

Prevalence of Hyperlipidemia among Healthy Females and Their Relationship with Waist Circumference and Body Mass Index

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Abstract:

Objectives: The present study aims to identify the prevalence of dyslipidemia among healthy females and analyzing the significance between hyperlipidemia and anthropometric indices including WC, WHR and BMI

Methods and Materials: A prospective hospital based cross sectional study was conducted in 100 female subjects approaching outpatient department. Information was collected about demographics (Age, gender and occupation), anthropometric measurements (body weight, height, BMI, WC,HC,WHR),personal habits of dietary pattern,alcohol,tobacco use and clinical parameters- BP(Blood pressure),FBS(fasting blood sugar),ECG, lipid sub fraction analysis using automatic analyzer.

Statistical Analysis: Mean value of anthropometric measurements,serum lipid sub fraction and FBS were calculated by using mean+S.D.The data collected were again categorized according to age into two groups by using Chi Squire test,unpaired t test was applied in comparisons of independent and dependent proportions.All statistical analysis were performed using SPSS(software package used for statistical analysis) package.

Results: Among 100 asymptomatic females, low HDL and highTGL were found to be higher in 31-40 years age group (P value <0.05)WC also higher in the same age group(P value <0.05).

Waist circumference had significant correlation with TC (P<0.01),TGL(P<0.01),LDL(P<0.01).

BMI ,WC were significantly correlated with HDL(r=0.606,P<0.05,r=0.743, P<0.05) in 31-40 years age group TGL,LDLwere also significantly correlated with BMI,WC,WHR in both age groups.

Conclusion: Dyslipidemia is more prevalent in young asymptomatic female being more common among 31-40 year age group. Low HDL cholesterol was most common dyslipidemic pattern being common in both <30years and 31-40 year age group.BMI, WC and WHR all of them have significant association with lipid sub fraction analysis. Combination of anthropometric measurements predicted dyslipidemia better in asymptomatic females than single one variable. There is increasing trend of obesity and dyslipidemia in asymptomatic females probably because of sedentary life styles. Early preventive measures needed to control overweight and prevent the future complications and disabilities .Health education about nutritious diet to be started in childhood will change the society into the healthy way.

Keywords: BMI-Body mass index, WC-Waist circumference, WHR-Waist hip ratio.

I. Introduction

Heart disease is the most important cause of death and sickness in developing countries like India¹. In women, those under the age of fifty, cardiac disease is unusual in the absence of disease such as diabetes or hypertension. The first step in assessing disease of coronary vessels in females is by introducing awareness of its existence both among doctors and females themselves². Diseased coronary arteries usually present atypically in females³. Unusual angina presentation is more common than myocardial infarction. National Commission on Macroeconomics and Health(NCMH)of India, there would be around 60 million new patients with arterial disease of the heart occur within 2015 in India and 23 million people of them would be younger than age of 40 years.

Coronary arterial disease is mainly due to atherosclerotic process affecting various sized arteries of the heart and abnormally high fat in blood has been found to be one of the most important factor contributing to vascular narrowing and hypo perfusion⁴.

WHO defines overweight and obesity as conditions in which the body fat accumulates to the extent that health and wellbeing are affected very much⁵. With obesity and weight above normal, the prevalence of high BP, high lipid level and high blood sugar increases substantially and are considered to the three factors on the pathway to cardiac disease and mortality^{6,7}.

Central adiposity is one of the best predictor of vascular disease of the heart independently of other major risk factors. It can be considered important risk factor when added to BMI⁸. The relationship among them is mediated by a modification /resistance produced by insulin on the metabolism of lipids⁹. Individuals who

presented "centrally obese"(i.e. with high WC,WHR) will have high serum lipid levels¹⁰. These observations has been noticed in a variety of populations all over the world specific in developed and less developed countries¹¹.

Apart from its interest for establishing a physiopathological causal link, this predictive association suggests the possibility of measuring one or more anthropometric indices of central adiposity as a first step in population screening for high lipid level in blood¹².

BMI when used alone as a anthropometric measurement is inadequate to differentiate between fat and fat free individuals. Other measurements which measures central obesity like WC, WHR should be added with BMI to assess dyslipidemia and future risk of CVD¹³.

II. Materials and Methods

The study was conducted after ethical clearance from ethics committee at Coimbatore medical college and hospital, Coimbatore. Biochemical analysis was done in department of biochemistry, Coimbatore. Informed consent in the prescribed form was obtained from all patients included in the study after explanation of the probable benefits in local language. The study obtained from healthy females attending master health check up in CMCH, Coimbatore.

