

Study of Dyslipidemia in Young Asymptomatic Adults Aged 20-40 YearsPriyanka Pandey¹, Rajesh Kumar Jha^{2*}, Ashwin Porwal³¹Postgraduate Student, Department of General Medicine, Sri Aurobindo Medical College & PGI, Indore, India²Professor & Head, Department of Gen. Medicine, Sri Aurobindo Medical College & PGI, Indore, India³Physician, Shalby Hospital, Indore, India**Original Research Article*****Corresponding author**

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Abstract: According to National Commission on Macroeconomics and Health (NCMH), a government of India undertaking, there would be around 62 million patients with CAD by 2015 in India and of these, 23 million would be patients younger than 40 years of age. Dyslipidemia individuals are more frequently "centrally obese" (e.g., with a high waist-to-hip circumference ratio (WHR) [7-8]. The HMGCoA (3-hydroxy-3-methylglutaryl-coenzyme A) reeducate inhibitors, often referred to as the "statins," continue to be a mainstay in the management of dyslipidemia. Source of data: Sri Eurobond Medical College & Post Graduate Institute, Indore (M.P.) Duration: 18 Months. Inclusion criteria: All diagnosed cases of asymptomatic young adults, patient had aged between 20-40 years, patient of both sexes, male and female. Exclusion criteria: Any patient below 20 years and above 40 years, Failure to give written consent for participation in the study. Sampling: Purposive sampling (non-probability sampling technique) was used to recruit a sample from the population of asymptomatic young adults that met inclusion-exclusion criterion for this observational study. Study tools: History, Systemic Examination, Complete hierogram, Fasting Blood Sugar, lipid profile, Blood Urea Nitrogen, TSH, Serum creatinine, ECG. Preparation and organization of data: A maximum of 336 patients were deemed fit into inclusion-exclusion criteria. Finally, three hundred thirty four patients were screened for this research was chosen purposively from the outpatient department of medicine at Sri Aurobindo Medical College and Post Graduate Institute; Indore was recruited as subjects for the study. Proportion of abnormal lipid subtractions found to be successively increased as the age of young asymptomatic adults had increased Results of present research projected that the low density lipoprotein found to be diagnosed more frequently abnormal (≥ 100 mg/dl) in 59.65% cases of asymptomatic young adults of aged between 31 and 40 years than 52.15% cases had aged between 20 and 30 years. Second most common pattern of dyslipidemia was high density lipoprotein found to be abnormal (≤ 40 mg/dl) in 51.46% cases of asymptomatic young adults of aged between 31 and 40 years as compared to 48.47% cases had aged between 20 and 30 years. There was significant difference between means of males and females in weight hip ratio and BMI. Overall 80.24% were found to be dyslipidemic. High ldl cholesterol >100 mg/dl was the most common dyslipidemic pattern in 59.65% cases in age group of 31-40 and 52.15% cases aged between 20-30 years. followed by HDL <40 mg/dl in 51.46% of age group 31-40 and 48.47% cases between 20-30, TGL >150 in 39.18% between 31-40 age group and 25.15% between 20-30 year age group ,and TC >200 in 21.05% cases between 31-40 years age group and 15.34% in 20-30 years of age group.

Keywords: Complete hierogram, Fasting Blood Sugar, lipid profile, Blood Urea Nitrogen, TSH, Serum creatinine, ECG.

INTRODUCTION

Whenever there is an imbalance in the level of fats or lipids in the blood stream it is called 'Dyslipidemia' and this condition can increase risk of Heart disease, Obesity, Diabetes, Kidney disease, Fatty liver, Thyroid disease and many more diseases. Cardiovascular diseases (CVD) are the most prevalent

cause of death and disability in both developed as well as developing countries [1]. South Asians around the globe have the highest rates of Coronary Artery Disease (CAD)[2]. According to National Commission on Macroeconomics and Health (NCMH), a government of India undertaking, there would be around 62 million patients with CAD by 2015 in India and of these, 23

