

## CORRELATION OF SERUM CHOLESTEROL AND BONE MINERAL DENSITY IN POST MENOPAUSAL WOMEN

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### Abstract

**Background:** To find a correlation between serum cholesterol and Bone mineral density in post menopausal women

**Methods:** The study was carried on matched cases and controls. The experimental group consisted of 100 females at postmenopausal age, in which by the DEXA method was diagnosed osteoporosis while the control group consisted of 50 females in a postmenopausal age but without diagnosed osteoporosis who served as controls.

**Results:** Postmenopausal women in the BMI range 18.5 to 25 (normal) were only included in the study. Others were excluded from the study to avoid confounding factors. The mean BMI in women with osteoporosis was  $22.13 \pm 1.76$  and in Group-II was  $21.26 \pm 2.06$ . The results were statistically insignificant. Analyzing the average values of serum cholesterol in our study, we found that the mean cholesterol level in group-I was  $210.32 \pm 34.21$  mg/dl and  $183.21 \pm 56.32$  mg/dl in group-II. The mean cholesterol level was significantly higher in women with osteoporosis.

**Conclusion:** On the decrease in bone mineral density and osteoporosis in postmenopausal women influence many risk factors. Preventive strategies for development of osteoporosis should be initiated in women with elevated serum cholesterol levels.

**Keywords:** Osteoporosis, Menopause, Lipid Profile, BMI.

### Introduction

Osteoporosis is defined as a progressive, systemic, skeletal disease characterized by low bone mass and micro architectural deterioration of bone tissues with a consequent increase in bone fragility and susceptibility to fracture. In postmenopausal women, osteoporotic fractures are more common than stroke, myocardial infarction, and breast cancer combined. Fractures can be costly and result in disability or death. Because there are no signs or symptoms of osteoporosis other than fracture, risk assessment is necessary to identify those at higher risk for clinical events.<sup>1-4</sup>

Bone mineral density (BMD), a golden criterion recommended by the WHO, is the primary diagnostic index for osteopenia and osteoporosis. Early postmenopausal women with an atherogenic lipid profile had lower lumbar and femoral BMD and had an increased risk of osteopenia compared to those with a normal lipid profile, suggesting that hyperlipidemia could be associated with osteoporosis.<sup>5</sup> The aim of present study was undertaken to examine the correlation of lipid profile with bone mineral density in post-menopausal women.

### Material and Methods

Women fulfilling the following inclusion and exclusion criteria were enrolled for the study.

**Inclusion criteria:** All postmenopausal women (1-5 years after the last menstrual cycle) with BMI 18.5-25 who are willing to participate in the study.

**Exclusion criteria:** Diabetes, chronic renal disease, inflammatory arthritis, diseases of thyroid and para thyroid glands, liver disease, malignancy, GIT disease like Crohn's disease and malabsorption, Use of drugs like statins, corticosteroid, hormone replacement therapy, diuretics, drugs for osteoporosis, Secondary osteoporosis due to endocrine diseases.

Study group A consisted of 100 postmenopausal females who had been diagnosed with osteoporosis in the Cabinet for Osteodensitometry by determining bone mineral density by DEXA method at the lumbar spine (L2-L4).

Group B consisted of 100 females in the postmenopausal age which after determination of bone mineral density by DEXA method, has not been diagnosed with osteoporosis.

All the examinees underwent biochemical analysis of blood. Samples were taken from a peripheral vein after 12 hours of fasting and were immediately centrifuged at four degrees Celsius (4° C). Plasma was used to analyse the lipid profile (total cholesterol, LDL cholesterol, TG, HDL cholesterol).

**Data analysis:** Data were presented as mean  $\pm$  standard error values for continuous variables and as percentage  $\pm$  standard error for categorical variables. Statistical analysis

was performed. A p value  $<$  0.05 was considered to be statistically significant.

