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Dyslipidemia: Risk Factors, Types and Preventive Measures

Dr. Nitin Jain

Professor of Medicine, Sri Venkateswaraa Medical College Hospital and Research Centre (SVMCH&RC), Puducherry, India

Abstract: ***Introduction: Dyslipidemia may be defined as increased levels of serum total cholesterol, low - density lipoprotein cholesterol, triglycerides, or a decreased serum high - density lipoprotein cholesterol concentration. Dyslipidemia is an established risk factor for cardiovascular disease (CVD). Material and methods: This prospective study comprised a population of men (55) and women (45); aged 35–65 years who were selected to study the prevalence of dyslipidemia. Chronic renal illness, hepatic dysfunction, recognized endocrine (excluding diabetes mellitus) or rheumatologic illnesses, Hypertension, Dyslipidemia, smoking, alcoholism, Hypothyroidism, treatment for any metabolic disorders or chronic infections were all ruled out. Results: Out of 100 participants, 55 (55 %) had BMI within the normal range, 30 (30%) had BMI 25 - 30 and 15 (15%) of them had BMI 30 - 35. Around 81% (n=81) of participants had Waist/Hip (W/H) ratio >0.9, in which males were 43% (n=43) and females were 38% (n=38). W/H ratio was noted to be higher in males than females. Conclusion: Dyslipidemia is a potent marker of coronary artery disease risk, especially among asymptomatic young individuals.***

Keywords: Dyslipidemia, CVD (cardio vascular disease), BMI (body mass index), cholesterol, prevalence

1. Introduction

Dyslipidaemia is a condition characterised by an elevation of triglycerides and low - density lipoprotein (LDL) and a reduction in highdensity lipoprotein (HDL) cholesterol. (1) The term dyslipidaemia differs from hyperlipidaemia, in that dyslipidaemia refers to the derangement of one or more lipoproteins like elevated total cholesterol, LDL - cholesterol and triglycerides, or lowering of HDL cholesterol, whereas mere elevation of lipoproteins is labelled as 'hyperlipidaemia'. (2–3) Dyslipidemia may result from either over - production or lack of clearance of the lipoprotein particles in plasma or may be related to defects in the apolipoprotein metabolism due to metabolic pathway enzyme deficiencies.

The prevalence of dyslipidemia varies geographically; although, it has been estimated that more than 50% of the adult population has dyslipidemia worldwide. (4) It is a proven risk factor in cardiovascular diseases (CVD). (5) which is a chronic non - communicable disease and one of the most important causes of death and disability. (6)

Dyslipidemia is classified as primary (genetic & most common in children) or secondary dyslipidemia (due tolifestyle & common in adults). (7) The causes behind primary dyslipidemia are single or multiple gene mutations thatresult in overproduction or defective clearance of TG & LDL cholesterol, & underproduction or excessive clearance of HDL. The most important causes of secondary dyslipidemia are alcohol overuse, a sedentary lifestyle with excessive dietary intake of saturated fat, cholesterol, & trans - fats. (8)

2. Material and Methods

This prospective study comprised a population of men (55) and women (45); 100 subjects, aged 35–65 years who were selected to study the prevalence of dyslipidemia. Chronic renal illness, hepatic dysfunction, recognized endocrine (excluding diabetes mellitus) or rheumatologic illnesses, Hypertension, Dyslipidemia, smoking, alcoholism, Hypothyroidism, treatment for any metabolic disorders or chronic infections were all ruled out. Socioeconomic and demographic status, anthropometric parameters, laboratory evaluations, lifestyle factors, and medical history were gathered through a comprehensive questionnaire and laboratory and clinical assessment for all participants. Participants were recruited for the study after obtaining written informed consent. Anthropometric readings like height, weight Body Mass index (BMI) and Waist/Hip ratio were calculated based on WHO classification and Dr. Chadha's anthropometric correlation study. (9) Atherogenic ratios calculation:

Atherogenic Index of Plasma (AIP) = log TG/HDLc.
Castelli's Risk Index (CRI - I) = TC/HDLc.
Castelli's Risk Index (CRI - II) = LDLc / HDLc.