million would be patients younger than 40 years of age. CAD is usually due to atherosclerosis of large and medium sized arteries and Dyslipidemia has been found to be one of the most important contributing factor [3] Central fat is a predictor of cardiovascular disease (CVD) independently of other major risk factors, including body mass index (BMI) [4,5]. The relationship between central adiposity and CVD is mediated by a modification of the metabolism of insulin and lipids [6]. Dyslipidemic individuals are more frequently "centrally obese" (e.g., with a high waist-to-hip circumference ratio (WHR) [7, 8]. Apart from its interest for establishing a physio pathological causal link, this predictive association suggests the possibility of employing one or more anthropometric measurements of central adiposity as a first step in population screening for dyslipidemia [9,10] Coronary heart disease (CHD) is one of the primary causes of morbidity and mortality in Western countries [11]. Every year, 7.2 million people die from CHD worldwide, more than from cancer or infectious causes. In the United States alone, 640,000 deaths can be attributed to CHD [12]. Three of the treatable and preventable risk factors for CHD are hypertension, dyslipidemia, and cigarette smoking [13]. In recent years, more emphasis has been focused on the management of cholesterol primarily through lifestyle modifications and drug therapy. Drug therapy offers numerous options, with each drug class attacking the disease state through its own unique pharmacologic mechanism. The HMGCoA (3-hydroxy-3-methylglutaryl-coenzyme A) reeducate inhibitors, often referred to as the "statins," continue to be a mainstay in the management of dyslipidemia.

AIMs and Objectives

To study dyslipidemia in young asymptomatic adults aged 20-40 years.

- To identify the prevalence and pattern of dyslipidemia in young asymptomatic adults.
- To correlate dyslipidemia with the BMI and Waist to Hip ratio.
- To identify various risk factors for selected age group of 20-40 years.

Review of literature

History

The history of lipid and cardiac care dates back to thousands of years. The first drawing of heart was done in the Paleolithic era, in a cave in El Pindal, Spain. People thought of the liver to be the center of the circulation. Sir Andrea Cesalpino used the term "blood circulation". Riva di Trento first described the presence of two main coronary arteries in 1559. In 1628, a

physician William Harvey noted the heart pumped blood in the body.

The Cholesterol timeline

- In 1758, Doctor Francois Poulletier isolated solid cholesterol from gallstones.
- In 1815, French chemist Michel Eugene Chevreul isolated and purified sterol from gallstones and named it "cholesterol."
- In 1838, Louis Rene Lecanu noted the presence of cholesterol in human blood.
- In 1913, Nikolai Anitschkow established a link between cholesterol and atherosclerosis.
- In 1927, Wieland & Adolf Windaus got Nobel Prize for cholesterol & bile acids structure.
- In 1932, Adolf Windaus defined the structure of cholesterol.

Atherosclerosis timeline

- In 1852, Irish Physician Richard Quain observed fatty material deposition in the blood vessels. He attributed this to local modification of nutrition.
- In 1854, Dr. Rudolf Virchow described atherosclerosis as a disease. He considered arterial clog is due to excess cholesterol deposition.

The Lipoprotein timeline

- In 1951, Doctors David Barr, Edward Russ & Howard Eder found heart patients had elevated LDL and decreased HDL levels.
- In a 10-year study, Gof man and colleagues studied ischemic heart disease patients. They found lower HDL and higher levels of LDL, IDL, and small VLDL.
- In 1985, Michael Brown & Joseph Goldstein awarded Nobel Prize for LDL pathway discovery.

Cholesterol tests timeline

- In 1934, a blood test for cholesterol developed.
- In 1955, Doctors Richard Havel, Howard Eder, and Carl Bragdon developed ultracentrifugation technique. It was used for isolating plasma lipoproteins.

Cholesterol treatment timeline

- In 1955, Canadian Dr. Altschul noticed that high doses of niacin could lower cholesterol levels.
- In 1976, Japanese biochemist Akira Endo isolated HMG-CoA reductase inhibitor called Compactin. It was isolated from the fungal strain *Penicillium Citrinum*. That led to the discovery of the first statin drug to reduce the level of cholesterol in the body.

