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RESEARCH ARTICLE

A COMPARATIVE STUDY OF SERUM LIPID PROFILE BETWEEN WOMEN OF RURAL AND URBAN POPULATION

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Abstract

Objective:
The objective of this study is to compare the serum lipid profile between women of rural and urban population.
Materials and Method:
This is a cross sectional study that involves 40 women of the age group between 20-40 years, 20 women from rural area and 20 women from urban population. Their fasting serum lipid profile which includes serum total cholesterol, serum triglycerides, High Density Lipoprotein, Low Density Lipoprotein and Very Low Density Lipoprotein are estimated and compared by using student's 't' test.
Results:
The lipid profile variables Serum Total cholesterol, Serum Triglycerides, Low Density Lipoprotein, Very Low Density Lipoprotein are significantly higher in the women of urban population and the High Density Lipoprotein value is higher in the women of rural population.
Conclusion:
The present study shows that the urban women has increased risk of cardiovascular disease with increased levels of serum total cholesterol, serum triglycerides, Low Density Lipoprotein, Very Low Density Lipoprotein and decreased level of good cholesterol High Density Lipoprotein when compared to the age matched rural women.

INTRODUCTION

Lipids are used in the body mainly to provide energy for the different metabolic processes, to form the membrane of the cell of the body and to perform other cellular functions. Adverse lipid profile is one of the major risk factors for coronary artery disease and myocardial infarction.[10] Lipid disorder is a major causal risk factor, which acts independently for progression of coronary artery disease.[2] The relationship between cholesterol and saturated fat with coronary artery disease was identified as early as 1950.[1] Raised serum cholesterol (TC), Triglycerides (TG), Low-density lipoprotein (LDL) and decreased High-density lipoprotein (HDL) are associated risk factors for cardiovascular disease.[9] High cholesterol levels are estimated to cause 56% of global ischemic heart disease.[8] Worldwide, there is a wide variation in mean population of cholesterol levels. Steady increase of cholesterol levels was noted in Asian countries and the trend was increasing faster in urban areas than in rural areas. [3]

AIMS AND OBJECTIVES:

The main aim of the study is to compare the serum lipid profile, which is the biochemical cardiovascular risk factor, between the women of rural population and women residing in urban areas.

MATERIALS AND METHOD:

This is a cross sectional study involving a total of 40 women, 20 women from rural population and 20 women from urban population. The study was pre-approved by the ethical committee of our institution review board.

Study population:

The rural subjects were selected from a hamlet Mokathan Parai approximately 75 km from Madurai in Peraiyur taluk of Madurai District, Tamil Nadu, India. It was dwelled by 126 people with 54 males, 53 females, 11 male children and 8 female children in the year 2011. Their main occupation was agriculture and cattle rearing. 20 women of age group between 20-40 years of apparent good health were selected from them for rural groups.

The urban subjects were recruited from 20 age matched women volunteers from Madurai. They were in apparent good health.

Dietary history was obtained from all participants. The rural population mainly consumes plant proteins more often than animal protein which is easily accessible, locally grown and of low cost. On the other hand the urban population with higher income consumes more animal protein compared to rural population.

Menstrual and contraception history was obtained from the participants in detail.

Exclusion Criteria:

Pregnant women, nursing mothers, patients with hypertension, diabetes mellitus, cardiac disease, recent myocardial infarction, renal failure, hypothyroid patients, hyperthyroid patients, women using all forms of temporary and hormonal contraceptives and women suffering from irregular menstrual cycle were excluded from this study.

Written consent was obtained from subjects after their requirements for participation in the study were explained.

Anthropometric measurements:

The height and weight of the subjects were measured by using standard methodology with the help of an inch tape and weighing machine and the Body Mass Index (BMI) was calculated by using Quetelet Index using the formula Wt(kg)/Ht(mt^2). The Mid arm circumference was determined by measuring halfway between olecranon process of ulna and acromion process of scapula using a non-stretchable tape. Blood pressure was determined in all subjects by using sphygmomanometer by auscultatory method in right upper arm in sitting posture; pressures at the first and fifth korotkoff's phase were recorded as systolic and diastolic blood pressures respectively.

Biochemical analysis:

Twelve hours of overnight fasting 5ml of blood samples were obtained by venipuncture from cubital fossa in a sterile tube using dispovan. The blood samples were allowed to clot for 45 minutes and then carefully centrifuged at 3000 r.p.m for 10 minutes. Clear serum samples obtained were used for analysis of biochemical parameters. Total cholesterol (TC) was determined by CHOD POD method using the reagent cholesterol (S.L) R1. Triglycerides were determined by Enzymatic calorimetric method (GPO- PAP methodology) using Triglycerides (S.L) R1 reagent. High Density Lipoprotein (HDL) cholesterol was determined by Selective immuno precipitation Method using the reagent HDL-C Direct R2 reagent.

