

Osteoporosis in Surgical Menopause

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Abstract

Background: Osteoporosis in both surgical and natural menopausal women are common health hazards all over the world. And the surgical menopausal women may have the greater chance of this disorder than those of natural menopausal women. **Objective:** To observe osteoporotic changes in both surgical and natural menopausal women in Bangladesh. **Method:** This Cross sectional study was carried out in the Department of Physiology, Sir Salimullah Medical College, Dhaka between 1st January 2010 to 31st December 2010. A total number of 60 female subjects were included in this study. Among them 30 surgical menopausal women age ranged from 45-55 years were included in the study group (Group B) and 30 natural menopausal women age ranged from 50-60 years were taken as control (Group A). All the menopausal women were selected from Out Patient Department (OPD) of Gynaecology and Obstetrics, Sir Salimullah Medical College and Mitford Hospital. Estimation of serum estrogen level by microparticle enzyme immunoassay (MEIA) method and T- score was obtained by Dual energy X-ray absorptiometry of both natural and surgical menopausal women were done. The statistical analysis was done by using appropriate method as applicable. **Results:** In this study T- score of both spinal and femoral neck bone were significantly ($p < 0.001$) lower in surgical menopausal women than those of natural menopausal women. Again, mean serum estrogen level was significantly ($p < 0.001$) lower in surgical menopausal women than that of natural menopausal women. **Conclusion:** The present study revealed that surgical menopausal women have greater chance of osteoporosis than those of natural menopausal women.

Key words: Menopause, Bone mineral density, Osteoporosis.

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Introduction

Physiologically menopause can be defined as permanent cessation of menstruation for at least 12 consecutive months¹. This natural menopause occurs as the ovaries become non-responsive to the stimulus of the gonadotropin hormones secreted by anterior pituitary gland. The menopause occurs usually between the ages of 45 to 52 years. Again, surgical menopause is the cessation of menstruation resulting from surgical removal of the uterus leaving one or both ovaries or the removal of both ovaries².

During menopause incidence of cardiovascular disease and bone demineralization become increase. Estrogen deficiency during menopause has got remarkable effects on cardiovascular, skeletal, urogenital and gastrointestinal system³. The decline in estrogen level not only affects cardiovascular system, but it also may be a risk factor for the development of osteoporosis in postmenopausal women. However, all these postmenopausal symptoms appear earlier in surgical menopausal women than those of natural menopausal women⁴.

Osteoporosis is a disease characterized by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced bone fragility and consequent increase in fracture risk⁵. At menopause, there is acceleration in the rate of bone loss which is 5% trabecular and 1.5% of total loss per year. In the first twenty years after menopause there is a 50% reduction in trabecular bone and 30% reduction in cortical bone primarily due to lack of estrogen⁶. It is well established that low bone mass is one of the main predictors of fractures and the incidence of fractures rises as bone mineral density declines⁷. Cessation of estrogen secretion from the ovary is associated with acceleration of bone loss, which depends mainly on the onset of menopause and its type⁸. Early menopause is a recognized factor for osteoporosis⁹ and surgical menopause represents a type of early menopause¹⁰.

Low levels of estrogen and androgens are linked to lower bone mineral density (BMD) and a higher risk of hip and vertebral fracture in menopausal women¹¹. Therefore, surgical menopausal women who have been oophorectomized may have an even greater risk of osteoporosis due to this low level of estrogen¹². However, after natural menopause, ovaries continue to produce significant amount of androgens, which are converted to estrogen peripherally¹³.

Again, some investigators also observed that the percentage of osteoporotic women was higher in surgical menopausal group in comparison to that of natural menopausal group of women¹⁴.

Life expectancy of Bangladeshi people especially of female has been increased for the last few years. Postmenopausal syndrome and its complication in Bangladeshi women are increasing with time. Recently, some studies have been done on dyslipidaemia in menopausal women in our country¹⁵. But little is known about the risk of osteoporosis in surgical menopausal women. Therefore, the present study has been

undertaken to observe and compare the osteoporotic changes between the surgical and natural menopausal women in Bangladesh. It is expected that the findings of the study would give a guideline to the clinicians for early detection and better management of this change in both types of menopausal women in order to improve their quality of life.

