



Research Paper

Study of calcium with lipid values in women population with cassava as staple food

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Abstract

Introduction: Osteoporosis and abnormal lipid function is very common in middle aged women in Kerala. A cross sectional observational study was conducted to find out the S.lipid profile and s. calcium Levels in premenopausal and post-menopausal women. Bone loss after menopause and various lipoprotein abnormalities is assessed by estimating calcium and lipoprotein levels.

This study also aims to find out any relation between calcium levels and lipid function

Methods: Study was done in 2 groups. 40 post-menopausal women and 40 premenopausal women

Results: There is considerable difference in between levels of S.calcium in pre and post-menopausal women. S.Cholesterol and S.LDL levels were significantly higher in post menopausal women compared to premenopausal women.

Conclusion: S.cholesterol levels were significantly higher in post-menopausal women when compared to pre-menopausal women. Serum Calcium levels were significantly lower in post-menopausal women

Keywords: S.Calcium, lipid function, premenopausal women, post menopausal women.

Introduction

The period during which the cycle ceases and the female sex hormones diminish to almost none is called menopause¹. It occurs between 45-55 years of age. The cause of menopause is "burning out" of the ovaries. At about age 45 years, only a few primordial follicles remain to be stimulated by FSH & LH and, the production of estrogens by the ovaries decreases as the number of primordial follicles approaches zero. When estrogen production falls below a critical value, the estrogens can no longer inhibit the production of

the gonadotropins FSH and LH. the gonadotropins FSH and LH (mainly FSH) are produced after menopause in large and continuous quantities, but as the remaining primordial follicles become atretic, the production of estrogens by the ovaries falls virtually to zero. At the time of menopause, a woman must readjust her life from one that has been physiologically stimulated by estrogen and progesterone production to one devoid of these hormones. The loss of estrogens often causes marked physiological changes in the function of the body, including (1) "hot flushes" characterized

by extreme flushing of the skin, (2) psychic sensations of dyspnea, (3) irritability, (4) fatigue, (5) anxiety, and (6) decreased strength and calcification of bones throughout the body. These symptoms are of sufficient magnitude in about 15 percent of women to warrant treatment. If counseling fails, daily administration of estrogen in small quantities usually reverses the symptoms, and by gradually decreasing the dose, postmenopausal women can likely avoid severe symptoms.¹

With the onset of menopause, rapid bone loss occurs which is believed to average approximately 2% to 3% over the following 5 to 10 yrs, being greatest in the early postmenopausal years². Calcium ion is an essential structural component of the skeleton³. Body can't synthesize it. There is growing evidence for the importance of nutrition in the maintenance of bones and joints health. Nutrition imbalance with endocrine abnormalities may be involved in osteoporosis⁴. Organ systems that play an important role in Calcium metabolism are Skeleton, Gastrointestinal tract and Kidney. Extracellular calcium ion concentration is determined by the interaction of calcium absorption from the intestine, renal excretion of calcium, and bone uptake and release of calcium, each of which is regulated by parathyroid hormone, vitamin D and calcitonin⁵. Bone mineralization and rate of bone turnover are controlled by a number of hormones in the human body. Parathyroid hormone (PTH) causes bone resorption and helps to maintain blood calcium levels. Estrogens exert a major effect in women on bone re-modelling by inhibiting interleukin (IL)-6 production that reduces bone resorption and also controls the timing of osteoclast apoptosis. Estrogen deficiency, therefore results in a longer life span of osteoclasts⁶.

Several epidemiological studies have reported a sex difference in the incidence of cardiovascular disease in men versus women in reproductive age^{7,8}. This is because of the difference in endocrine make up of men and women. Oestrogen is said to have a protective role against CAD. This is

by its action on lipoprotein metabolism and by its direct action on vessel wall. Presence of oestrogen receptors in liver suggests that beneficial effects of estrogen on lipoprotein metabolism are due in part to direct hepatic action. Also oestrogens increase the number of HDL receptors in liver. It increases catabolism of circulating LDL molecules. Estrogen receptors can increase plasma HDL also. A study by Barr et al concluded that women had a greater quantity of α lipoprotein (HDL) where as men had more β lipoprotein (LDL) in plasma.