Characteristics of the Major Classes of Lipoproteins

| <i>Category</i> | <i>Composition</i> | <i>Origin</i> |
|-----------------------------------|--------------------------------------|-----------------|
| Chylomicrons | Exogenous triglycerides | Gut |
| Very Low Density lipoproteins | Triglycerides | Liver |
| Intermediate Density Lipoproteins | Cholesterol esters and triglycerides | VLDL/HDL |
| Low density lipoproteins | Cholesterol | VLDL Catabolism |
| High density lipoproteins | Cholesterol | Liver, Gut |

The classes from largest and least dense to smallest and most dense are chylomicrons, very-low-density lipoprotein (VLDL), intermediate-density lipoprotein (IDL), low-density lipoprotein (LDL), and high-density lipoprotein (HDL). The larger, more buoyant particles primarily have a triglyceride-rich core, while the smaller, denser particles have a cholesterol ester core.

LDL accounts for approximately 60% to 70% of total serum cholesterol and is the primary atherogenic class of lipoproteins. HDL constitutes approximately 20% to 30% of total serum cholesterol with VLDL comprising about 10% to 15%.

METHODS

Research Design

The design of present study is observational.

Source of data

Sri Aurobindo Medical College & Post Graduate Institute, Indore (M.P.)

Duration

1st of October 2015 to 31st of March 2017, 18 Months.

Inclusion criteria

- All diagnosed cases of asymptomatic young adults.
- Patient had aged between 20-40 years.
- Patient of both sexes, male and female.
- Given the written consent for participation in the study.

Exclusion criteria

Any patient below 20 years and above 40 years, Failure to give written consent for participation in the study

Sampling

Purposive sampling (non-probability sampling technique) was used to recruit a sample from the population of asymptomatic young adults that met inclusion-exclusion criterion for this observational study.

Study tools

History, Systemic Examination, Complete haemogram, Fasting Blood Sugar, lipid profile, Blood Urea Nitrogen, TSH, Serum creatinine, ECG

Preparation and organization of data

Cases of asymptomatic young adults aged between 20 years and 40 years and of both the sexes that further met all the inclusion criteria selected as subjects during specified schedule. A maximum of 336 patients were deemed fit into inclusion-exclusion criteria. Finally, three hundred thirty four patients were screened for this research was chosen purposively from the outpatient department of medicine at Sri Aurobindo Medical College and Post Graduate Institute; Indore was recruited as subjects for the study.

Diagnostic Criteria

For serum lipids, we referred to NCEP - ATP III Guidelines. According to these standard guidelines, hypercholesterolemia is defined as TC >200mg/dl, LDL-C as >100mg/dl, hypertriglyceridemia as TG >150mg/dl and HDL-C <40mg/dl. Dyslipidemia is defined by presence of one or more than one abnormal serum lipid concentration. For serum Glucose levels, we referred to ADA Guidelines. Persons with fasting blood glucose >126mg/dl or who were on medication for diabetes was considered as having diabetes mellitus.

Statistical methodology

The raw data were entered into the computer database. The responses of frequencies were calculated and analyzed by using the raw data of 334 subjects. Statistical software, SPSS version 17.0 Trial was used for analysis. Prevalence of an outcome variable along with 95% confidence limits was calculated. Both, descriptive and inferential statistics were used to study the prevalence, pattern and clinical significance in cases of asymptomatic young adults.

Critical Values and Notations

Following are the notations used to present the significance of observed probability value for various selected parameters. Insignificant/Not Significant (p value: p>0.05) Suggestively/Poorly Significant (p value: p<0.08 to p<0.06) Moderately Significant/Significant (p value: p<0.05 to p<0.02) Highly/Strongly significant (p value: 0.01<p<0.001)

RESULTS

The present study entitled "study of dyslipidemia in young asymptomatic adults aged 20-40 years" is carried out in the department of General Medicine at Sri Aurobindo Medical College and Post Graduate Institute, Indore (M. P.). The spread of mean age (mean ± standard deviation) of male cases of

asymptomatic young adults found to be 31.53±6.23 years with a range from 20 to 40 years found to be little

greater as compared to age of female cases (30.80±6.54 years) noted within same age range from 20 to 40 years.

