

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20211493>

Original Research Article

Bone health after menopause: effect of surgical menopause on bone mineral density and osteoporosis

Kavitha Lakshmanan^{1*}, M. G. Dhanalakshmi², Anand Ganesan³, Sindhura Myneni⁴

¹Department of Obstetrics and Gynecology, Chettinad Hospital and Research Institute, Chennai, Tamil Nadu, India

²Department of Obstetrics and Gynaecology, Sri Ramachandra Medical College, Chennai, Tamil Nadu, India

³Omandurar Multi Superspeciality Hospital, Chennai, Tamil Nadu, India

⁴Department of Obstetrics and Gynaecology, Panimalar Medical College Hospital and Research Institute, Chennai, Tamil Nadu, India

Received: 05 April 2021

Revised: 16 April 2021

Accepted: 17 April 2021

***Correspondence:**

Dr. Sindhura Myneni,

E-mail: sindhuramyneni15@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Natural menopause or surgical menopause is associated with endocrinological changes and alteration in bone and mineral metabolism. Hence this study was conducted to assess the bone mineral density changes in women with surgical menopause.

Methods: This is a prospective observational study conducted in the department of obstetrics and gynaecology at Sri Ramachandra medical college, which is a tertiary care teaching hospital. 60 women with surgical menopause were included in the study. BMD was assessed by dual energy X-ray absorptiometry at the lumbar spine and hip joint. All the data was entered in Microsoft excel spread sheet and analysed by using SPSS software.

Results: Among 60 study subjects, 41 individuals had a normal BMD, 16 had osteopenia, and 3 were diagnosed with osteoporosis. Osteopenia and osteoporosis is significantly higher in patients who had undergone hysterectomy with removal of ovaries. Observations of osteopenia and osteoporosis were significantly higher with increasing number of years post hysterectomy.

Conclusions: Prevalence of osteoporosis is high in patients who undergo hysterectomy. Oophorectomy is associated with postoperative bone loss. Targeted management strategies should include routine BMD assessment and hormone therapy improves management of bone health in this population. Further more studies are needed in large populations to test alternative treatments for post oophorectomy osteoporosis.

Keywords: Osteoporosis, Osteopenia, Hysterectomy, Bone mineral density, DEXA

INTRODUCTION

Osteoporosis is a common health problem affecting postmenopausal women which leads to increased susceptibility to fractures.¹ The prevalence rate of osteoporosis increases with age leading to morbidity and markedly affecting the quality of life in postmenopausal women.² Postmenopausal osteoporosis usually occurs within 5-10 years of menopause, which became a

challenge in this group.³ Natural menopause or surgical menopause is associated with endocrinological changes and alteration in bone and mineral metabolism.⁴ Due to menopause the ovarian follicles loses their function resulting in decreased production of estradiol and other hormones. This leads to formation of more osteoclasts which enhances bone resorption that leads to loss of bone mineral density destroying the architecture which results in osteoporosis.⁵ In surgical menopause decreased

estrogen is secondary to the total loss of ovarian function where as in natural menopause it is secondary to multifactorial phenomenon.⁶ The blood supply to the ovaries are affected after hysterectomy, thus the women who have surgical menopause have early changes in their endocrinological status. The onset of endocrinological changes after surgical menopause is very sudden unlike natural menopause.⁷

Gold standard in the diagnosis of osteoporosis is dual X-ray absorptiometry (DEXA) which can assess the mineral content of the whole skeleton as well as the sites which are vulnerable to fragility fractures. DEXA is a non-invasive painless method of assessing the bone strength which involves radiation exposure that amounts to 10% of an X-ray.^{8,9} Based on the WHO criteria, a T-score >-1 is normal, while T-scores <-1 to >-2.5 indicate osteopenia, and T-scores <-2.5 are diagnostic for osteoporosis.¹⁰

Very few studies were reported in the literature review to see the endocrinological changes associated with surgical menopause on bone mineral density. Hence, present study was conducted to assess the bone mineral density changes in women with surgical menopause.