Low Density Lipoprotein (LDL) cholesterol was calculated using following equation (Friedwald formula)

LDL Cholesterol = Total cholesterol – VLDL Cholesterol – HDL Cholesterol

Very Low Density Lipoprotein (VLDL) cholesterol was calculated by using the following equation:

VLDL cholesterol = Triglycerides x 0.02.

Statistical analysis:

The values were expressed as mean ± standard deviation. The data from the rural and urban groups were compared by using Student's *t*-test using SPSS (Statistical Package for Social Science) software version 3.5. P values <0.05 were considered to indicate statistical significance.

RESULTS:

The findings of the current study are summarized in the table

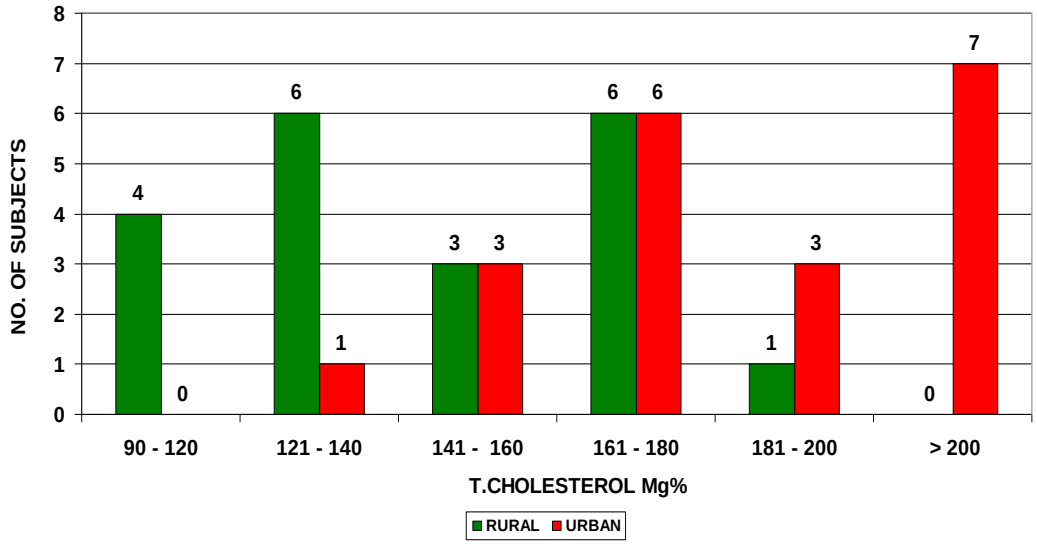
Table: 1 Observation of different parameters and its mean values between the rural and urban women

Variables	Rural Women (n=20)	Urban Women (n=20)	P value
Age (yrs)	29.75±6.45	26.3±4.7	0.061
Body Mass Index (BMI) (Kg/mt^2)	18.16±2.53	21.84±4.29	**0.002**
Mid Arm Circumference MAC (cm)	22.6±2.68	25.7±3.94	**0.006**
Systolic BP (mmHg)	112.4±11.42	110.1±10.37	0.509
Diastolic BP (mmHg)	74.1±7.83	70.5±8.26	0.165
Serum Total cholesterol (TC) (mg%)	142.17±26.28	184.9±30.63	**<0.001**
Serum Triglycerides (TG) (mg%)	102.49±42.45	157.67±88.61	**0.015**
High Density Lipoprotein (HDL) (mg%)	42.33±8.03	36.02±7.8	**0.016**
Low Density Lipoprotein (LDL) (mg%)	79.61±21.33	113.26±23.56	**<0.001**
Very Low Density Lipoprotein (VLDL) (mg%)	20.23±11.05	37.21±17.89	**<0.001**

p-value < 0.05 is significant.

