochemistry Department of J.N. Institute of Medical Sciences, Imphal, Manipur. Lipid Profile of subjects aged ≥20 years from May 2018 to April 2019 were consecutively studied. Serum total Cholesterol, Triglyceride, HDL-C, LDL-C were included in study to assess the status of dyslipidemia in 940 individuals.

Study Design: Hospital based cross sectional study.
Study Location: This was a tertiary care teaching hospital-based study done in Department of Biochemistry, at Jawaharlal Nehru Institute of Medical Sciences, Manipur, India.

Study Duration: May 2018 to April 2019.
Sample size:940 patients.
Subjects & selection method: The study population was drawn from consecutive diabetic patients who presented to Dr. Ram ManoharLohia Combined Hospital with dyslipidemia and were prescribed the indicated statins and underwent fasting blood test of lipid profile before statin treatment initiation between from November 2014 to November 2015. Patients were divided into three groups (each group had 100 patients) according to doses of statins. The prescribed doses of statin in RMLH for diabetic patients (10)
Inclusion criteria: All the subjects, male and female between the age group of 20 and 80 years who attended lipid profile test were considered for the study.

Exclusion criteria: Patients with, ischemic diseases (like acute coronary syndrome, acute myocardial infarction, and pulmonary embolism), renal diseases, liver diseases or with any type of malignancy were excluded from the study. Participants taking alcohol, tobacco, oral contraceptives, hormone replacement or supplementation therapy and individuals with modified physiological states such as pregnancy, psychological and mental disorders were also excluded.

Procedure methodology: Prior consent was obtained in the language they can understand. After an overnight fasting, 5 ml of venous blood was withdrawn and allowed to clot at room temperature. Plasma was obtained by centrifugation at 3000 revolutions per minute for 10 minutes and serum was collected. The serum was processed within one hour of collection. Cholesterol (CHOD-POD method)[11], triglycerides (GPO-POD method)[12], and HDL-C (Phosphotungstate method)[13] were measuredusing spectrophotometer. VLDL-C and LDL-C were calculated by using Friedewald's formula[14]. Quality was controlled using standard solutions (CMC-EQAS) as an External quality assessment scheme (EQAS).

Statistical analysis: The statistical analysis was performed using the SPSS (version 24.0). Results were expressed as percentages and lipid levels were expressed as the mean ± SD. The study protocol was approved by the institutional human research ethical committee and informed consent was obtained from all the patients before enrolling into the study. A p value <0.05 was considered significant. Prevalence of dyslipidemia by means of its determinants was calculated using the prevalence rate formula: number of patients per total number of all subjects at the time of study multiplied by 100.
Definitions: Dyslipidemia was defined as presence of one or more than one abnormal serum lipid values. According to NCEP III recommendations cut-off values were[15]:
1. Hypertriglyceridemia:TG≥150mg/dl
2. High LDL cholesterol:LDL-C≥100mg/dl
3. Low HDL cholesterol:HDL-C≤40mg/dl and
4. Hypercholesterolemia: TC≥200mg/dl
5. Isolated hypercholesterolemia: Serum cholesterol ≥ 200 mg/dl and triglycerides <150 mg/dl.
6. Isolated hypertriglyceridemia: Serum triglycerides ≥ 150 mg/dl and cholesterol <200 mg/dl.
7. Isolated low HDL-C: HDL-C ≤ 40 mg/dl (male) and ≤ 50 mg/dl (female) without hypertriglyceridemia or hypercholesterolemia.

III. Result

The study population was comprised of 940 subjects that included 346 males and 594 females and the clinical characteristics of the subjects are shown in Table-1. On applying NCEP guidelines we found out that nearly 76% of the subjects had atleast one abnormal parameter.

