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Original Research Article

Prevalence of osteoporosis in hysterectomised as compared to non-hysterectomized women in 7th decade of life

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ABSTRACT

Background: Osteoporosis is considered as a major public health issue with fragility fractures of the hip, vertebrae and distal radius being the most important consequences. It has been said to be an age-related degenerative process. However, postmenopausal women develop this disease due to age-related bone mineral loss as well as due to declining levels of estrogen in the body following menopause leading to increased risk of fractures. Objectives of this study were to find out the prevalence of osteoporosis in hysterectomised and non-hysterectomised postmenopausal women in 7th decade of life.

Methods: Descriptive cross-sectional study done on a total of 66 postmenopausal women who were in their 7th decade of life. They were divided into two groups, one consisting of 36 women who underwent natural menopause and the other group of 30 women who had surgical menopause. The bone mineral density of both the groups was measured using DEXA scan and comparison was done between these study groups.

Results: Out of 30 hysterectomised subjects, 24 (80%) were found to be having osteoporosis, 6 (20%) had osteopenia and none had normal BMD. While out of 36 subjects in the non-hysterectomised group, 14 (38.88%) had osteoporosis, 16 (44.44%) had osteopenia and 6 (16.66%) subjects had normal BMD. Significant relation (p-value 0.001) was found on comparison of the study groups. In addition, significant positive correlation was between BMD and BMI whereas negative correlation was seen between BMD and parity.

Conclusions: Hysterectomy was found to increase the incidence of osteoporosis. Obesity was found to have protective effect against bone mineral loss while increasing parity had a negative relation with BMD.

Keywords: BMD, DEXA, Hysterectomy, Osteoporosis, Postmenopausal

INTRODUCTION

Osteoporosis is a systemic skeletal disease characterized by low bone mass and micro-architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fractures.¹ It is a “silent” disorder as the loss of minerals occurs without discernable symptoms. Development of osteoporosis is age related as well as a result of declining estrogen levels following menopause.² About 30% of Indian menopausal

women aged 50 years or more are having osteoporosis while 35% are found to be at risk. The relationship of estrogen depletion following menopause and bone loss has been well established and it is estimated that estrogen deficiency is responsible for 75% of bone loss that occurs in postmenopausal women. Bone loss occurs at an accelerated rate of about 3% in women at menopause and for next 10 years as compared to 0.03% in preceding years.³ Osteoporosis occurs due to decrease in bone mineral density (BMD) when oestrogen levels drop

following natural or surgical menopause. Surgical menopause leads to earlier osteoporosis as studies have shown lower bone density in the lumbar spine and proximal femur in hysterectomised women when compared to women with intact uteri of same age group.⁴

Moreover, hysterectomy along with bilateral oophorectomy leads to even earlier occurrence of osteoporosis as ovarian conservation in postmenopausal women has been shown to reduce the rate of bone loss due to the small amounts of estrogen produced from ovaries.⁵

Fragility fracture is the most serious manifestation of osteoporosis, defined as a fracture occurring spontaneously or following minor trauma. Osteoporosis is considered as a major public health issue, with fragility fractures of the hip, vertebrae and distal radius being the most important consequences. All these conditions lead to increased morbidity, hospital care and dependency.⁶

Geriatric population in India is on rise and incidence of hysterectomy is getting common in our setting. Keeping this in mind, this study was undertaken to find out and compare the prevalence of osteoporosis in postmenopausal hysterectomised and non-hysterectomised women.

METHODS

This study was conducted in the Department of Obstetrics and Gynaecology and BMD was done in the Department of Radiology, Swami Rama Himalayan University (SRHU), Swami Ram Nagar, Dehradun during a time period of one year from May 2016 to April 2017. Subjects were taken from the out-patient department. A written informed consent was taken in Hindi and English from the subjects involved in the study. Ethical clearance was taken from the ethical committee of the university.