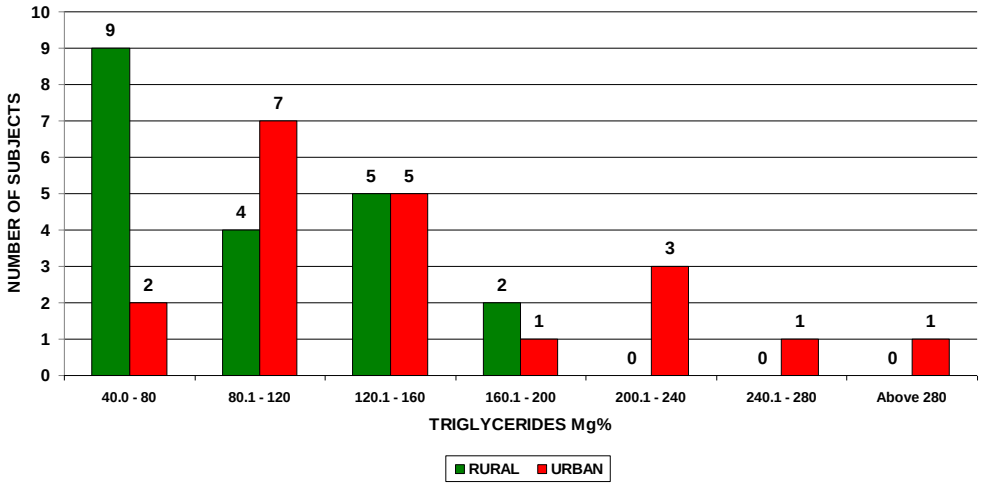
The findings of the current study shows that the 20 rural subjects aged 20-40 years (mean 29.75 years) and the 20 urban subjects of aged between 20-40 years (mean 26.3 years). The mean Body Mass Index (BMI) of the rural subjects is 18.16 (2.53) and that of the urban subjects is 21.84(4.29). The mean mid arm circumference of the rural population is 22.6 (2.68) cms and that of urban population is 25.7 (3.94) cms. The Body Mass Index and the mid arm circumference of the rural subjects is significantly lower $p<0.05$ than the urban subjects. There is no significant difference in systolic and diastolic blood pressure between the rural and urban subjects.

Fig 1: Comparison of Serum Total cholesterol levels between Rural and Urban women



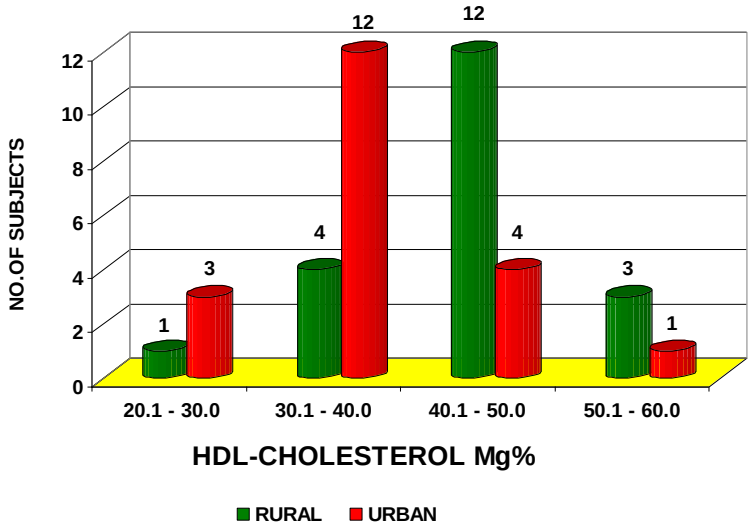
The Serum total cholesterol levels is significantly lower ($p<0.05$) in rural women compared to the urban women.

Fig 2: Comparison of Serum Triglycerides between the Rural and Urban women



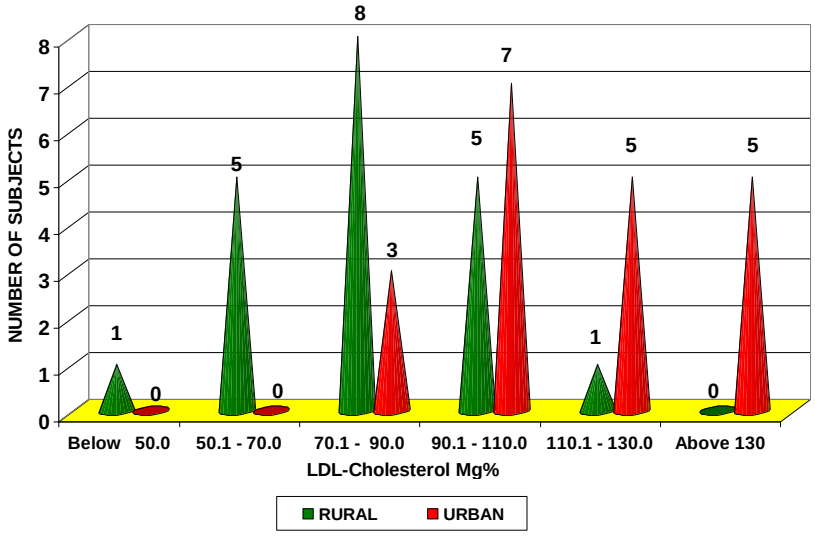
The Serum Triglycerides levels is significantly lower ($p<0.05$) in rural women compared to the urban women.