This is a prospective cross sectional study which was conducted in 100 female subjects without previous medical/surgical illness after detailed history from them. The exclusion criteria for the study design include females with diabetes mellitus, hypertension, ischemic heart disease, chronic renal/liver disease, hypothyroidism and patients on lipid lowering drugs.

III. Blood Collection And Laboratory Methods

Blood samples were Taken In The Morning After 8-10 Hours. Tc Was Measured By Dynamic Extended Stability Chod-Pap Method, Triglyceride (Tgl) Concentrations Were Measured By Tc Was Measured By Dynamic Extended Stability Chod-Pap Method, And Triglyceride (Tgl) Concentrations Were Measured By Dynamic Extended Stability With Lipid Clearing Agent Gpo-Trinder Method. The Reagent Is Based on the method of Wako and the modifications by McGowan et al and Fossati et al. International Federation of Clinical Chemistry (IFCC) approved enzymatic methods. LDL was estimated by Fried ward's formula, VLDL was calculated by dividing TGL by Five Control sera were included in each batch of samples analyzed.

IV. Stastical Analysis

Mean values of all parameters in subgroups were calculated by independent sample t test. Age, anthropometric measurements, serum lipid sub fraction and FBS levels measured were calculated by using mean_±SD. The data collected were again categorized according to two age group. By using Chi Squire test, unpaired t test was applied in comparisons of independent and dependent proportions P value <0.05 was considered deemed significant. Results were expressed as percentages. All statistical analysis were performed using SPSS (software package used for statistical analysis) package.

V. Results

The study population was comprised of 100 asymptomatic females aged between 25-40 years .Among them 43% were found to be dyslipidemic,41% were found to be normal BMI,33% were found to be overweight.76% were normal WC,24% were abnormal WC.Low HDL is 55% ,followed by TGL in 25%, TC and LDL were 16% each.

Dyslipidemia was present in 92.3% of obese persons, 21.2% of overweight and 31.7% of normal BMI individuals. Abnormal WC was seen in 91.7% of the study population, it has significance with dyslipidemia(P value <0.01).Among 100 study population ,low HDL and high TGL were found to be higher in 31-40 years age group than <30 years age group.61.5% were found to be low HDL in 31-40 years age group,50.8% were <30 years age group.

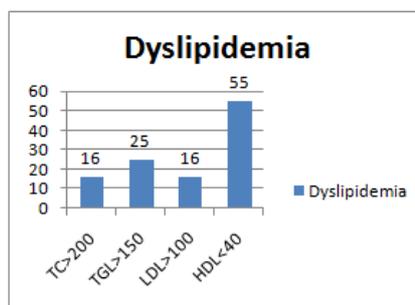
Diabetes was found in 5% of the study population, among them 3.3% were below 30 years age group, 7.7% were in 31-40 years age group. High BMI,BP,WC were found in 31-40 years age group has statistical significance(P value <0.05%).Dyslipidemia was found to be significant in tobacco chewer (P value <0.01%) and in alcoholics(P value <0.05%).In the study population,16 were vegeterians,WC was found to be higher in those who had vegetarian diet (P value <0.01%).

Pearson correlation coefficient analysis of variables obesity and dyslipidemia was significant between BMI, WC and WHR.Among them BMI and WC were significant at P value <0.01%.BMI with TGL (P value <0.01%), HDL (P value <0.01%).WC had significant correlation with TC, TGL, LDL (P value <0.01%).There was significant correlation between BMI and WC with TC($r=0.323$ and $r=0.734$, P value <0.05%), TGL($r=0.530$ and $r=0.789$, P value <0.01%) in <30 years age group. BMI, WC were significantly correlated with

HDL($r= 0.606$ and $r=0.743$, P value $<0.05\%$) in 31-40 years age group.TGL and LDL also were significantly correlated with BMI, WC and WHR in both age groups.

Pattern of Dyslipidemia in Asymptomatic Females

	No	P value
TC>200	16	>0.05
TGL>150	25	>0.05
LDL>100	16	>0.05
HDL<40	55	>0.05



Pearson Correlation Coefficient Analysis of Variables

		TC	TGL	LDL	HDL
BMI	Pearson Correlation	.396**	.597**	.421**	-.330**
WC	Pearson Correlation	.646**	.664**	.703**	-.529**
WHR	Pearson Correlation	.204*	.369**	.236*	-.268**

** Significance at 0.01 level.

VI. Discussion

In our study, a step towards evaluating the blood level of lipids and glucose in asymptomatic females in urban population and identifying the coronary risk factors by anthropometric variables. The study identifies the pattern of dyslipidemia such as hypercholesterolemia,hypertriglyceridemia and abnormally high LDL and low HDL levels in all age groups which are well known risk factors for cardiovascular diseases. Overall prevalence of dyslipidemia was ranged from 10-73% in various studies¹⁴. In our study43% of asymptomatic females were found to be dyslipidemic.Our results are consistent with the previous cross sectional study conducted among Sudanese women in Khartoum state¹⁵ and a cross sectional study conducted at Tirupathi¹⁶ wherein increased prevalence of dyslipidemia in young females was found to be one of the major contributors of coronary artery disease.