Table 1. clinical characteristics of study population

		N	Mean ± SD
TC	Males	940	158.46 ± 45.68
	Females	594	154.55 ± 41.41
	Total	346	155.98 ± 43.01
Tg	Males	940	166.78 ± 86.66
	Females	594	147.70 ± 76.63
	Total	346	154.97 ± 81.22
HDL-C	Males	940	44.62 ± 9.9
	Females	594	44.87 ± 8.13
	Total	346	44.75 ± 8.86
LDL-C	Males	940	82.84 ± 39.71
	Females	594	80.34 ± 34.42
	Total	346	81.22 ± 36.43
Age	Males	940	49.5 ± 13.19
	Females	594	46.16 ± 12.86
	Total	346	47.39 ± 13.08

Hypercholesterolemia, hypertriglyceridemia, low HDL-C and increased levels of LDL-C were found to be more in females (figure-1). On further comparing, according to the age, we found the peak prevalence of dyslipidemia to be in 40-50 years old patients and decline gradually on both side (figure-3).

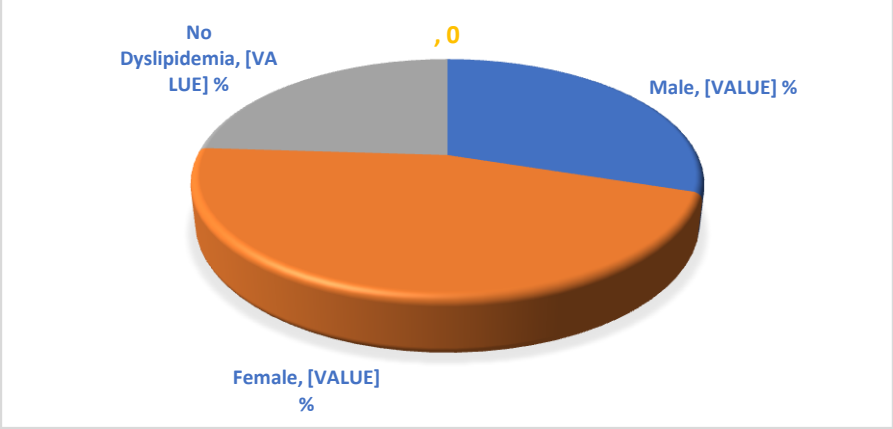

Fig 1. Sex specific prevalence of dyslipidemia in the study population

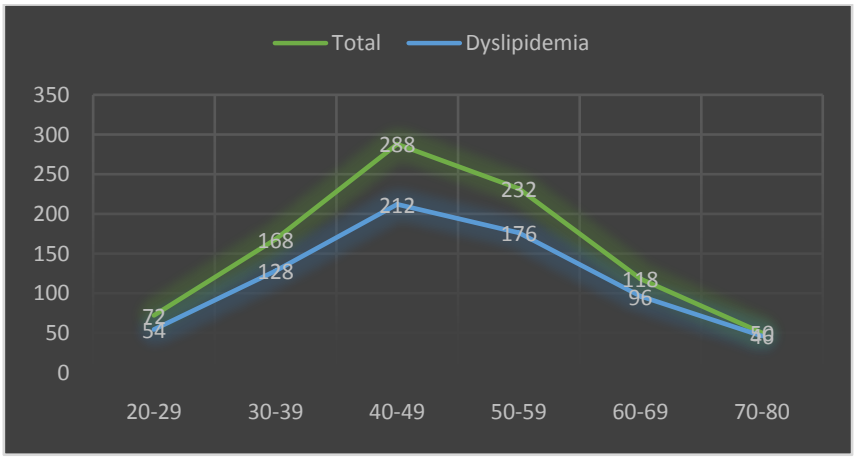

FIG-3: Age Specific Prevalence of Dyslipidemia in The Study Population

In this study, we found high cholesterol level in 16% (64 males and 88 females), high triglycerides in 44% (184 males and 232 females), low HDL-C in 31% (114 males and 184 females), high LDL-C in 28% (108 males and 160 females), high isolated cholesterol in 5% (20 males and 26 females), high isolated triglyceride in 32% (140 males and 170 females and low isolated HDL in 19% (62 males and 120 females) (table-2).