Fig:3 Comparison of serum High Density Lipoprotein (HDL) between the Rural and Urban women



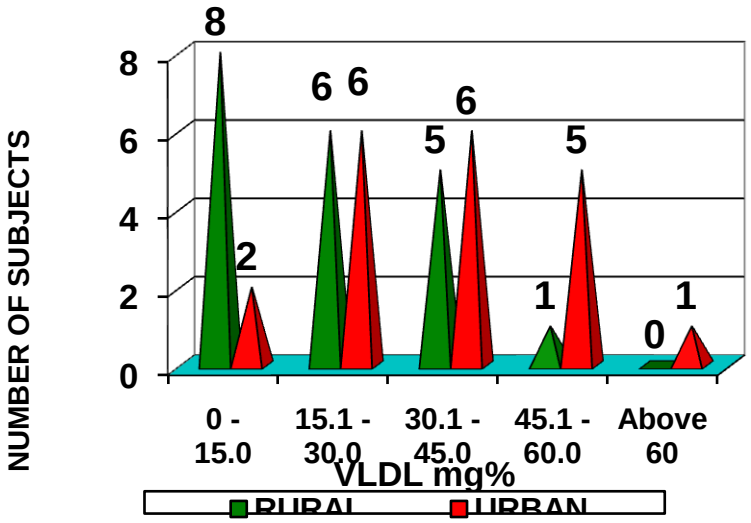
The Serum High Density Lipoprotein (HDL) levels is significantly higher (p=0.016) in the rural women compared to the urban women.

Fig: 4 Comparison of Serum Low Density Lipoprotein (LDL) between the Rural and Urban women



The Serum Low Density Lipoprotein (LDL) levels is significantly lower (p<0.05) in rural women compared to the urban women.

Fig:5 Comparison of Serum Very Low Density Lipoprotein (VLDL) between the Rural and Urban women



The Serum Very Low Density Lipoprotein (VLDL) levels is significantly lower ($p<0.05$) in rural women compared to the urban women.

DISCUSSION:

The present study shows that the entire lipid levels except High Density Lipoprotein is higher in the women of urban population compared to the age-matched women of rural population.

The THUSA Survey [7] showed that the women in the urban areas were more at the risk of increasing Total Cholesterol, Low Density Lipoprotein, triglycerides and increased High density Lipoprotein levels.

The studies by Steyn et al [6] on the black population in Cape Peninsula showed that the subjects living in the urban settings has no effect on Total Cholesterol concentration.

Reddy K K et al [5] in their study showed that the higher cholesterol levels in urban group compared with the rural Indian population.

Several factors might be associated with these biochemical differences between two population groups. These populations vary by their socio-economic status, dietary habits, physical activity and means of livelihood. The rural population in Madurai District, India are usually dependent on agro-based economy and they are required to work in agriculture fields. Whereas urban women are less exposed to perform such strenuous physical activities. Such activities are the major influencing factors that regulate the body anabolic and catabolic functions including metabolism of carbohydrate, protein and fat.

Dietary habit is another factor recognized to be associated with lipid status. The rural population consumes plant protein more often than animal protein due to easy access to locally-grown, fresh and low-cost vegetables. On the other hand urban population usually with higher income, consume higher amounts of animal proteins. Vegetable diets contain less saturated fat and cholesterol and greater amount of dietary fibre and their consumption helps to lower the level of serum cholesterol. Animal protein is rich in both saturated and unsaturated fat than vegetable based diet and its consumption in higher amount contributes to higher lipid levels.

The increase in the mean cholesterol level can be due to changing life style of people during recent years associated with rapid urbanization and also globalization. Rapid urbanization is speculated to be social engine of the increasing burden of cardio vascular disease (CVD) in India. Urbanization is associated with increased consumption of energy – rich food, a decrease in energy expenditure (through less physical activity) and erosion of traditional social support in the population. This in turn leads to the higher rate of CVD and strokes in urban areas of developing countries. Even within India, marked increase in both CVD prevalence and risk factors has been observed in urban residents as compared to their rural counterparts.

CONCLUSION:

In conclusion the present study shows that the urban women has increased risk of cardiovascular disease with increased levels of total cholesterol, Low Density Lipoprotein, Very Low Density Lipoprotein and triglycerides and decreased level of good cholesterol High Density Lipoprotein when compared to the age matched rural women.

LIMITATION:

The exact information regarding daily diet, daily calorie consumption and physical activity at work and at leisure time could be extracted.

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