A COMPARATIVE STUDY OF TOTAL SERUM CHOLESTEROL AND HDL CHOLESTROL IN PREMENOPAUSAL AND POSTMENOPAUSAL WOMEN IN AND AROUND BARPETA TOWN, ASSAM

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ABSTRACT

INTRODUCTION

After menopause abnormal lipid levels and a relatively high incidence of coronary heart disease show a possible relationship among estrogens, normal lipid level and a relative immunity to CHD. A reduction of plasma HDL cholesterol may impair the normal clearance of cholesterol from arterial wall and thereby accelerate the development of atherosclerosis. In the study two groups of women were selected, one group of 100 cases between age group of 20-45 years and the other group of 100 cases between the age group of beyond 45 years who attained menopause. A total of 200 cases taken from various body mass index and various personal habits like smoking and alcohol consumption, food habits, etc. The investigation carried out was Total serum cholesterol, serum high density lipoproteins (HDL), Triglyceride, serum low density lipoproteins (LDL) and serum very low density lipoproteins (VLDL). These investigations were done in both the groups and collected data were analyzed statistically. The mean distribution of this parameter of lipid profile among the pre-menopausal subject is as follows-Total serum cholesterol-165.1±13.06mg%, HDL-57.35±8.05mg% TG-87.71±13.51mg%, LDL-9192±19.47mg% and VLDL-17.55±2.83mg%. The distribution of different parameters of lipid profile among the postmenopausal subjects are as follows- Total serum cholesterol 238.39±41.60mg%, HDL C-37.91±5.35mg% TG-149.61±33.15mg%, LDL-170.95±40.90, mg% VLDL-29.99±6.42mg%. On comparing both values of both the age group it was seen that total serum cholesterol, were increased in postmenopausal women significantly and there was a significant decrease in HDL C in post-menopausal state. In conclusion the study reflects menopause does have an unhealthy effect on serum cholesterol in women.

KEYWORDS

Menopausal women, Estrogen, Cholesterol, HDL, LDL, VLDL.

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INTRODUCTION: There is a marked difference in the risk of coronary heart disease between the men and women of reproductive age, but this gap closes with advancing age. It seems likely that some factors of reproductive physiology are responsible for it. Oestrogen has a favourable effect on lipid profile.[1,2] Oestrogens are thought to increase HDL cholesterol by reducing the hepatic triglyceride lipase activity that catabolizes HDL.

The menopausal transition, usually four years in duration, begins when menstrual irregularities appear. This is a result of higher percentage of anovulatory cycles as the follicular pool from the ovary is exhausted. Menopause is defined as the 1 cessation of menstruation for 12 months in a woman over 45 years and occurs on average at the age 51 years. This is a result of a decline ovarian function-oestrogen and progesterone are no longer being produced because the ovary has completely depleted its follicular pool. Menopause is an oestrogen deficient state, but unlike the other hormone deficient state it is not a disease. Every woman who lives enough becomes postmenopausal.[3]

After menopause abnormal lipid levels and relative incidence of coronary heart disease show a possible relationship among oestrogens, normal lipid levels and a relative immunity to CHD. HDL is good cholesterol and has an inverse relationship with CHD. It has been suggested that transport of cholesterol from peripheral tissue to liver for subsequent catabolism and excretion, is the function of HDL cholesterol. A reduction of plasma HDL cholesterol may impair the normal clearance of cholesterol from arterial wall and thereby accelerate the development of atherosclerosis.[4,5,6]

Premenopausal women are said to be protected against CHD, but this protection is lost once women become postmenopausal. In this study serum cholesterol in pre and postmenopausal women in local population is estimated and the prevalence of dyslipidaemia among the postmenopausal women population is compared.

MATERIALS AND METHODS: Two hundred subjects of different age group were selected randomly and put into two groups.100 were in premenopausal age group and 100 were in postmenopausal age group.