METHODS

Study design, location, population and duration

Current study was a prospective observational study conducted at the department of obstetrics and gynaecology in Sri Ramachandra medical college, which is a tertiary care teaching hospital. 60 women with surgical menopause were included in the study conducted from July 2009 to July 2011.

Inclusion criteria

An inclusion criterion for current study was patients who had surgical menopause.

Exclusion criteria

Exclusion criteria for current study were; pre existing atraumatic fracture, secondary osteoporosis, chronic illness, patients on drugs which affects bone mass like diuretics, anticonvulsants, barbiturates.

Study outcomes

Demographic and surgical details of 60 women who had surgical menopause were collected and divided in to two groups based on ovarian conservation. BMD was assessed by dual energy X-ray absorptiometry at the lumbar spine and hip joint. The results were interpreted using WHO T-score criteria, a T-score >-1 is normal, while T-scores <-1 to >-2.5 indicate osteopenia, and T-scores <-2.5 are diagnostic for osteoporosis. Informed written consent was obtained from all the participants. The purpose of the study was explained clearly to the

study participants. Confidentiality of the study participants was maintained throughout the study

Data entry and analysis

All the data was collected and entered in MS excel sheet and analysis was done by using SPSS software.

RESULTS

Demographic data of current study population is exhibited in (Table 1). Among 60 study subjects, 41 individuals had a normal BMD, 16 had osteopenia, and 3 were diagnosed with osteoporosis (Figure 1). Out of 60 cases, ovarian conservation was done in 30 cases and removal in 30 cases. The occurrence of osteopenia and osteoporosis is significantly higher in patients who had undergone hysterectomy with removal of ovaries (Figure 2). For BMD changes in respect to ovarian conservation p value was found to be statistically significant ($p=0.043$). The observations of osteopenia and osteoporosis were significantly higher with increasing number of years post hysterectomy (Table 2). For bone mineral changes according to time elapsed since hysterectomy, the p value was statistically significant ($p=0.022$).

Table 1: Showing demographic data of patients.

Age (years)	N
40-50	18
51	40
>60	2

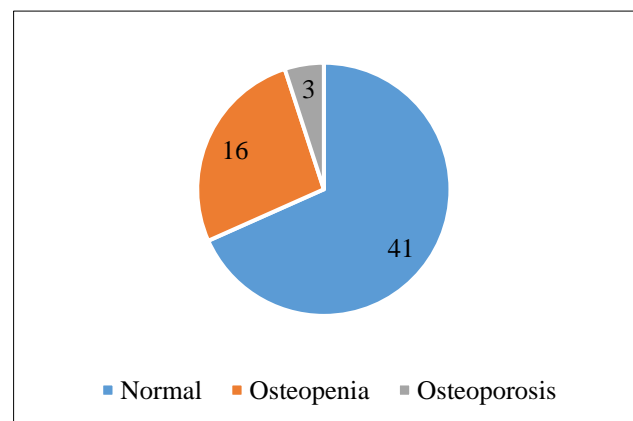


Figure 1: BMD changes in surgical menopause.

DISCUSSION

With increase in geriatric population and rise in incidence of hysterectomy osteoporosis is the commonest problem encountered. Premenopausal hysterectomy is associated with decreased ovarian reserve, follicular atresia, and subsequently reduced long term estrogen secretion. Women who undergo hysterectomy will have greater gradual bone mineral loss than women with an intact uterus and have an increased risk of osteoporosis.¹¹

Moreover hysterectomy along with bilateral oophorectomy results in earlier occurrence of osteoporosis when compared to ovarian conservation.¹²

Table 2: BMD changes according to time lapsed since hysterectomy.