All patients in the age group of 61 to 70 years who presented in Gynecology OPD were included in the study and divided into two groups of non-hysterectomised and hysterectomised postmenopausal women. A total of 66 subjects were taken in which 36 patients were non-hysterectomised and had natural menopause while 30 patients had undergone hysterectomy with bilateral salpingoophorectomy and had surgical menopause. Women with history of long term steroid or thyroxine therapy, smoking and alcohol intake, any malignancy, diabetes mellitus, hormone replacement therapy, prophylactic drugs for osteoporosis or taking medications that may affect bone turnover were excluded.

Relevant medical, obstetric and menstrual history was taken including history of past illness, personal and family history. Clinical assessment of the women including general, systemic and local examination (as applicable) was done according to pre-set case recording form. The weight and height of all the subjects were

recorded. Bone mass density was assessed by DEXA scan as per standard protocol at lumbar spine.

According to WHO criteria, bone mineral density was compared to two norms-healthy young adults (T-score) and age-matched (Z-score). A T-score within 1SD (+1 or -1) of a young adult mean indicates normal bone density, a T-score of 1 to 2.5 SD below the young adult mean (-1 to -2.5 SD) indicates osteopenia and a T-score of 2.5 SD or below the young adult mean (≤ -2.5 SD) indicates the presence of osteoporosis

Interpretation and analysis of obtained data was carried out using software SPSS version 22. We used descriptive and inferential method to conclude the present findings. Unpaired T-test was used to make conclusions. Spearman correlation was performed based on the ability to detect the relationship between various parameters. $P < 0.05$ was considered statistically significant.

RESULTS

The mean age of menopause in hysterectomised patients was 45.93 and in non-hysterectomised group was 47.19. The average parity in hysterectomised group of patients was 3.60 and that in non-hysterectomised group was 3.22.

The mean T-score of DEXA in hysterectomised patients was -3.54 and that in the non-hysterectomised group was -2.28 with a significant p-value of 0.000. The mean Z-score of DEXA in hysterectomised group was -1.82 and -0.89 in non-hysterectomised patients having p-value of 0.007 showing significant relation.

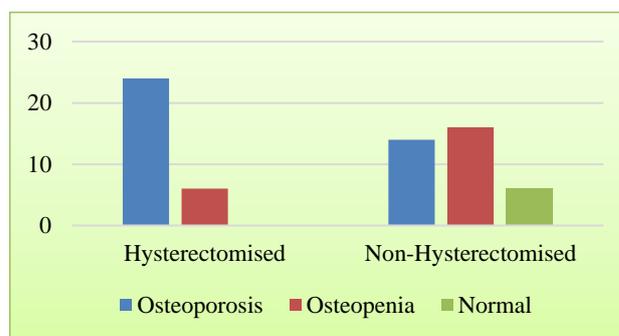


Figure 1: Relationship between osteoporosis and osteopenia in hysterectomised and non-hysterectomised subjects.

Out of 30 patients, 24 patients (80%) in hysterectomised group had osteoporosis as compared to only 14 patients (38.88%) in non-hysterectomised group having 36 patients. 6 patients (20%) in hysterectomised group had osteopenia whereas 16 women (44.44%) had osteopenia in non-hysterectomised group. 6 patients (16.66%) in non-hysterectomised group were found to have normal BMD while none of the patients in hysterectomised group had normal BMD showing that there was a significant

relationship between bone loss and history of hysterectomy in the study groups.

Table 1: Correlation between BMD and age.

Predictor variables	Dependant variable age (years)	
	r value	p value
Dexa T	0.148	0.237
Dexa Z	0.141	0.259

As shown in Table 1, the correlation between BMD and age in our study was found to be insignificant (p-value 0.237) suggesting that the value of BMD was unrelated to the increasing age.

Table 2: Relationship between parity and BMD.

Predictor variables	Dependant variable parity	
	r value	p value
Dexa T	-0.357	0.003
Dexa Z	-0.355	0.0003

In Table 2, there was significant relation between increasing parity and incidence of osteoporosis and osteopenia with a significant p-value of 0.003 which shows that incidence of bone loss increases with increasing number of pregnancies and childbirth.