It was suggested that relative protection of women from atherosclerosis could be partly due to their higher HDL cholesterol⁹. It is established that menopause heralds a change in serum lipids towards male pattern (Hallberg et al 1967). LDL-C levels in serum increase progressively as women age and go through menopause & at their 50s their average LDL level is higher than those of men of same age. After menopause, incidence of cardiovascular disease in women tends to be similar to men (Oliver and Boyd in 1956)^{10,11}. Framingham heart study in 1976 revealed that in postmenopausal women, the risk of CAD is increased compared to premenopausal¹². Several studies explain the relation of menopause and CAD. The sex advantages that are lost in menopause are proved by various experimental studies.

This study was done in Kottayam where cassava was their staple diet. Cassava are good sources of dietary fiber and is rich in calcium. This intends to find out any correlation between calcium levels and lipid levels between premenopausal and postmenopausal women in Kottayam and to find out any effect of diet on these values.

Materials and Methods

Study was done in women at various age groups. They are divided into women at the reproductive age and those who are in menopause. Subjects with known thyroid disease and subjects having diabetes, hypertension and heart disease were excluded from study. Study was conducted in 80

women attending medicine OPD with prior informed consent. Screening of all subjects for the study was done using proforma. Blood samples were collected from subject by venous puncture method using disposable syringes and needles. 8 ml blood were collected from anti cubital vein under aseptic precautions and transferred to Bottles Serum Cholesterol, Triglyceride, Hdl Cholesterol, Ldl Cholesterol, Vldl Cholesterol Were Estimated And Analyzed. S.Albumin And S. Total calcium estimated. Then corrected calcium level was found out using formula.

$$\text{Corrected calcium} = \text{s.calcium} + 0.8 (4 - \text{S.Albumin})$$

Results

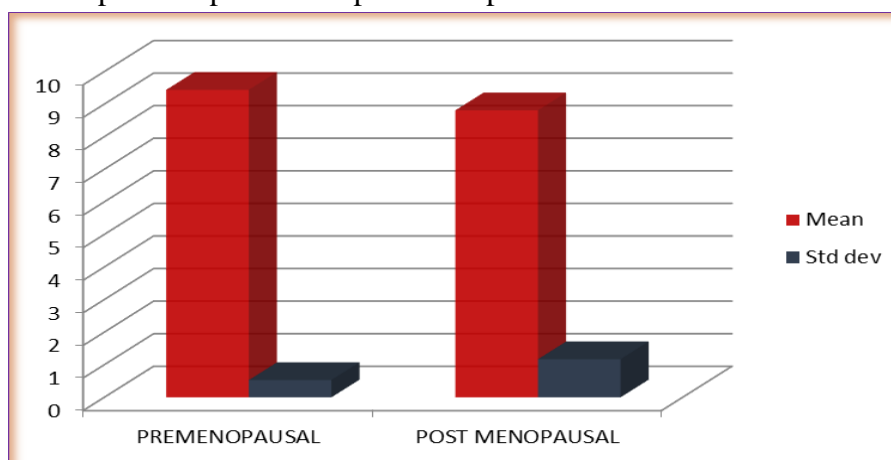
This study is designed as a cross sectional observational study and statistical analysis has been done to determine the difference between two groups. Data was analysed using statistical package for social sciences (SPSS).Mean value of each parameter is obtained,Standard deviation was calculated. student t test was used to find out the statistical significance between the means of each parameter. Correlation coefficient found out between calcium and each parameter of lipid function. The results are summarized in tables and figures. P value of < 0.05 will be taken as the level of significance

Observation and Results

Table 1: Comparison of Corrected S.Ca in 2 Groups of Women

| | Premenopausal Women | Postmenopausal Women |
|-------|---------------------|----------------------|
| MEAN | 2.63 | 3.93 |
| STDEV | 3.05 | 3.77 |