Our study which showed that elevated lipid levels were prominent in 31-40 years age group as compared to <30 years which means the risk of dyslipidemia increases as the age advances. In our study, FBS found to be more in 31-40 years age group and of these7.7%were found to be newly diagnosed diabetes mellitus. The remaining subjects with impaired FBS (6%) are on their way to become diabetic in future which is an important risk factor for CAD. In our study, dyslipidemia was found significant among tobacco chewers and alcoholics (P value $<0.01\%$).This is consistence with the study done by Gupta et al¹⁷.

In our study ,the most common dyslipidemic pattern observed was low HDL cholesterol(61.5%).These finding is consistent with Jaipur Heart Watch-2¹⁸ and cross sectional study which was conducted at Tirupathi¹⁶.In our study, low HDL was not differ significantly between the age group<30 years(50.84%) and 31-40years(61.5%)¹⁴.HDL cholesterol particles are mainly involved in reverse cholesterol transport leading to antiatherogenic effect .HDL is more specific in prevention and removal of cholesterol within the arterial wall¹⁹. Increased prevalence of low HDL was reported in earlier study by Enas et al, who found that only 5% of Asian Indian Women had optimal HDL levels²⁰.

In the process of atherosclerosis, high LDL cholesterol and its oxidation has been recognized as primary risk factor for CAD by NCEP-ATP-III²⁰. In our study, low HDL was found in 20.5% in 31-40years age group, 13.1% among ≤ 30 year because of unhealthy food habitus and life style modifications. The second most common lipid sub fraction contributing to dyslipidemia was hypertriglyceridemia which was 30.8% in the age group of 31-40years, 21.3% among ≤ 30 years. When compared to western population, Indian had relatively low serum cholesterol predispose them to CAD²¹. Our dietary patterns are rich in saturated fats²² and also involve destruction of nutrients like foliate by overcooking and frying. Reuse of the same cooking oil for frying, refrying leading to transfatty acid formation which probably contributes to increased risk of dyslipidemia in our population¹⁵. In Canadian study, influence of diet on dyslipidemia was studied by utilizing three groups; a control group group with only dietary modifications and a group that was started on statin. After four weeks, lipid profile was repeated and compared. A drastic reduction in both diet and statin group than control group.

However between them not much variation in lipid levels²³. Both of them have same effect and dietary intervention is a more viable option.

In our study, BMI, WC and WHR correlated with dyslipidemia in female population. Further correlation analysis between BMI and lipid sub fraction revealed that BMI showed significant correlation with TGL(P <0.01%),LDL(P <0.01%),HDL(P <0.01%).WC had significant correlation with TC(P <0.01%),TGL(P <0.01%),LDL(P <0.01%).WHR also significant correlation with TC(P <0.05%),LDL(P <0.05%) and TGL(P <0.01%).These measures consistent with studies conducted by Chad a DS et al,Misra et al^{14,24}.

BMI was widely used as an indicator of obesity, it has some limitations because it dependent on race, age and body fat percentage, Asians had low BMI and high body fat .Abdominal obesity has been significantly associated with CVD risk which has been measured by anthropometric indices like WC, WHR especially in females^{25,26}. In Nurses' Health Study conducted by Rexrode KM et al, they identified WC and WHR both are independent risk factors of CAD in women²⁷.

Dyslipidemic persons are more frequently "centrally obese"¹⁴ especially females. In our study, BMI WC and WHR all are correlated with lipid sub fraction analysis. None of anthropometric measures when used alone was able to predict dyslipidemia better. In our country, Physicians should always consider combination of anthropometric parameters like WC, WHR in addition to BMI to assess the cardio metabolic health.

VII. Conclusion:

Dyslipidemia is more prevalent in young asymptomatic females being more common among 31-40 years age group .Low HDL cholesterol was the most common dyslipidemia pattern in both ≤30 years and 31-40 years age group.BMI,WC&WHR all of them have significant association with lipid sub fraction analysis. Combination of anthropometric measurements predicted dyslipidemia better in young asymptomatic females than single one variable.

Therapeutic lifestyle changes which is the main component in primary and secondary prevention of dyslipidemia in asymptomatic young females probably because of sedentary life styles. Early preventive measures needed to control overweight and prevent the future complications and disabilities.

Health education about nutritious diet to be started in childhood will change the society into the healthy way.

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