Table-1: Pattern of dyslipidemia with respect to age of young asymptomatic adults

| Age Group | Parameter of Dyslipidemia | Lipid Abnormality | Proportion (N=163/171) |
|---------------------|---|-------------------|------------------------|
| 20-30 Years (N=163) | Total Cholesterol ≥200mg/dl | 25 | 15.34 |
| | Triglyceride ≥150mg/dl | 41 | 25.15 |
| | Low Density Lipoprotein (LDL) ≥100mg/dl | 85 | 52.15 |
| | High density Lipoprotein (HDL) ≥40mg/dl | 79 | 48.47 |
| 31-40 Years (n=171) | Total Cholesterol ≥200mg/dl | 36 | 21.05 |
| | Triglyceride ≥150mg/dl | 67 | 39.18 |
| | Low Density Lipoprotein (LDL) ≥100mg/dl | 102 | 59.65 |
| | High density Lipoprotein (HDL) ≥40mg/dl | 88 | 51.46 |

Pattern of dyslipidemia according to age of selected asymptomatic young adults is shown in table 1. Comparison between groups to identify pattern of dyslipidemia indicated that the cases belonged to the age group of 31-40 years had elevated lipid subtractions as compared to age group of 20-30 years which reflected that lipid abnormalities found to be dependent on age. Proportion of abnormal lipid subtractions found to be successively increased as the age of young asymptomatic adults had increased Results of present research projected that the low density lipoprotein

found to be diagnosed more frequently abnormal (≥100 mg/dl) in 59.65% cases of asymptomatic young adults of aged between 31 and 40 years than 52.15% cases had aged between 20 and 30 years. Second most common pattern of dyslipidemia was high density lipoprotein found to be abnormal (≤40 mg/dl) in 51.46% cases of asymptomatic young adults of aged between 31 and 40 years as compared to 48.47% cases had aged between 20 and 30 years. Lipid sub fractions analysis of cases to assess the Severity of dyslipidemia among young asymptomatic Adults

Table-2: lipid sub fractions analysis of cases to assess the severity of dyslipidemia among young Asymptomatic adults

| Lipid Profile Parameter | Dyslipidemia | Total Cholesterol (mg/dl) | LDL(mg/dl) | Triglycerides (mg/dl) | HDL (mg/dl) |
|-------------------------|--------------|---------------------------|------------|-----------------------|-------------|
| Minimum | Absent | 82.00 | 43.00 | 28.00 | 40.00 |
| | Present | 95.00 | 57.00 | 41.00 | 17.00 |
| Maximum | Absent | 193.00 | 149.00 | 98.00 | 102.00 |
| | Present | 312.00 | 525.00 | 248.00 | 65.00 |
| Mean | Absent | 142.74 | 101.94 | 79.76 | 47.59 |
| | Present | 171.75 | 158.10 | 116.07 | 38.28 |
| Standard Deviation | Absent | 21.04 | 28.65 | 15.92 | 9.01 |
| | Present | 37.56 | 81.23 | 34.25 | 8.91 |
| Std. Error of Mean | Absent | 2.59 | 3.53 | 1.96 | 1.11 |
| | Present | 2.30 | 4.96 | 2.09 | 0.54 |
| p-value (LOS) | Absent | Z=6.04# | Z=5.53# | Z=8.39# | Z=7.59# |
| | Present | P<0.001 | P<0.001 | P=0.001 | P=0.001 |

the mean differences are highly significant at the 0.001 level of significance.(LOS-Level of significance) Correlation of age, body mass index and waist heap Ratio of asymptomatic young adults With lipid sub fractions.

Table-3: Correlation of age, body mass index and waist heap ratio of asymptomatic Young adults with lipid sub fractions

| Parameter | Correlation | Total Cholesterol (mg/dl) | Triglyceride(mg/dl) | LDL (mg/dl) | HDL (mg/dl) |
|----------------------------|-------------|---------------------------|---------------------|-------------|-------------|
| Age | r | 0.15# | 0.16# | 0.17# | -0.06 |
| (Year) | p-value | =p-0.006 | p-0.003 | p-0.003 | p->0.05 |
| Body Mass | r | 0.31# | 0.20# | 0.22# | 0.00 |
| Index (kg/m ²) | p-value | -0.001 | p-0.001 | p-0.001 | p>0.05 |
| Waist | r | 0.12 | 0.12* | 0.00 | -0.07 |
| Heap Ratio | p-value | P<0.03 | P<0.03 | p-0.05 | p-0.05 |

The correlation is highly significant at the 0.006, 0.003 and 0.001 levels of significance. *The

correlation is significant at the 0.05 level of significance. ®The correlation isn't (Insignificant)

significant at the 0.05 level of significance. (LOS-Level of Significance).