Table 2. **Serum lipid levels of patients and pattern of dyslipidemia (n=940)**

Serum lipid (Abnormal value)	Mean ± SD	Patients with deranged lipids
TC (>200 mg%)	227.50 ± 28.16	Male = 64 Female = 88 Total = 16%
TG (>150%)	216.78 ± 84.69	Male = 184 Female = 232 Total = 44%
LDL-C (>100 mg%)	128.65 ± 29.34	Male = 108 Female = 160 Total = 28%
HDL-C (<40 mg%)	34.97 ± 4.03	Male = 114 Female = 184 Total = 31%
Isolated Hypercholesterolemia	229.43 ± 28.04	Male = 20 Female = 26 Total = 5%
Isolated Hypertriglyceridemia	207 ± 68.69	Male = 140 Female = 170 Total = 32%
Isolated low HDL-C	34.72 ± 3.66	Male = 62 Female = 120 Total = 19%

Of the total study population, 57.44% patients were aged ≥ 40 years and 31.91% below 40 years. Pearson's correlations test showed that age was significantly correlated ($P \leq 0.05$) with all lipid profile parameters. Table-3 gives details about correlation of various demographic variables with lipid parameters.

Table 3: Correlation of age with various lipid parameters

	LDL-C	HDL-C	TG	TC
Age				
***Correlation coeficient**	−0.06864	0.04176	−0.04939	0.051664
P value	<0.0001	<0.0001	<0.0001	<0.0001

*Pearson's correlation coefficient. HDL-C: High-density lipoprotein cholesterol, LDL-C: Low-density lipoprotein cholesterol, TC: Total cholesterol, TG: Triglyceride

Figure 2 shows the overlap of the individual components of dyslipidemia. About 7% (n =65) of the adult population had three lipid abnormalities (hypercholesterolemia + hypertriglyceridemia + low HDL-C) and 4% (n= 40) of the population had all four lipid abnormalities (hypercholesterolemia + hypertriglyceridemia + low HDL-C + high LDL-C). Only 24% (n= 220) had no lipid abnormality.

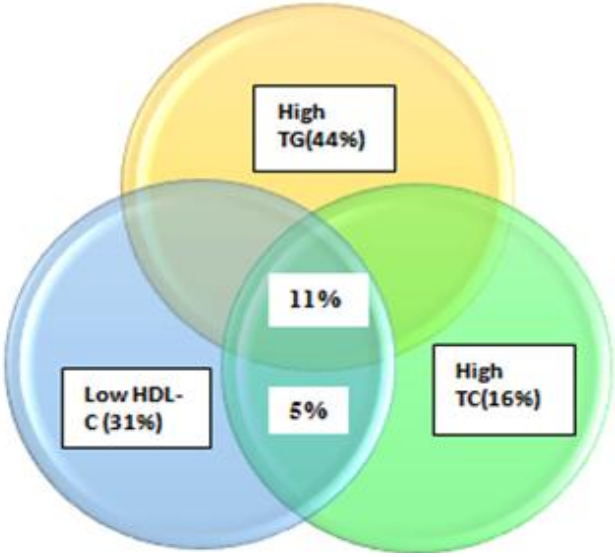

Figure 2. Venn diagram to show the overlap of the individual components of dyslipidemia [Hypercholesterolemia, hypertriglyceridemia and low HDL-cholesterol].

IV. Discussion

Regional studies regarding pattern of dyslipidemia is very essential to prevent the complications related to it. We found no related studies in rural community of the region. This type of studies helps the medical fraternity to understand the design and occurrence of dyslipidemia and disorders associated with it so we can take more action in preventing it. Our results are consistent with other studies from India. In study by Prabhakaran et al.,[16] among men in large industry in northern India, the prevalence of dyslipidemia was found to be 62%, which is near to 76% in our study. However, the WHO prevalence for dyslipidemia in India of 27.1 % is lower as compared to our data. Our study is also consistent with other 2 similar studies from India where the prevalence in younger population was found to be as high as 80% [17,18].