Time elapsed (years)	Hysterectomy without ovarian conservation			Hysterectomy with ovarian conservation		
	BMD Impression			BMD Impression		
	Osteopenia N (%)	Osteoporosis N (%)	Normal N (%)	Osteopenia N (%)	Osteoporosis N (%)	Normal N (%)
1-5	6 (40)	0 (0)	9 (60)	1 (5.3)	0 (0)	18 (94.7)
6-10	5 (38.5)	1 (7.7)	7 (53.8)	2 (22.2)	0 (0)	7 (77.8)
11-15	1 (50)	1 (50)	0 (0)	1 (50)	1 (50)	0 (0)

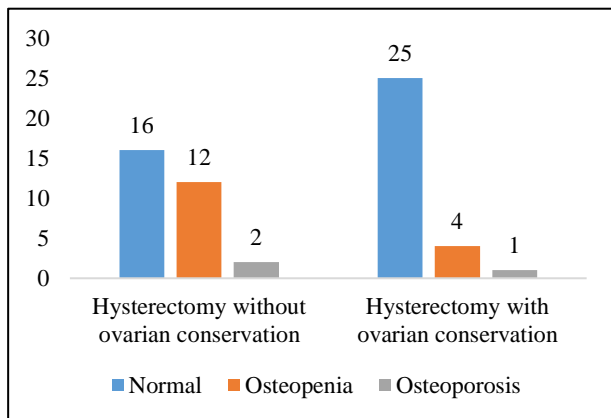


Figure 2: Distribution of BMD changes in respect to ovarian conservation.

Literature review showed the prevalence of osteoporosis ranging from 4.9% to 23.3%.^{13,14} Numerous factors like age, nutritional status, duration of menopause, BMI, number of pregnancies have been reported to be the cause of osteoporosis. Maximum number of osteopenic and osteoporotic were in post-menopausal period. As age advances, the incidence of osteopenia and osteoporosis increases with increase in osteoporotic fractures. This may be due to an increased imbalance between bone resorption and formation with aging, which is an important cause of osteoporosis in elderly.¹⁵

In present study it was observed that the occurrence of osteopenia and osteoporosis is significantly higher in patients who had undergone hysterectomy which is similar to various studies.^{11,15-17} In contrast to this Kritz-Silverstein et al found no effect of hysterectomy on BMD.¹⁸ Present study showed osteopenia and osteoporosis is significantly higher in patients who had undergone hysterectomy with removal of ovaries.^{12,16} Oophorectomy should be considered as an individual basis given a women's unique risk of ovarian cancer. The fear of possible negative consequences should not overshadow the benefits of this prophylactic procedure. In Addition to this, age at hysterectomy should also be considered in the decision to proceed with oophorectomy.

Osteopenia and osteoporosis was significantly higher with increasing number of years post hysterectomy which is in comparison with previous studies.¹⁹⁻²¹ The bone 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.¹⁵ The above results clearly showed that premenopausal women undergoing hysterectomy experience bone loss and especially in women who undergo oophorectomy. This requires attention and active management with hormone replacement therapy which includes estrogen alone or in combination with progestin slows bone turnover and increases BMD and thereby reduces fracture risk.

Limitations

Present study has few limitations; study includes only smaller sample size, secondly data regarding hormone replacement therapy was not included. Subjects were relatively healthy postmenopausal women, and none of them had a history of smoking, alcohol or caffeine consumption, treatment with glucocorticoid drugs, etc. Women with any one of these factors are likely to have a higher risk of osteoporosis, and may require screening for osteoporosis at an earlier age.

CONCLUSION

Prevalence of osteoporosis is high in patients who undergo hysterectomy. Oophorectomy is associated with postoperative bone loss. Targeted management strategies should include routine BMD assessment and hormone therapy improves management of bone health in this population. Further more studies should be conducted in large populations to test alternative treatments for post oophorectomy osteoporosis.

