Prevalence and Pattern of Dyslipidemia in a Rural Community in Anand District of Gujarat

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ABSTRACT

Introduction: Dyslipidemia is a major risk factor for CHD and denotes lipid abnormalities such as high Total Cholesterol (TC), elevated Low Density Lipoprotein Cholesterol (LDL-C), Hypertriglyceridemia, Low High Density Lipoprotein Cholesterol (HDL-C). Dyslipidemia triggers more than four million deaths per year in the world.

Aim: To evaluate prevalence of dyslipidemia in individuals attending health checkup program in tertiary care hospital in Gujarat

Materials and Methods: This study was done at the Biochemistry Department, of Tertiary Care Hospital and Medical College. Total 585 normal healthy individuals (422 males and 163 females above 18 years) who voluntarily attended 'whole

body checkup scheme' at the hospital were selected. Serum total Cholesterol, Triglyceride, HDL-C, VLDL-C, LDL-C were included in study to assess the status of dyslipidemia in individuals.

Results: In this study, we found high cholesterol level in 27% (113 males and 46 females), high triglycerides in 18% (84 males and 23 females), low HDL-c in 29% (156 males and 16 females), high LDL- C in 60% (264 males and 89 females). Abnormal lipid parameters are more prevalent in males as compared to females.

Conclusion: This study showed worrying prevalence of dyslipidemia among rural population including younger population. A healthy life-style and diet is advocated to reduce the occurrence of dyslipidemia.

INTRODUCTION

Apart from risk factors like hypertension, diabetes mellitus, obesity, cigarette smoking and sedentary lifestyle, dyslipidemia is one of the most important risk factors identified for cardiovascular disease [1].

Some other risk factors are family history, age, gender and insulin resistance. Cardiovascular diseases are the major contributors to morbidity and mortality throughout the world. For the last many years there has been more attention on lipoproteins and their constituent molecules because of their relation with cardiovascular diseases [2].

Higher levels of cholesterol in blood are responsible higher risk of cardiovascular disease and stroke [3] and high cholesterol is accountable for one third of ischaemic heart disease globally [4,5]. 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) globally [4]. The prevalence of raised total cholesterol among adults (Total cholesterol ≥ 6.2 mmol/l (240 mg/dL) was 9.7%. This data particularly represented 8.5% for males and 10.7% for females particularly in the year 2008 [6].

Lowering raised serum cholesterol reduces the risk of heart disease. 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; the same serum cholesterol reduction for 70-year old men can result in an average 20% reduction in heart disease occurrence within five years [6].

In the World Health Report of the year 2002, it was specifically denoted that by 2020 the largest cause of death and disability in India will be Cardiovascular Diseases (CVDs). If we go by figures then, it is predicted that around 2.6 million Indians to die due to coronary heart disease. This would be accountable for 54.1% of all CVD deaths [7].

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. Lipids and lipoproteins are being analysed with various methods and principles on different analysers. These differences cannot be neglected [8].

MATERIALS AND METHODS

This study was done at the Biochemistry Department, of tertiary care hospital and attached Medical College, Anand District, Gujarat. It was a cross-sectional study with a posteriori sampling performed over a period of one year in 2011-12. A

total of 2137 individuals who attended 'whole body checkup scheme' at tertiary care hospital were evaluated, out of all 585 normal healthy individuals (422 males and 163 females) were selected after applying the inclusion and exclusion criteria. All the subjects, male and female between the age group of 18 and 75 years were considered for inclusion in the study. A detailed history was taken.

Patients with, ischaemic 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.

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. Statistical analysis was done using Medcalc and SPSS statistical software Version 20.0.

Prior consent was obtained in the language they can understand. After 12 hours overnight fast, 5 mL of venous blood samples were collected in plain tubes and allowed to clot for half an hour and centrifuged to get serum. Cholesterol (Cholesterol oxidase method) [9], triglycerides (Enzymatic method) [10], and HDL-C (Homogeneous enzymatic colorimetric assay method) [11] were measured in fully automated analyser (Cobas integra 400 plus clinical chemistry analyser). VLDL-C and LDL-C were calculated by using Friedewald's formula [12]. Quality was controlled using standard solutions (BioRad-USA) as an External Quality Assessment Scheme (EQAS).

RESULTS

Results are presented in mg/dL units. Age and gender distribution of serum lipid profile in study population is shown in [Table/Fig-1].

Dyslipidemia was defined as presence of one or more abnormal serum lipid values. According to NCEP III recommendations cut-off values were:

1. TG≥150mg/dL (2.0mmol/L)
2. LDL-C≥100mg/dL (2.6 mmol/L)
3. HDL-C≤40mg/dL (1.04mmol/L) and
4. TC≥200mg/dL (2.7mmol/L) [13].

In this study, we found high cholesterol level in 27% (113 males and 46 females), high triglycerides in 18% (84 males and 23 females), low HDL-Cholestrol in 29% (156 males and 16 females), high LDL- C in 60% (264 males and 89 females). Abnormal lipid parameters are more prevalent in males as compared to females. There was significant difference in all parameters in different age groups. Except total cholesterol and VLDL, p-value of all parameters was significantly different statistically between males and females [Table/Fig-1,2].