Methods

This Cross sectional study was carried out in the Department of Physiology, Sir Salimullah Medical College, Dhaka between 1st January 2010 to 31st December 2010. A total number of 60 female subjects were included in the study. Among them 30 surgical menopausal women age ranged from 45-55 years were included in the study group (Group B) and 30 natural menopausal women age ranged between 50-60 years were studied as control group (Group A). All the menopausal women were selected from Out Patient Department (OPD) of Gynaecology and Obstetrics of Sir Salimullah Medical College and Mitford Hospital. All the subjects were belonged to lower middle socioeconomic status. Subjects with any disease such as hypertension, diabetes mellitus, skeletal disorder, tuberculosis, heart disease and other acute and chronic disease, history of fracture, suffering from mental disorder, using prescribed medicine, alcohol users, and smokers were excluded from the study. The aim, objectives, risk and the procedure of the study were explained in details to the subjects and their written informed consents were taken. Ethical approval was taken from the Institutional ethics committee (IEC) of Sir Salimullah Medical College. Detailed family history and medical history of the subjects were also taken. Then their general information and data were collected in the prefixed questionnaire. With all aseptic precautions, five (5) ml of venous blood was drawn from median cubital vein by sterile disposable syringe. Serum estrogen level was estimated by MEIA method in the the Department of Biochemistry, BSMMU, Dhaka. Dual energy X-ray absorptiometry for

obtaining 'T' - score of bone mineral density in both natural and surgical menopausal women was performed in the centre for Nuclear Medicine and Ultrasound, Sir Salimullah Medical College and Mitford Hospital, Dhaka. Blood pressure measurement and fasting blood sugar of all the participants were also done in the laboratory of Physiology Department, Sir Salimullah Medical College for exclusion of patients from hypertension and diabetes mellitus.

Statistical analysis was done by using Statistical package of social service (SPSS) for windows version-15. Data were expressed as mean \pm SD. Bonferroni test, Independent sample 't' test, Chi-square (χ^2) test and Fisher's exact test were used as the test of significance as applicable.

Results

Anthropometric data of the subjects are expressed in Table I.

Table I: Age and Body Mass Index (BMI) in different groups (n=60)

Groups	n	Age (years)	BMI(kg/m ²)
A	30	56.03 \pm 2.63	23.34 \pm 0.77
B	30	50.80 \pm 3.00	23.64 \pm 0.72

Statistical analysis

Groups	p value
A vs B	0.000*** 0.508 ^{ns}

Data are expressed as Mean \pm SD.

Group A: Natural menopausal women (Control).

Group B: Surgical menopausal women (Study).

*** = p < 0.001

ns = Not significant.

The mean (\pm SD) serum estrogen level was significantly (p < 0.001) lower in group B than that of group A (Figure 1).

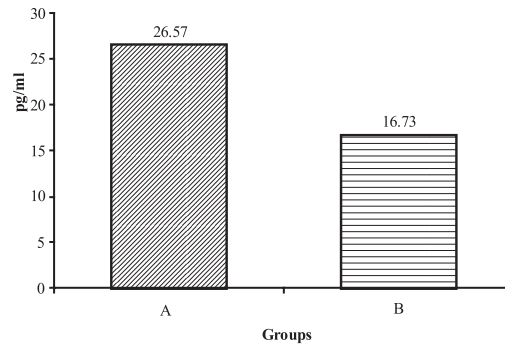


Figure 1: Mean Serum Estrogen level in menopausal women (n=60)

The mean \pm SD T score of spinal and femoral neck bone were significantly (p < 0.001) lower in group B in comparison to those of group A (Table II).

Table II: T score of Bone Mineral Density in menopausal women (n=60)

Groups	n	T score	
		Spinal	Femoral neck
A	30	-1.43 \pm 0.78	-1.32 \pm 0.85
B	30	-2.11 \pm 0.71	-2.08 \pm 0.77

Statistical analysis

	p value	
A vs B	0.000***	0.000***

Data are expressed as Mean \pm SD.

Group A: Natural menopausal women (Control)

Group B: Surgical menopausal women (Study)

*** = Significant at p < 0.001

n = total number of subjects

Again, the percentage of subjects with normal spinal bone finding was significantly (P < 0.05) lower in group B than that of group A. Whereas, the percentage of subjects with osteoporosis and osteopenia were higher in group B than those of

group A but the differences were not statistically significant (Figure 2).