Funding: No funding sources

Conflict of interest: None declared

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

REFERENCES

1. Lane NE. Epidemiology, etiology and diagnosis of osteoporosis. *Am J Obstet Gynecol.* 2006;194:S3-11.
2. Mazziotti G, Bilezikian J, Canalis E, Cocchi D, Giustina A. New understanding and treatments for osteoporosis. *Endocrine.* 2012;41:58-69.
3. Pinheiro MM, Reis Neto ET, Machado FS, Omura F, Yang JH, Szejnfeld J, et al. Risk factors for osteoporotic fractures and low bone density in pre and postmenopausal women. *Rev Saude Publica.* 2010;44:479-85.
4. John N, Morgan BD. The loss of bone with age; osteoporosis and fractures. *Clin Ortho.* 1970;71:229-32.
5. Deepthi SK, Amar G, Naryan R, Naidu JN. Study of biochemical bone turnover markers in postmenopausal women leading to osteoporosis. *Int J Appl Bio Pharmaceut Technol.* 2012;3:301-05.
6. Yildiz A, Sahin I, Gol K, Taner Z, Ulutiirk A. Bone loss rate in the lumbar spine: a comparison between natural and surgically induced menopause. *Int J Gynecol Obstet.* 1996;55:151-9.
7. Kumari P, Rao R, Dhiman B. Comparison of serum mineral levels in perimenopausal women with surgical menopausal women: Analytical cross sectional study. *Int J Clin Obstet Gynecol.* 2020;4(4):324-6.
8. Marshall D, Johnell O, Wedel H. Meta-analysis of how well measures of bone mineral density predict occurrence of osteoporotic fractures. *BMJ.* 1996; 312(7041):1254-9.
9. Kanis JA. Assessment of fracture risk and its application to screening for postmenopausal osteoporosis: synopsis of a WHO report. WHO Study Group. *Osteoporos Int.* 1994;4(6):368-81.
10. Tuzun S, Eskiuyurt N, Akarirmak U, Saridogan M, Senocak M, et al. Incidence of hip fracture and prevalence of osteoporosis in Turkey: the FRACTURK study. *Osteoporos Int.* 2012;23:949-55.
11. Simoes R. Effects of simple hysterectomy on bone loss. *J Sao Paulo Medical.* 1995;113(6):1012-6.
12. Erekson E, Martin D, Ratner E. Oophorectomy: the debate between ovarian conservation and elective oophorectomy. *Menopause.* 2013;20(1):110-4.
13. Limpaphayom KK, Taechakraichana N, Jaisamrarn U, Bunyavejchevin S, Chaikittisilpa S, Poshyachinda M, et al. Prevalence of osteopenia and osteoporosis in Thai women. *Menopause.* 2001;8(1):65-9.
14. Haussler B, Gothe H, Göl D, Glaeske G, Pientka L, Felsenberg D. Epidemiology, treatment and costs of osteoporosis in Germany-the Bone EVA Study. *Osteoporosis Int.* 2007;18(1):77-84.
15. Gopinath VR, Johnson P, Kumar AP, Pratibha M, Subhashini AS, Menon G. Prevalence of osteoporosis and evaluation of its risk factors in surgical and natural postmenopausal women: a pilot study. *Sri Ramachandra J Med.* 2010;3(1):9-13.
16. Klaus SV. Bone loss in premenopausal women: results of a prospective observational study over 9 years. *Climacteric.* 2002;15(5):433-40.
17. Cheng S, Sievänen H, Heinonen A, Uusi-Rasi K, Carbone L, Tylavsky F, et al. Does hysterectomy with ovarian conservation affect bone metabolism and density?. *J Bone Mineral Metabol.* 2003;21(1): 12-6.
18. Kritz-Silverstein D, Mühlen DGV, Barrett-Connor E. Hysterectomy and oophorectomy are unrelated to bone loss in older women. *Maturitas.* 2004;47(1):61-9.
19. Shamim S, Lal M, Shamim R. Prevalence of osteoporosis in hysterectomized as compared to non-hysterectomized women in 7th decade of life. *Int J Reprod Contracept Obstet Gynecol.* 2015;7(5):1975.
20. Surangtip S, Sakondhavat C, Soontrapa S, Kaewrudee S, Somboonporn W. Prevalence of osteoporosis in postmenopausal women at Srinagarind Hospital, Khon Kaen University. *Thai J Obstet Gynaecol.* 2010;26-34.
21. Agarwal SC, Dumitriu M, Tomlinson GA, Grynbas MD. Medieval trabecular bone architecture: the influence of age, sex, and lifestyle. *Am J Anthropol.* 2004;124(1):33-44.

Cite this article as: Lakshmanan K, Dhanalakshmi MG, Ganesan A, Myneni M. Bone health after menopause: effect of surgical menopause on bone mineral density and osteoporosis. *Int J Reprod Contracept Obstet Gynecol* 2021;10:1820-3.