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Premenopausal group consisted of normal healthy women of reproductive age group, with normal menstrual cycle. This group included women between 20 to 45 years. Postmenopausal group consisted of normal healthy women after attaining menopause. Menstrual history is considered to be the most reliable indication in selection of this group. Women who had missed 12 menstrual cycles consecutively or more were considered to be postmenopausal women.[7] This group included women after 45 years with history of cessation of menstruation for at least one year. All the subjects were carefully screened to exclude any underlying pathology like hypertension, diabetes mellitus, cardiac disease etc. A history of food habit was also taken as this plays an important role in changing the lipid profile of an individual.

The present study was conducted after obtaining the proper approval from the institutional ethical committee of Fakhruddin Ali Ahmed medical College Hospital, Assam. Study duration was from June 2014 to May 2015.

The subjects were selected from different areas of Barpeta town and in clinical history the following points were specially emphasized-menstrual history, food habit, associated systemic illness and history of past illness. On general examination weight, height, blood pressure, pulse rate, jaundice, oedema etc. were examined routinely. A routine clinical examination of all the systems like respiratory system, cardiovascular system, and alimentary system was done in all subjects. The procedure followed was in accordance with the ethical standard of the committee on human experimentation of the institution.

The following special investigations were done related to the study. All the tests were done in the central clinical laboratory of Fakhruddin Ali Ahmed Medical College & Hospital, Barpeta, Assam.

1. Serum total cholesterol.
2. Serum HDL cholesterol.
3. Serum Triglyceride.
4. Serum LDL.
5. Serum VLDL.

Venous blood was collected from the subjects under aseptic measures after an overnight fasting. The collecting vials were then allowed to stand for 30-45 minutes to separate the serum. Then the serum was centrifuged to take the supernatant serum, which was transferred to a sterile cupped container and stored at 2-8 degree centigrade or used for the investigations of the study.

Using a photoelectric colorimeter, all the above mentioned biochemical estimations were done. After biochemical estimation, the results obtained were statically analyzed and compared between the different groups of study by applying "Z" test to evaluate the changes of lipid profile in premenopausal and postmenopausal state.

Methods of estimation: Total serum cholesterol was estimated by cholesterol oxidase peroxidase method. With this method the normal values of total cholesterol varies from 130-250mg/dl. Triglyceride, LDL and VLDL were estimated by using diagnostic kit for each.

STATISTICAL ANALYSIS: All values are presented as Mean±SD. For comparison of different variables such as total cholesterol, HDLC, TG, LDL and VLDL between the two groups, P values were found out by applying Z test. The standard value of P at 0.05 level is 1.96. If the calculated Z value was higher than 1.96 (i.e. standard P<0.05), then it was calculated that there are statistically significant difference in the variables between the two groups, otherwise not.

RESULTS: The breakup of the 200 subjects according to the menstrual history is presented in the Table no. 1.

The mean distribution of the total cholesterol and HDL cholesterol, TG, LDL and VLDL among the premenopausal subjects are presented in the Table no. 2. The mean distribution of total cholesterol, HDLC TG, LDL and VLDL in the postmenopausal women is presented in the Table 3, All the mean values have been found to be within 95% confidence level.

For the comparisons of the TC, HDLC, TG, LDL and VLDL level Table no 4, 5, 6, 7 and 8 are constructed respectively. For testing statistical significance between the two groups, the P values were to be found out by applying Z test. All the tables show highly significant difference in lipid profile between the premenopausal and postmenopausal groups.

Menstrual category	No. of cases
Premenopausal-Group A	100(50%)
Postmenopausal-Group B	100(50%)
Total	**200(100%)**

Table 1: Break up of 200 samples according to the menstrual history

Parameters	Mean±SD	SE=$\frac{SD}{\sqrt{n}}$	95% C.I. [Mean-196 SE, Mean+1.965 SE]
TC (mg %)	165.14±13.06	1.31	162.57, 167.71
HDLC (mg%)	57.35±8.05	0.81	55.76, 58.94
TG (mg%)	87.71±13.51	1.35	85.86, 90.36
LDL (mg%)	91.92±19.47	1.95	88.10, 95.74
VLDL (mg%)	17.55±2.83	0.28	17.00, 18.10