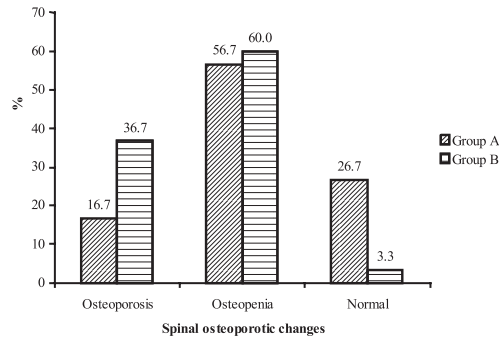


Figure 2: Distribution of menopausal women by the presence of spinal osteoporotic changes (n=60)

In this study, the percentage of subjects with femoral neck osteoporosis was significantly higher ($p < 0.01$), whereas osteopenia was non-significantly ($p > 0.05$) lower in group B than those of group A (Figure 3).

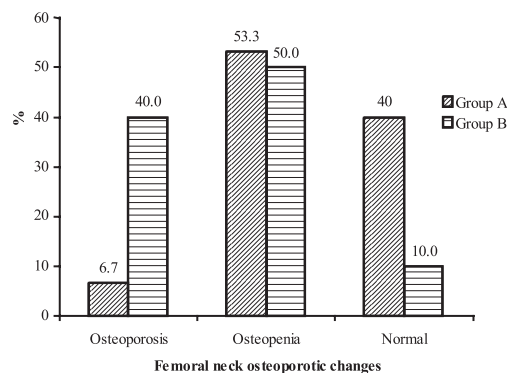


Figure 3: Distribution of menopausal women by the presence of femoral neck osteoporotic changes (n=60)

Discussion

In this study, significantly lower serum estrogen level was found in surgical menopausal women than that of natural menopausal women. This finding is consistent with that of some other researchers¹⁶. On the contrary, some researchers observed higher level of serum estrogen level in surgical menopausal women than that of natural menopausal women¹⁷. In that study the age

range of surgical menopausal women was from 42-51 years whereas in natural menopausal women age range was from 55-74 years. So, may be due to this older age group of natural menopausal women, their serum estrogen level was lower.

Again, in the present study significantly lower T score of spinal and femoral neck bone were also found in surgical menopausal women in comparison to those of natural menopausal women. This finding is in agreement with those of different researchers⁴.

Small amount of estrogen and androgens are produced by ovary in natural menopausal women¹³. Whereas, in surgical menopausal women after bilateral oophorectomy, serum estrogen and testosterone levels decrease and follicle stimulating hormone rises suddenly. Some investigators suggested that a significant amount of estrogen in menopausal women come from peripheral conversion of androstenedione in adipose tissue. Thus the conversion is greater in obese women¹⁸. Therefore, after surgical removal of ovary, there is significant decrease in androgen production resulting decrease in estrogen level¹⁹.

Estrogen concentration is an important determinant of rate of bone remodelling. Thus deficiency of estrogen leads to bone loss after menopause⁶. Estrogen also has effects on increase calcium absorption and vitamin D metabolism²⁰, calcitonin secretion²¹ and sensitivity of bone to parathyroid hormone²². Again, it has been suggested that low BMI, sedentary life style and less calcium intake are also associated with risk of bone loss²³.

It has been suggested that the gradual withdrawal of estrogen in natural menopause may have little influence on bone loss because of homeostatic maintenance²⁴. But in surgical menopause ovarian function is suddenly lost. Therefore, the magnitude of bone loss in surgical menopausal women was more obvious than that of natural menopausal women²⁵.

Some investigators suggested that androgen inhibit bone resorption as well as increasing bone formation²⁶. Androgen acts synergistically with

estrogen in natural menopausal women to increase bone mineral density²⁷.

In the present study, significantly lower measured value of T score of both spinal and femoral neck bone in surgical menopausal women suggests that, bone loss is more prominent in this group of women. Again, percentage of subjects with osteoporosis and osteopenic changes in surgical menopausal group of women was higher, which also in favour of this statement. Moreover, there is increased early involvement of both spinal and femoral neck bone as evidenced by observing the presence of maximum percentage of subjects in both group of menopausal women with osteopenic changes rather than osteoporotic changes. However, osteoporosis and osteopenic changes are more marked in surgical menopausal women may be due to estrogen deficiency as the measured value of this hormone, which was lower in this group of patients of the present series.

Conclusion

From the present study, it can be concluded that osteoporosis occur more in surgical menopausal women in comparison to that of natural menopausal women.

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