The body mass index of patients was found to be fairly correlated with total cholesterol, triglycerides and LDL while the direction of relationship found to be positive and could satisfy the higher limit of statistical significance ($p < 0.001$). But, body mass index of patients found not to be correlated with HDL with positive direction of relationship while couldn't satisfy the limit of statistical significance ($p > 0.05$). The triglyceride level found to be significantly ($p < 0.03$) correlated with waist heap ratio but at poor level while the direction of relationship found to be positive confirmed on statistical ground. But, there was not any correlation recorded between total cholesterol, LDL and HDL with waist hip ratio.

DISCUSSION

This study is a step towards evaluating dyslipidemia in asymptomatic young adults in Indian population and identifying these risk factors of coronary artery disease by anthropometric variables. Our study showed that elevated serum lipids were more prominent in 31- 40 year age group as compared to ≤ 30 years, which means the risk of dyslipidemia increases as the age advances. Dyslipidemia was found significant among tobacco chewers, smokers and alcoholics in our study. This is in consistence with study by Gupta BK *et al.* [14] Oxidative modification of LDL-Cholesterol is a key process of atherosclerosis and elevated LDL Cholesterol has been recognized as primary risk factor for CAD by National Cholesterol Education Program (NCEP) Adult Treatment Panel(ATP)III [15]. In our study increased LDL-C has been found to be second lipid sub fraction contributing to dyslipidemia and was found to be higher in 31- 40 years age group. In our study BMI and WHR predicted dyslipidemia. BMI and WC predicted dyslipidemia better than WHR when lipid sub fraction analysis was done. None of the anthropometric variables when used alone was able to predict dyslipidemia better, hence while dealing with dyslipidemia in Indians, physicians should consider combination of anthropometric parameters like WC and WHR in addition to BMI [16].

CONCLUSION

This study was conducted at sri aurobindo medical college and post graduate institute, indore (M.P) from 1st October 2015 to 31st march 2017.

- The Study population was comprised of 334 asymptomatic adults attending patients admitted to Medical Wards that included 187 females and 147 males.
- There was significant difference between means of males and females in weight hip ratio and BMI
- Overall 80.24% were found to be dyslipidemic.
- High ldl cholesterol > 100 mg/dl was the most common dyslipidemic pattern in 59.65% cases in

age group of 31-40 and 52.15% cases aged between 20-30 years. followed by HDL < 40 mg/dl in 51.46% of age group 31-40 and 48.47% cases between 20-30, TGL > 150 in 39.18% between 31-40 age group and 25.15% between 20-30 year age group ,and TC > 200 in 21.05% cases between 31-40 years age group and 15.34% in 20-30 years of age group.

- Lipid sub fraction analysis revealed that males had higher values compared to females with a prevalence of 91.16% as compared to 71.66 % of females.
- Waist circumference and BMI was found to be significantly higher in dyslipidemic patients Dyslipidemia was found significantly higher among those who had habit of Tobacco chewing, smoking and Alcohol intake
- Combination of anthropometric variables predicted dyslipidemia better in these asymptomatic adults than any one particular variable

Limitations

Genetic and secondary causes of dyslipidemia were not ruled out, Lipoprotein estimation was not done, and LDL-C was not estimated separately in those who had high triglyceride Levels, Sample size was less due to time constraint. Dyslipidemia is more prevalent in young asymptomatic adults, being more common among 31-40 years age group, High LDL Cholesterol was the most common pattern of dyslipidemia found being common among ≥ 30 years age group, BMI and WHR predicted dyslipidemia, Combination of lifestyle therapies i.e ,enhanced physical activity, dietary modification and therapeutic intervention would help us in treatment and management of dyslipidemia.

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