The most common lipid abnormality in our population was high triglyceride and low HDL-C. This is also consistent with other studies in North India [19], where low HDL-C is predominant lipid abnormality along with high TG. Our result differs a little from south India studies where high LDL-C and TG are predominant lipid abnormality rather than low HDL-C[20]. One published study from western India [18] from metropolitan population has shown high LDL-C similar to our study and one other study has shown low HDL-C is predominant in western India than high LDL-C[21].

Oxidative modification of LDL-C is the key process to the atherosclerosis. A fraction of cholesterol is taken up by macrophages; this is not a regulated pathway. Increased levels of LDL or modification of LDL by glycation (as seen in diabetes mellitus) or oxidation increases the fraction of cholesterol taken up by macrophages. LDL infiltrates through arterial walls, and are taken up by macrophages or scavenger cells. This is the starting event of atherosclerosis leading to myocardial infarction. When these cells become engorged with cholesterol, foam cells are formed, that get deposited in the sub-endothelial space triggering formation of atheromatous plaque and leading to possible MI.

Low HDL-C levels shows stronger predictor of occurrence and reoccurrence of MI and stroke. They are also associated with premature and severe CAD[22].High TG is already an independent risk factor for coronary heart disease.

More importantly, a healthy lifestyle should be practiced right from childhood stage to prevent this epidemic. Vegetable oils and fish oils contain PUFA (polyunsaturated fatty acid). Excretion of cholesterol needs prior esterification with PUFA. PUFA will help in lowering of cholesterol in the body and so PUFA is anti-atherogenic. Deep frying and refrying in the same oil leads to trans fatty acids formation. Trans fatty acids decrease HDL-cholesterol and may cause atherosclerosis. Leafy vegetables because of its high fibre content, will increase the motility of bowels and reduce reabsorption of bile salts. And the only excretory route of cholesterol excretion is through bile. Vegetables also contain plant sterols (sitosterol) which decrease the absorption of cholesterol.

Worldwide, cardiovascular disease is estimated to be the leading cause of death and loss of disability-adjusted life years. Although age-adjusted cardiovascular death rates have declined in several developed countries in past decades, rates of cardiovascular disease have risen greatly in low-income and middle-income countries [23], with about 80% of the burden now occurring in these countries. In view of this, all efforts need to be taken to clearly understand the role of risk factors in the emerging epidemic, for its effective control.

Presence of dyslipidemia even among the young adults as observed in this study is distressing and thus screening right from younger ages may help promote lifestyle changes that can prevent or slow atherogenesis. Several randomized controlled trials have shown that effective treatment of dyslipidemia reduces the rate of morbidity and mortality [24]. The observations from the present study provide insight into the magnitude of the burden of dyslipidemia in India.

V. Conclusion

This study showed worrying prevalence of dyslipidemia among the population including younger population and both the gender. It is essential to conduct appropriate intervention programs aimed at risk factor reduction and routine screening programs for blood lipid levels. A healthy life-style and diet must be encouraged to reduce the occurrence of dyslipidemia. Moderate exercise and therapeutic interventions aimed at reducing dyslipidemia are mandatory to prevent further complications. Screening of such persons would support early identification and treatment of dyslipidemia.

References

[1]. Snehalatha, C.; Nanditha, A.; Shetty, A.S.; Ramachandran, A. Hypertriglyceridaemia either in isolation or in combination with abdominal obesity is strongly associated with atherogenic dyslipidaemia in Asian Indians. Diabetes Res. Clin. Pract. 2011, 94, 140–145.

[2]. Tziomalos, K.; Athyros, V.G.; Karagiannis, A.; Mikhailidis, D.P. Dyslipidemia as a risk factor for ischemic stroke. Curr. Top. Med. Chem. 2009, 9, 1291–1297.

[3]. Stamler, J.; Daviglus, M.L.; Garside, D.B.; Dyer, A.R.; Greenland, P.; Neaton, J.D. Relationship of baseline serum cholesterol levels in 3 large cohorts of younger men to long-term coronary, cardiovascular, and all-cause mortality and to longevity. JAMA 2000, 284, 311–318.