Table 3: Relationship between BMI and BMD.

Predictor variables	Dependant variable BMI	
	r value	p value
Dexa T	0.461	0.001
Dexa Z	0.307	0.012

Similarly, in Table 3, significant negative relationship was found between increasing BMI with bone loss (p value 0.001) which suggests that increasing BMI is inversely proportional to bone strength.

DISCUSSION

Osteoporosis is a metabolic bone disorder characterized by decreased bone density and deterioration in micro architectural framework of bone leading to fragility fractures, as defined by WHO. With the increase in the geriatric population worldwide osteoporosis is the commonest bone problem of the elderly.

Due to this demographic change it is estimated that the risk of hip fractures will increase approximately up to 60 folds till 2050. The magnitude of the problem is such that a women's lifetime risk of hip fracture is equal to the combined risk of breast, uterine and ovarian malignancy.⁷ Osteoporosis is more prevalent in India with increasing life longevity, higher life expectancy but poor nutrition. Based on 2001 census approximately 163 million Indians above the age of 50 years out of which 20% women are osteoporotic and this is on an increasing trend.⁸

The prevalence of osteoporosis in postmenopausal women ranges from 4.9% to 23.3% in various studies. Limpaphayom et al reported 4.9% whereas Haussler B et al reported it to be 23.3%. Various factors have been reported to be the cause of osteoporosis like age, nutritional status, duration of menopause, BMI, number of pregnancies etc.

In the present study of total 66 cases, 30 were hysterectomised and 36 were non-hysterectomised. In this, 13 cases in hysterectomised group were below 65 years of age and 17 were above 65 years. 12 cases in non-hysterectomised group were below 65 years and 24 cases were aged more than 65.

BMD is considered to be an age-dependent variable which demonstrates an increasing trend in the distribution of osteoporosis with advancing age. Age is the primary determinant in osteoporosis. The decrease in bone mass in post-menopausal women is due to age as well as diminished estrogen levels in body.

In 2009 Sakondhvat et al. stated that with increasing age, the BMD of lumbar spine and femoral neck also decreases. Meiyanti et al. in 2010 found that BMD is inversely proportional to age in Lumbar spine and Distal Radius with bone mass loss of 1-2% annually for a period of 5-10 years. The bone mass loss increases with increasing years of postmenopausal women with 1-2.3% in first 5 years and 7-10% after 5 years thus increasing the chances of osteoporotic fractures.

In 2013, Agarwal MT et al in their study found a positive correlation between age and BMD and found that more than 50% of women above the age of 55 years had osteoporosis while it was only 8% in age group of 35-44, thus found that with increasing age, the BMD of women decreases significantly with a p value of 0.000.⁹ Similarly Singh Tarandeep et al found that in Indian population, post-menopausal women have 15% more chances of fractures.¹⁰

In the present study all the patients were from the age group of 61-70 years. We found that there was no significant difference in BMD with increasing age with the p value of 0.237 of DEXA T value and 0.259 of DEXA Z value as shown in Table 3. Present results are not consistent with other studies, may be because we compared only 10 years of age difference.

Hysterectomy is presumed to lead to hypoestrogenism and reduced production of gonadotropins leading to bone loss. Siddle et al stated that 1/3rd of hysterectomised women lose their ovarian function within 1-2 years of surgery.¹¹ Prostaglandin E2 is the principle product of arachidonic acid metabolism in the bone which leads to bone resorption. Prostaglandin E2 and F2 alpha also effect bone resorption. Thus, stating that hysterectomy leads to reduced bone mass while some authors in their

study found that there is no significant relationship between hysterectomy and BMD.