P value =.01. Since p value <0.05, THIS IS HIGHLY SIGNIFICANT.there is considerable difference between calcium levels of premenopausal and post menopausal women

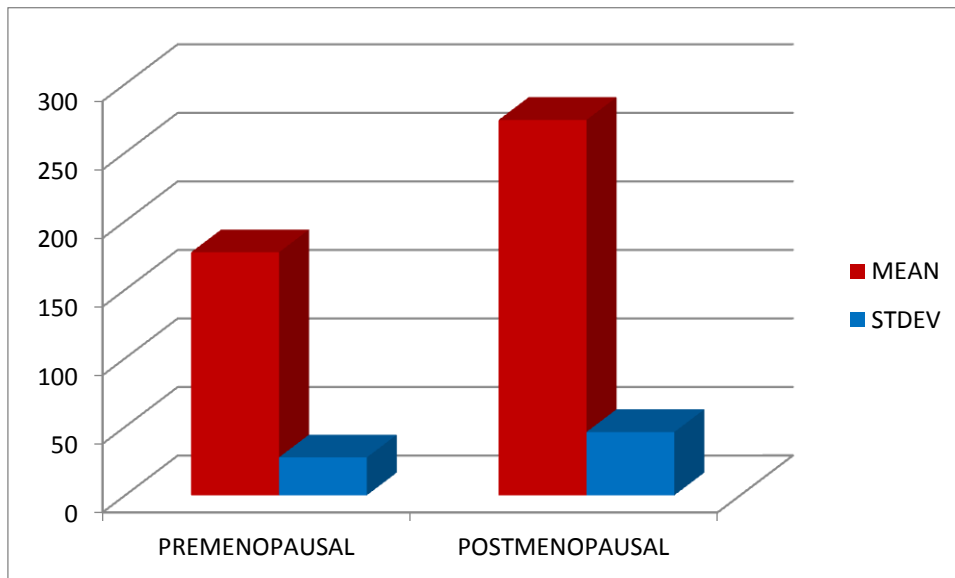


Bar Diagram showing difference in mean of S.Calcium in Premenopausal and Post Menopausal Women

Table 2 Comparison of S.Cholesterol in two groups

| | Premenopausal Women | Postmenopausal Women |
|-------|---------------------|----------------------|
| Mean | 9.44 | 8.81 |
| STDEV | 0.53 | 1.17 |

Since p value < 0.05, this is significant. There is considerable difference between cholesterol levels of premenopausal and post menopausal women

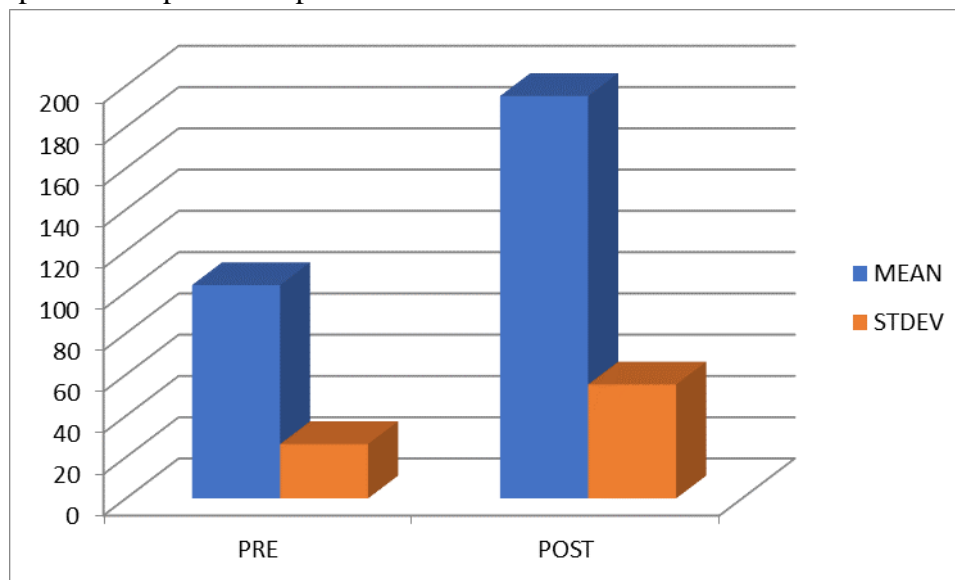


Bar Diagram showing difference in mean of S.Cholesterol in Premenopausal and Post Menopausal Women