Age (years)	Gender	TC	TG	HDL-C	LDL-C	VLDL	TC/HDL-C	LDL-C/HDL-C
20-29	M (161)	164.4±33.9*	94.45±43.63	43.85 ±9.33	110.96±28.52	21.03±26.32	3.88±1.08	2.41±0.90
	F (35)	157.8±25.4	86.97±47.05	51.23±11.97	88.91±21.26	17.4±9.41	3.22±0.9	1.83±0.67
	Both (196)	163.2±32.6	93.12±44.23	45.17±10.22	98.81±27.70	20.38±24.21	3.76±1.0	2.31±0.89
30-39	M (119)	184.4±35.4	118.71±55.4	43.85±9.33	116.13±29.98	23.9±11.12	4.38±1.11	2.8±0.9
	F (31)	168±35.7	88.4±37.42	52.87±9.58	97.27±29.12	17.95±7.56	3.24±0.81	1.85±0.74
	Both (150)	181.1±36.4	112.5±53.53	45.39±11.03	112.3±30.67	22.67±10.74	4.15±1.166	2.6±0.96
40-49	M (67)	187.54±32.4	116±50.1	42.84±9.68	119.9±29.12	24.8±15.5	4.56±1.081	2.98±0.87
	F (36)	177.2±26.5	93.1±37.1	52.44±9.32	105.9±19.97	18.6±7.37	3.44±0.765	2.12±0.58
	Both (103)	183.9±30.7	108±47.1	46.2±10.57	115±27.04	22.63±13.52	4.17±1.12	2.68±0.89
50-59	M (41)	183.5±37.15	113.9±48.55	42.78±9.35	117.62±30.76	22.75±9.71	4.36±0.85	2.87±0.95
	F (54)	196.54±34.8	109.2±42.35	57.2±11.48	117.4±28.59	22.11±8.51	3.53±0.84	2.14±0.71
	Both (95)	189.1±36.55	11.86±45.8	49±12.52	117.5±29.69	22.47±9.17	4±0.94	2.56±0.92
60-80	M (20)	174.9±31.9	98.6±43.4	47.5±11.51	105.6±25.27	22.7±16.31	3.68±0.85	2.34±0.61
	F (20)	198.7±28.98	120.65±29.23	54.3±15.51	119.9±23.21	24.13±5.85	3.82±0.79	2.33±0.63
	Both (40)	186.77±32.4	109.6±38.18	50.9±13.9	11.76±25.01	23.4±12.11	3.75±0.81	2.34±0.61
All	M (421)	176.69±35.7	107.5±49.87	43.62±9.87	110.6±30.16	22.74±19.02	4.18±1.1	2.67±0.92
	F (163)	178.8±34.18	98.33±41.32	53.68±11.47	105.2±27.14	19.78±80.29	3.42±0.84	2.04±0.68
	Both (584)	177.28±35.3	104.9±47.79	46.4±11.27	109.1±29.43	21.91±16.79	3.97±1.09	2.49±0.91
	p-value	0.482	0.038	0.0001	0.045	0.056	0.0001	0.0001

[Table/Fig-1]: Age and gender distribution of serum lipid profile in study population.
* Data is shown as mean±SD.

Age (years)	Gender	TC	TAG	HDL-C	LDL-C	TC/HDL-C	LDL-C/HDL-C
20-29	M (161)	23(14)	22(14)	57(35)	84(52)	25(16)	68(42)
	F (35)	3(9)	5(14)	5(14)	9(26)	1(3)	5(14)
	Both(196)	26(13)	27(14)	62(32)	93(47)	26(13)	73(37)
30-39	M (119)	45(38)	29(24)	48(40)	83(70)	36(30)	74(62)
	F (31)	6(19)	2(6)	2(6)	14(45)	1(3)	4(13)
	Both (150)	51(34)	31(21)	50(33)	97(65)	37(25)	78(52)
40-49	M (67)	25(37)	19(28)	26(39)	51(76)	20(30)	46(69)
	F (36)	7(19)	2(6)	4(11)	20(56)	2(6)	6(17)
	Both (103)	32(31)	21(20)	30(29)	71(69)	22(21)	52(50)
50-59	M (41)	17(41)	11(27)	19(46)	35(85)	14(34)	36(88)
	F (54)	20(37)	10(19)	3(6)	30(56)	3(6)	11(20)
	Both (95)	37(39)	21(22)	22(23)	65(68)	17(18)	47(49)
60-80	M (20)	13(65)	3(15)	6(30)	11(55)	2(10)	8(40)
	F (20)	10(50)	4(20)	2(10)	16(80)	1(5)	7(35)
	Both (40)	23(58)	7(18)	8(20)	27(68)	3(8)	15(38)
All	M (421)	113(27)	84(20)	156(37)	264(63)	97(23)	232(55)
	F (163)	46(28)	23(14)	16(10)	89(55)	8(5)	33(20)
	Both (584)	159(27)	107(18)	172(29)	353(60)	105(18)	265(45)

[Table/Fig-2]: Prevalence of dyslipidemia in study population according to NCEP III.

DISCUSSION

Hypertriglyceridemia, abnormally high LDL-C and low HDL-C are well known risk factors for cardiovascular disease in India. Based on the NCEP III criteria the dyslipidemic states were noted with high TG (18%), high LDL-C (60%), low HDL-C (29%), and high cholesterol (27%).

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 help 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., [14] among men in large industry in northern India, the prevalence of dyslipidemia was found to be 62%, which is near to 60% in our study. However, the WHO prevalence for dyslipidemia in India of 27.1 % is lower as compared to our data. Our study differs from other two similar studies from India where the prevalence in younger population was found to be as high as 80% [15,16].

The most common lipid abnormality in our population was high LDL-C and low HDL- C. In contrast to other studies in North India [17,18], where low HDL-C is predominant lipid abnormality along with high TG. Our result is similar to most studies from south India where high LDL-C and TG are predominant lipid abnormality rather than low HDL-C [19,20]. One published study from western India [16] 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 LDI-C [21].

LIMITATION

As this was a cross-sectional study, we could not get the data of BMI. No data on statin usage by individuals were available, neither were dietary habits taken into account.

CONCLUSION

This study showed worrying prevalence of dyslipidemia among rural population including younger population and both the gender. 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.

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