Kritz-Silverstein D et al followed 447 post-menopausal women and found no effect of hysterectomy on BMD.¹² Similar study was done by Akdemir N et al and found that hysterectomy had no long-term effect on BMD.¹³

In 2003, Cheng S et al in their study found that BMD was significantly higher in non-hysterectomised women when compared with hysterectomised women with a p value of 0.001.¹⁴

Gopinath RV et al in their study found that BMD in non-hysterectomised women was 753.36 ± 176.2 g/cm² compared to 973.2 ± 108.28 g/cm². It showed significant higher BMD in non-hysterectomised group with a p value of <0.05 .¹⁵

Melton JL et al did a study on 9258 patients and found that hysterectomised women are more prone to fractures with 1.21 fold increased chances of fractures compared to non-hysterectomised women.¹⁶ This increased risk of fracture was found to be due to reduced bone mass, stating that hysterectomy leads to reduced bone mass and higher chances of osteoporotic fractures.

Simoes RD et al found that there was a significant reduced BMD in Lumbar spine and proximal femur in hysterectomised women compared to non-hysterectomised women.¹⁷ Similar results were found by Ozkaya E et al in their study and found BMD to be significantly lower in Femur and Trochanter of post-hysterectomised group compared to natural menopausal women.¹⁸

In the present study, in 66 patients 30 were hysterectomised and 36 were non-hysterectomised. We found osteoporosis in 24 out of 30 patients who got hysterectomised (80%) whereas 14 out of 36 patients had osteoporosis in non-hysterectomised group (38.88%). Thus, stating that osteoporosis is significantly more common after hysterectomy with a significant p value of 0.001.

Parity is considered inversely proportional to BMD as pregnancy and lactation are associated with changes in calcium homeostasis which in turn leads to decreased BMD and osteoporosis. On the contrary, some authors presume that there is higher absorption of calcium in pregnancy as a result of higher Vitamin D levels, parathyroid hormone and estrogen levels thus increasing the bone density.

In the present study the mean parity in hysterectomised group was 3.60 with a SD of ± 1.40 whereas in non-hysterectomised group was 3.22 ± 1.12 which is comparable as there was no significant difference in parity in both groups with a p value of 0.229. Similarly, live births and abortions were also comparable as there

was no significant difference in both groups with a p value of 0.079 and 0.276 respectively.

In the present study we found that with increasing parity occurrence of osteoporosis increases as shown in Table 2 with p value of 0.003 for DEXA T and p value of 0.0003 for DEXA Z score. Present results are consistent with other studies and literature.

BMI is a representative of total body fat. Several studies state the relation between BMI and BMD and demonstrate that body weight and adipose tissue may influence BMD as higher BMI means overweight individual and more adipose tissue. Adipose tissue is considered to synthesize leptins that are associated with osteoblasts which stimulate mineralization bone mass. Also, there is production of estrone as a result of peripheral conversion of adrenally derived androstenedione by aromatization in fat. Thus, stating that higher BMI results in higher BMD. Sukumar et al. in 2010, Meiyanti in 2010 found a positive correlation between BMI and BMD.

Cavkaytar S et al in their study found that patients who had BMI over 32 kg/m² had a statistically significant protective effect against osteoporosis.¹⁹ They found that higher the BMI, higher was the BMD.

In a study by Heidari B et al at Amirkola Health and Ageing Project (AHAP) including 537 postmenopausal women, it was seen that overweight women who had BMI of 25-30 kg/m² showed a significant decrease in occurrence of osteoporosis and osteopenia.²⁰

Present results are consistent with other studies and literature as BMD in our patients is higher with higher BMI with a significant p value of 0.001 for DEXA T value and p value of 0.012 for DEXA Z value as shown in Table 8. Thus, stating that higher BMI may have a protective effect against osteoporosis or osteopenia.

CONCLUSION

The salient features of this study are

- Higher BMI had a positive relationship with BMD suggesting that obesity has a protective effect against osteoporosis and osteopenia
- BMD was directly dependent on parity. With increasing parity, more occurrence of osteoporosis was seen
- There was significant positive relationship between BMD and history of hysterectomy. Thus, hysterectomy was found to increase the incidence of osteoporosis.
- There was positive correlation between menopause and occurrence of osteoporosis.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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