Table: 3 Comparison of S.LDL in Premenopausal and Post Menopausal Women

| | PREMENOPAUSAL WOMEN | POSTMENOPAUSAL WOMEN |
|-------|---------------------|----------------------|
| MEAN | 105.58 | 166.65 |
| STDEV | 28.98 | 60.37 |

Here p value less than 0.05. This is highly significant. There is a considerable difference between S.LDL levels of premenopausal and post menopausal women.



Bar Diagram showing Difference in mean of S.LDL in Premenopausal and post Menopausal Women

Table 4

| | Premenopausal Women | Postmenopausal Women |
|--------|---------------------|----------------------|
| S.HDL | 48.22 ±6.47 | 46.43±4.3 |
| S.VLDL | 25.67 ±4.66 | 26.98± 4.74 |
| S.TGL | 128.35 23.33 | 138.21±9.91 |

1. Comparison of S.HDL in Premenopausal and Post Menopausal Women

p value >0.05 .

Here p value more than 0.05. There is no considerable difference between S.HDL levels of premenopausal and post menopausal women

2. Comparison of S.Triglyceride in Premenopausal and Post Menopausal Women

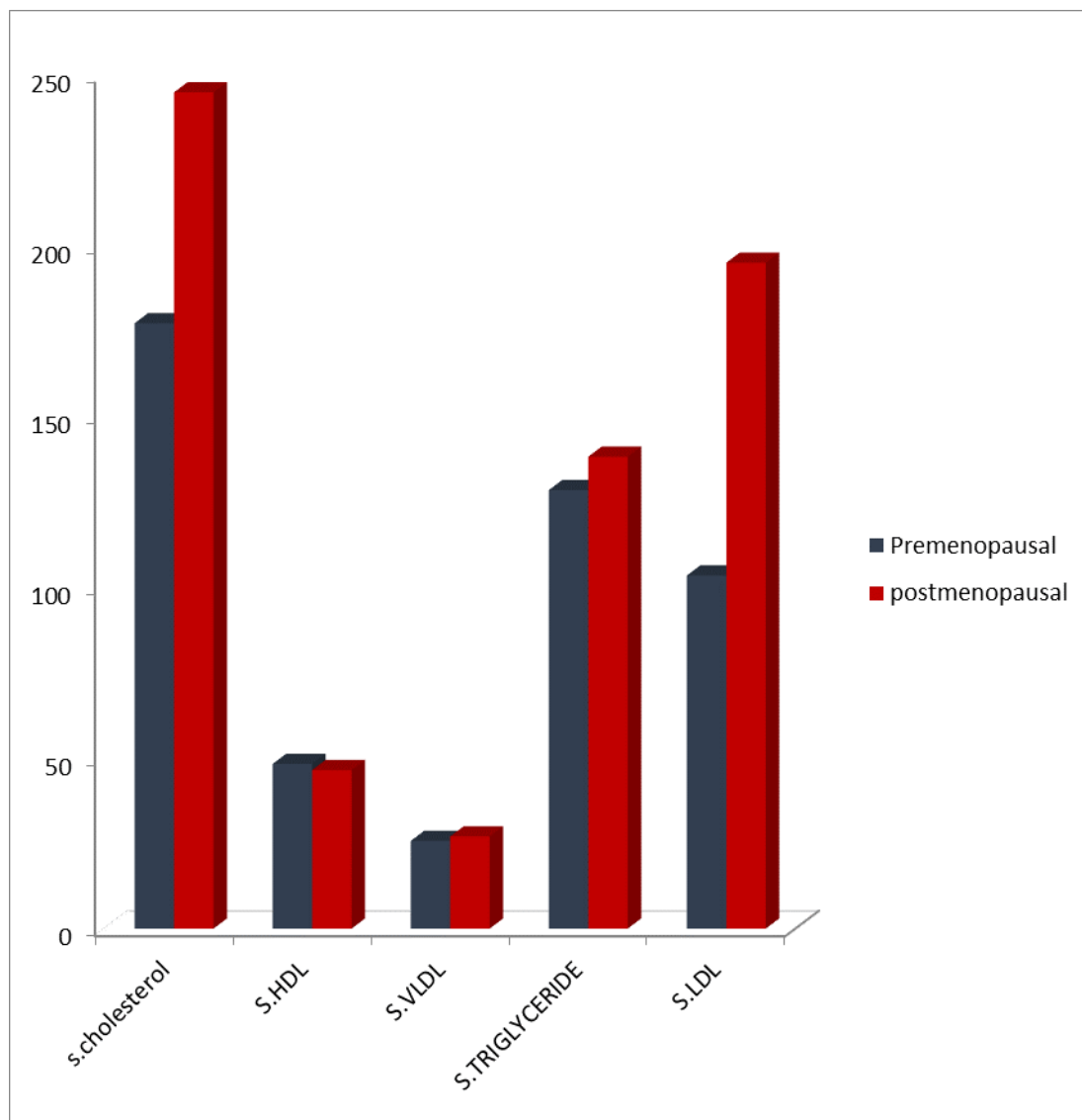
P value >0.05

Here p value more than 0.05. There is no considerable difference between S.TGL levels of premenopausal and post menopausal women.

3. Comparison of S.VLDL in Premenopausal and Post Menopausal Women

P value >0.05

Here p value more than 0.05. There is no considerable difference between S.VLDL levels of premenopausal and post menopausal women



Bar Diagram Showing Difference in Lipid Profile between Premenopausal and Postmenopausal Women

Correlation

Correlation coefficients were calculated between S. Ca levels and various lipid parameters .

Premenopausal women

| premenopause | Correlation coefficient | P value | postmenopause | Correlation coefficient | P value |
|----------------------|-------------------------|---------|----------------------|-------------------------|---------|