According to these standard guidelines, hypercholesterolemia is defined as TC >200mg/dL, LDL - C as >100mg/dL, hypertriglyceridemia as TG>150mg/dL and HDLc <40mg/dL. The Atherogenic Indices of the study population namely AIP, CRR I & II has been categorized as per Misra et al. (13) Body Mass Index (BMI): $<18.5 kg/m^2$ is defined as underweight, $18.5 \leq BMI < 24 kg/m^2$ is defined as normal, $24 \leq BMI < 28 kg/m^2$ overweight, and ≥28 categorized as obese (10); Abdominal obesity: waist size≥90cm for men, ≥85cm for women (11); Hypertension: systolic blood pressure≥140 mmHg and or diastolic blood pressure≥90 mmHg or previous diagnosis. (12) Continuous variable blood lipid levels were described by mean and standard deviation. Following Investigations were conducted: Fasting and post prandial blood sugar Blood glucose, Total cholesterol (done in fasting serum sample using enzymatic method), Triglycerides (Enzymatic method used), High density lipoprotein, Low density lipoprotein.

Table showing the distribution of dyslipidemia among 100 participants

Parameters	Males (number) = (percentage %)	Females (number) = (percentage %)
Age	57	51
Rural	17	9
Urban	24	17
Smoking	54	3
Waist/hip ratio	43	38
BMI (25 - 30)	16	14
BMI (30 - 35)	8	7
Hypercholesterolemia	3	2
Hypertriglyceridemia	7	4
High LDL - cholesterol	25	15
High HDL - cholesterol	34	18

3. Results

This study included 55 males and 45 females. Fasting and post prandial blood glucose was performed, and diabetes was ruled out for all participants before commencement of the study. Out of 100 participants, 55 (55 %) had BMI within the normal range, 30 (30%) had BMI 25 - 30 and 15 (15%) of them had BMI 30 - 35. Around 81% (n=81) of participants had Waist/Hip (W/H) ratio >0.9, in which males were 43% (n=43) and females were 38% (n=38). W/H ratio was noted to be higher in males than females. Lipid profile reveals only the presence of dyslipidemia changes, but atherogenic dyslipidemic changes are predicted by better sensitive indices like AIP, CRR I &II.

4. Discussion

Dyslipidemia refers to unhealthy levels of one or more kinds of lipid in blood. Several factors can lead to dyslipidemia such as smoking, obesity, sedentary lifestyle and consumption of high fatty food. Lifestyle changes may help to get cholesterol and triglyceride levels under control. Daily exercise and weight loss may also improve cholesterol profile. Statins or fibrates and a healthy lifestyle, usually manage dyslipidemia. These statistics show challenge in health education, screening and controlling lipid profile in the population under the study.

Several studies have reported varying prevalence and type of dyslipidemia from different regions of India. The prevalence of high TG, high LDL cholesterol, low HDL and high total cholesterol were observed from north, west and southern part of India. (13) These variations can be explained by differences in the study population with respect to age and sex distribution, inclusion of patients with CVD and population or hospital - based study.

Dyslipidemia is a significant predictor of coronary artery disease (CAD) in asymptomatic healthy individuals. (14, 15) Scientific evidences prove the strong association between incidence of CAD with atherogenic dyslipidemia. (16)

Wallace et al. and Wilson et al. have demonstrated a direct relationship between serum LDL - C and CVD incidence (17). It has also been shown that an increased level of TC (hypercholesterolemia), particularly LDL - C promotes the atherosclerosis process, leading to the deposition of cholesterol and fatty acids in the artery wall, whilst HDL - C is usually considered to be protective and returns cholesterol to the liver. (18)

The study found that the risk of dyslipidemia rises significantly with the increase of BMI. Overweight and obesity are important risk factors for dyslipidemia. In our study, the risk of dyslipidemia for those with abdominal obesity is 1.50 times higher than normal people, which is consistent with previous reports. (19) At present, smoking is a definite independent risk factor for dyslipidemia which is directly related to duration of smoking. (20) Therefore, smoking should be stringently controlled to alleviate the increase of dyslipidemia. Hypertension, abnormal glucose metabolism, hyperuricemia and dyslipidemia often coexist, and affect each other. Disorder of blood glucose metabolism can lead to the imbalance of lipid anabolism and catabolism in the system, which further causes abnormal lipid metabolism. This is consistent with previous findings. (21) However, the limited sample size, inconsiderate contents of designed questionnaire, the potential impact of confounding factors (e. g., bad mood of participants, typo mistakes) and the introduction of biases might compromise the conclusion and need further validation. This study provides scientific basis for study of the prevention and treatment of dyslipidemia in this area, and urge the residents needs more urgent attention on dyslipidemia.

5. Conclusion

Dyslipidemia is a potent marker of coronary artery disease risk, especially among asymptomatic young individuals. In individuals with CAD, hypertriglyceridemia and low HDL cholesterol are more prevalent than hypercholesterolemia. This shows that among Indian individuals with CAD, a new preventative approach is necessary.

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