### Results

Maximum number of women in both the groups were in the age group 51-60 years suggesting that it is the age in which women attains her menopause mostly. The mean age of this study was  $53.21 \pm 5.01$  in group-I and  $53.62 \pm 5.02$  in group-II. No significant difference was observed according to age between both the groups (p-value  $>$ 0.05).

**Table 1: General characteristics**

Variable	Group-A	Group-B	p-value
BMI(Kg/Mt <sup>2</sup> )	22.13 $\pm$ 1.76	21.26 $\pm$ 2.06	<b>&gt;0.05</b>
Total Cholesterol(mg/dl)	210.32 $\pm$ 34.21	183.21 $\pm$ 56.32	<b>0.01</b>

Postmenopausal women in the BMI range 18.5 to 25 (normal) were only included in the study. Others were excluded from the study to avoid confounding factors. The mean BMI in women with osteoporosis was  $22.13 \pm 1.76$  and in Group-II was  $21.26 \pm 2.06$ . The results were statistically insignificant. Analyzing the average values of serum cholesterol in our study, we found that the mean cholesterol level in group-I was  $210.32 \pm 34.21$  mg/dl and  $183.21 \pm 56.32$  mg/dl in group-II. The mean cholesterol level was significantly higher in women with osteoporosis.

### Discussion

Postmenopausal women in the BMI range 18.5 to 25 (normal) were only included in the study. Others were excluded from the study to avoid confounding factors. The mean BMI in women with osteoporosis was  $22.13 \pm 1.76$  and in Group-II was  $21.26 \pm 2.06$ . The results were statistically insignificant. Analyzing the average values of serum cholesterol in our study, we found that the mean cholesterol level in group-I was  $210.32 \pm 34.21$  mg/dl and  $183.21 \pm 56.32$  mg/dl in group-II. The mean cholesterol level was significantly higher in women with osteoporosis.

Sadat-Ali M et al (2005)<sup>7</sup> observed that the mean BMI in group A with women of  $>$ 6 children was  $31.95$  kg/m<sup>2</sup> and in group B with women of  $<$ 5 children was  $29.14$  kg/m<sup>2</sup>. The BMD of the lumbar spine of group A was  $0.850$  g/cm<sup>2</sup> (SD $\pm$ 0.112) compared to group B in which it is  $0.699$  g/cm<sup>2</sup> (SD $\pm$ 0.141),  $p <$ 0.005. This difference was statistically significant.

Skrzek A et al (2014)<sup>8</sup> suggested the optimal values of the body mass index (BMI) which would indicate the most favourable preservation of the bone mineral density in postmenopausal women is  $26.9$  kg/m<sup>2</sup>.

Shukla J et al (2013)<sup>9</sup> found that postmenopausal women with osteoporosis had significantly increased values of total cholesterol (Mean  $137.11$  mg/dl SD  $7.28$ ). This is in accordance with the result in the above study. Adami and

colleagues<sup>10</sup> found no significant association of elevated serum cholesterol with a decrease in bone mineral density at the hip level in women aged 68-75 years. Y.-Y. Chen et al<sup>11</sup> found that postmenopausal women with osteoporosis had a significantly higher total cholesterol level compared to those with the normal bone mineral density. Li et al<sup>12</sup> worked on relationship between lipid profiles and bone mineral density and observed no correlation between total cholesterol level and osteoporosis susceptibility in postmenopausal women. M.K. et al<sup>13</sup> observed that BMD at femur ( $0.887 \pm 0.152$ ) decreased significantly with increasing quartiles of total cholesterol ( $<$ 200mg/dl) ( $P = 0.024$ ) in highest quartile in postmenopausal women.

### Conclusion

After analysing the results of the study, it can be concluded that serum cholesterol is associated with bone mineral density in postmenopausal women. Hence a lipid profile is recommended in postmenopausal women as an atherogenic lipid profile is a risk factor for the development of osteoporosis in the elderly postmenopausal females. Thus, preventive measures can be instituted in the form of lifestyle modifications, diet and drugs to improve the quality of life in this group of females.

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