| S.Ca & S.CHOLESTEROL | -0.08 | > 0.05 | S.Ca & S.CHOLESTEROL | -0.07 | > 0.05 |
| S.Ca & S.HDL | -0.07 | > 0.05 | S.Ca & S.HDL | -0.10 | > 0.05 |
| S.Ca & S.VLDL | 0.27 | > 0.05 | S.Ca & S.VLDL | 0.007 | > 0.05 |
| S.Ca & S.LDL | 0.03 | > 0.05 | S.Ca & S.LDL | -0.05 | > 0.05 |
| S.Ca & S.TGL | 0.27 | > 0.05 | S.Ca & S.TGL | 0.007 | > 0.05 |
| S.Ca & LDL/HDL | -0.05 | > 0.05 | S.Ca & LDL/HDL | 0.02 | > 0.05 |
| S.Ca & TC/HDL | -0.07 | > 0.05 | S.Ca & TC/HDL | 0.03 | > 0.05 |

Since p value >0.05 ,these correlations are not significant

POST MENOPAUSAL WOMEN

Since p value >0.05, these correlations are not significant.

Discussion

In post menopausal women there is a decrease in circulating Oestrogen compared to premenopausal women. The oestrogen deficiency and other changes in menopause may lead to hot flushes, fatigue, lack of concentration, menstrual irregularity, psychological symptoms, osteoporosis, ischemic heart disease, effect on thyroid function and alterations of lipid profile.

The present study was conducted to compare and correlate the relation between serum levels of calcium and lipid profile in normal healthy menopausal women and in healthy women of reproductive age group before menopause. The study was performed in two groups of subjects, a group of 40 healthy Premenopausal women and a group of 40 postmenopausal women

The mean values of S.CALCIUM (Corrected calcium levels with albumin (mg/dl) in premenopausal women is 9.44 ± 0.53 , while that of postmenopausal women is 8.81 ± 1.17 . There is a highly significant difference in s.calcium levels since p value is <0.01.This was consistent with findings of the studies, Altered liver function and the Status of Calcium in Postmenopausal Women in Around Manglore²³ and A longitudinal study of pre and post menopausal changes in calcium metabolism²⁴.This difference in levels attributed to estrogen deficiency.