[4]. World Health Organization. The global burden of disease: 2004 update. Geneva World Health Organization, 2008.

[5]. World Health Organization. Global health risks: Mortality and burden of disease attributable to selected major risks. Geneva, WHO, 2009.

[6]. World Health Organization. Prevention of cardiovascular disease: Guidelines for assessment and management of cardiovascular risk. Geneva, WHO, 2007.

[7]. Chatlert P. Rural-urban difference in lipid levels and prevalence of dyslipidemia: a population-based study in khonkaen province, Thailand. J Med Assoc Thai. 2006;89(11):1835-44.

[8]. World Health Organization. Global status report on non-communicable diseases 2010. Geneva, WHO, 2010.

[9]. Bonow RO, Smaha LA, Smith Jr SC, Bonow RO, Smaha LA, Smith Jr SC, et al. World Heart Day 2002: the international burden of cardiovascular disease: responding to the emerging global epidemic. Circulation. 2002;106:16.

[10]. In: Mendis S, Puska P, Norrving B, eds. Global atlas on cardiovascular disease prevention and control. Geneva: World Health Organization; 2011.

[11]. Richmond W. Preparation and properties of a cholesterol oxidase from Nocardia sp. and its application to the enzymatic assay of total cholesterol in serum. Clin Chem. 1973;19(12):1350-56.

[12]. TGBuccolo G et al. Quantitative determination of serum tri glycerides by use of enzimes. Clin Chem 1973; 19 (5): 476-482.

[13]. Wiebe DA and Warnick GR. Measurement of high-density lipoprotein cholesterol. In: Handbook of Lipoprotein Testing 2nd Ed. Rifai N, Warnick GR, Dominiczak MH. AACC press, Washington. 2000; 221-244.

[14]. Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. Clin Chem. 1972;18:499–502.

[15]. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive summary of the third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III). JAMA. 2001; 285(19):2486-97.

[16]. Prabhakaran D, Shah P, Chaturvedi V, Ramakrishnan L, Manhapra A, Reddy KS. Cardiovascular risk factor prevalence among men in a large industry of northern India. Nati Med J. 2005;18 :59-65.

[17]. Sam JE, Sam NJ, Ganesh HK & Maben EVS. Prevalence of dyslipidemia in patients undergoing general health checkup. Int J Biol Med Res. 2014;5(3):4305-08.

[18]. Sawant AM, Shetty D, Mankeshwar R, Ashavaid TF. Prevalence of dyslipidemia in young adult Indian population. J Assoc Physicians India. 2008; 56:99-102.

[19]. Gupta R, Prakash H, Kaul V. Cholesterol lipoproteins, triglycerides, rural urban differences and prevalence of dyslipidemia among males in Rajasthan. J Assoc Phys India. 1997;45(4):275–79.

[20]. Rajmohan L, Deepa R, Mohan A, Mohan V. Association between isolated hypercholesterolemia, isolated hypertriglycerideia and coronary artery disease in South Indian type 2 diabetic patients. Indian Heart J. 2000;52(4):400–06.

[21]. Dyslipidemia among adults attending preventive health checkup program of a tertiary care hospital in rural Gujarat. International Journal of Medical and Clinical Research. 2015; 6(1):321-25.

[22]. Enas EA, Yusuf S, and Mehta JL. Prevalence of Coronary Artery Disease in Asian- Indians. Am J Cardiol1992;70:945-49.

[23]. Yusuf S, Reddy S, Ounpuu S, Anand S (2001) Global burden of Cardiovascular diseases: Part I: General considerations, the epidemiologic transition, risk factors and impact of urbanization. Circulation 104: 2746–2753

[24]. Costa J, Borges M, David C, Vaz Carneiro A (2006) Efficacy of lipid lowering drug treatment for diabetic and non-diabetic patients: meta-analysis of randomized controlled trials. BMJ 332: 1115–1124.