Table 2: Mean distribution of Total cholesterol (TC) and HDL cholesterol among premenopausal group

Parameters	Mean±SD	SE=$\frac{SD}{\sqrt{n}}$	95% C.I.
TC (mg%)	238.39±41.60	4.16	230.24, 246.54
HDLC (mg%)	37.91±5.35	0.54	134.10, 156.12
TG (mg%)	149.61±33.15	3.32	143.10,156.12
LDL (mg%)	170.95±40.90	4.09	162.93, 178.97
VLDL (mg%)	29.99±6.42	0.64	28.67, 31.17

Table 3: Mean distribution of Total cholesterol and HDL cholesterol among the post-menopausal group

Groups	Mean TC (mg%)	SD (mg%)	Z value	P value
Premenopausal (100 cases)	165.14	13.06	16.8	
Postmenopausal (100 cases)	238.39	41.60		P<0.05**

Table 4: Comparison of TC(mg%) level in both the groups and P value

Groups	Mean HDLC (mg%)	SD (mg%)	Z value	P value
Premenopausal	57.35	8.05	20.11	P<0.05**
Postmenopausal	37.91	5.35		

Table 5: Comparison of HDL Cholesterol level in premenopausal and postmenopausal women and P value

Groups	Mean TG (mg%)	SD (mg%)	Z Value	P-value
Pre-menopausal	87.71	13.51	17.29	P<0.05**
Post-menopausal	149.61	33.51		

Table 6: Comparison of TG(mg%) level between both groups and P value

Groups	Mean LDL (mg%)	SD (mg%)	Z Value	P-value
Pre-menopausal	91.92	19.47	17.45	P<0.05**
Post-menopausal	170.95	40.90		

Table 7: Comparison of LDL-cholesterol between the two groups and P value

Groups	Mean VLDL (mg%)	SD (mg%)	Z Value	P-value
Premenopausal	17.55	2.81	17.75	P<0.05**
Post-menopausal	29.99	6.42		

Table 8: Comparison of VLDL-cholesterol between the two groups and P value

**Highly significant

DISCUSSION: Menopause is an oestrogen deficient state, but not a disease. However menopause elicits constellation of effect on the body, including increased incidence of cardiovascular diseases and bone mineralization. These are the major cause of morbidity and mortality in the aging. Increased incidence of cardiovascular disease has direct relationship with the changes in the lipid profile.[2] The present study was undertaken with the primary objective of quantifying the prevalence of dyslipidaemia in terms of menstrual status and to compare the major parameters of lipid profile i.e. total cholesterol, HDL cholesterol, TG, LDL and VLDL in serum.

On statistical analysis the mean age of premenopausal subjects was 30 years and the mean total cholesterol was 165.14mg%. On the other hand mean age of postmenopausal group appears to be 59.47 years where the mean total cholesterol is found to be 238.39mg%.

Masazumi Akahoshi et.al. In 1996 in Nagasaki, Japan conducted a study to see the changes of total serum cholesterol in women after menopause, where they found an increase in the total serum cholesterol in women around 3 years before the onset of natural menopause.[8]

In the present study the mean HDL C level in serum was 57.35±8.05mg% in premenopausal group and it was 37.91±5.33 mg% in postmenopausal group. On comparison Z value was 20.11($p<0.05$) and this shows that there is a decreasing trend of serum HDL cholesterol level in postmenopausal age and the mean difference is highly significant.

The function of LDL is to supply cholesterol to the peripheral tissues from the liver and functions of the HDL are to pick up the cholesterol from the peripheral tissues for further catabolism and excretion. Oestrogen increase the plasma HDL, so, in oestrogen deficient state in women the normal lipid profile shift to dyslipidaemia, which is atherogenic. Oestrogen increases the apoB100 receptor activity in the cell membrane leading to lower LDL and more efficient clearance of VLDL, and increase rate of synthesis and reduced clearance of HDL. Thus increases apoB100 receptor activity will provide the cell with more cholesterol and it will reduce the HMG CoA reductase activity by negative feedback mechanism and thereby lower the cholesterol synthesis. HMG Co. A reductase enzyme act on HMG Co. A during cholesterol synthesis and form mevalonic acid. Six mevalonic acid molecules will condense to form squalene and it will hydroxylate to cholesterol. Lack of oestrogen reverses the process and raise the cholesterol level.[9,10]