The mean value of s.cholesterol (mg/dl) in premenopausal women is 177.27 ± 27.63 and that of post menopausal women is 244.9 ± 55.42 .here the difference is significant since p value is <0.05. The levels of S.cholesterol higher in postmenopausal women. This is consistent with studies. "Sex difference in coronary disease: two opposing Views"²⁵ and "Influence of sex and sex hormones upon the development of atherosclerosis and upon the lipoproteins of the plasma"⁹. During menopause protective effect of estrogen is lost and serum lipids change towards a male pattern.

Mean LDL levels of premenopausal women are 103.38 ± 26.3 and postmenopausal women are 195 ± 55.2 . Here p value <0.05.So there is a considerable difference between the serum LDL levels between the two groups. This is inconsistent with findings of studies, Thyroid functions and serum lipids in older women²⁶.Oestrogen increases the catabolism of LDL molecules, when that advantage is lost in menopause LDL levels rise.

Mean HDL levels in pre and menopausal women is 48.22 ± 6.47 and 46.43 ± 4.3 .Here p value is >0.05.Although there is a small difference between both groups, this is not statistically significant. Mean S.VLDL levels in pre and menopausal women is 25.67 ± 4.66 and $26.98 \pm$

4.74. Here p value is >0.05 There is no considerable difference between the serum LDL levels between the two groups. Mean S.triglyceride levels in pre and postmenopausal women is 128.35 23.33 and 138.21 \pm 9.91. Here also no statistical difference between these levels. Positive correlation was found out between S.Ca & S.VLDL, S.Ca & S.LDL, S.Ca & S.TGL in premenopausal women. But they were not statistically significant. Negative correlation was found out between S.Ca & S.Cholesterol, S.Ca & S.HDL, S.Ca & LDL/HDL RATIO, S.Ca & S.Cholesterol/HDL ratio. But they were not statistically significant.

Correlation coefficients were calculated between S. Ca levels and various lipid parameters. Positive correlation was found out between S.Ca & S.VLDL, S.Ca & S.TGL, S.Ca & LDL/HDL RATIO in Post menopausal women. But they were not statistically significant. Negative correlation was found out between S.Ca & S.Cholesterol, S.Ca & S.HDL, S.Ca & S.LDL, S.Ca & S.Cholesterol/HDL ratio. But they were not statistically significant.

Oestrogen deficiency may induce calcium loss due to decreased intestinal calcium absorption and decreased renal calcium conservation²⁷. The low serum calcium might be due to increased urinary loss of calcium in post menopausal women. Estrogen deficiency may induce calcium loss due to decreased intestinal calcium absorption and decreased renal calcium conservation²⁷. This study proved there is decrease in calcium level in women after menopause, even though they are taking cassava like calcium giving foods. This is pointing towards the effects of decreased estrogen after menopause and need of regular supplementation of calcium after menopause.

Screening, S.calcium and S.lipid profile may be advised for every women in the perimenopausal age groups so that the related problems during menopausal transition can be reduced.

Conclusion

- S.Calcium levels were significantly lower in post menopausal Women when compared to premenopausal women.
- S.Cholesterol and S.LDL levels were significantly higher in post menopausal women compared to premenopausal women
- There were no significant difference in the levels of S.HDL, S.VLDL, S.triglycerides between the premenopausal and Post menopausal women.
- But no correlation found between S.calcium and other parameters of lipid profile in premenopausal and post menopausal group.

The difference in the levels of S.Calcium and S.Cholesterol, S.LDL between the premenopausal and post menopausal women may be attributed to the hormonal changes of menopause mainly the decrease in oestrogen levels. Women health education regarding calcium-rich diet must be given to postmenopausal women, especially those from low socioeconomic status. However, further studies are needed to evaluate the levels of calcium in postmenopausal women

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