Regarding HDL, it is said that oestrogen reduce the hepatic triglyceride lipase activity that catabolizes HDL cholesterol, so in oestrogen deficiency hepatic triglyceride level activity is unopposed and HDL level tends to decrease.[10]

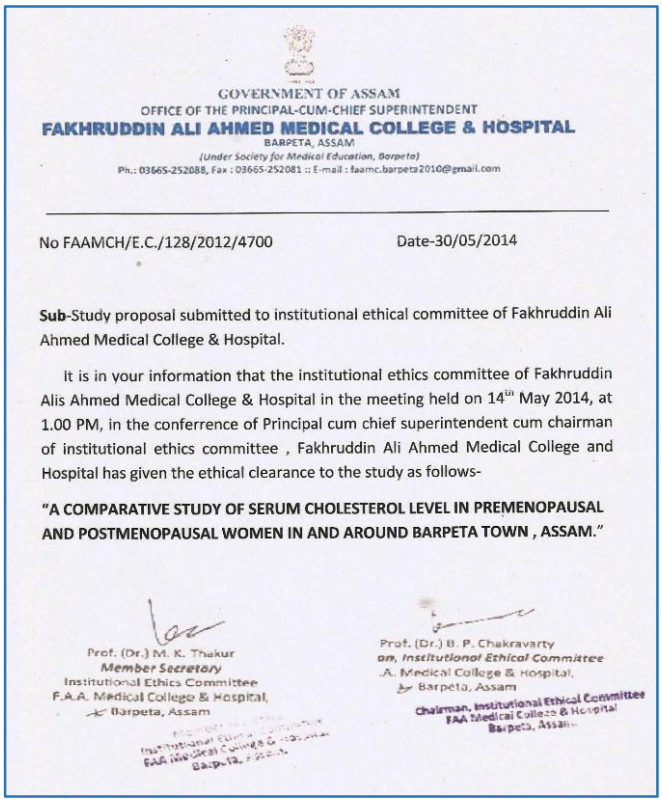
One of the inevitable oestrogen deficient state is menopause in women, which is defined as permanent cessation of menstruation following loss of ovarian follicular activity by age of average 51-53 years (WHO).

The data generated in the present study shows a definite relationship between menopause and serum dyslipidaemia in terms of increase TC and decreased HDL C after menopause.

CONCLUSION: Several studies have found positive association between menopause and alteration in lipid profile. The present study is also one such study undertaken to quantify altered serum lipid profile level if any in relation to menopause amongst the local population of Barpeta, Assam. After statistical comparison of the data generated in the study it was found that TC, TG, LDL-C and VLDL-C were increased in postmenopausal women in highly significant manner and there was a significant decrease in HDLC in postmenopausal state in women. This suggest that oestrogen have a favourable effect on lipid profile, they lower TC, TG, LDL and VLDL and comparatively increase HDLC by reducing hepatic triglyceride lipase activity that catabolizes HDLC.

Thus the present study showed that menopause does have an unhealthy effect on serum cholesterol on women, which is similar to the work of Masazumi Akohoshi et.al.[8]

With an increasing aging population in the developed world, oestrogen deficiency in women represent an enormous burden upon health system of the countries and it is therefore desirable to undertake similar studies to identify the manifestations of oestrogen deficiency and to offer treatment to prevent or reverse these effect.



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Sub-Study proposal submitted to institutional ethical committee of Fakhruddin Ali Ahmed Medical College & Hospital.

It is in your information that the institutional ethics committee of Fakhruddin Alis Ahmed Medical College & Hospital in the meeting held on 14th May 2014, at 1.00 PM, in the conferrence of Principal cum chief superintendent cum chairman of institutional ethics committee , Fakhruddin Ali Ahmed Medical College and Hospital has given the ethical clearance to the study as follows-

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