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Changing Lifestyle to Reduce the Risk Factors of Osteopenia in Menopause Iranian Women

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Abstract

Background: This study found a way to change the lifestyle and reduced the risk factors of osteopenia in menopause Iranian women.
Methods: A cross-sectional study was designed in order to enroll 50 years or older asymptomatic women, who referred to the Imam Hossein medical center, Tehran, Iran for outpatient screening from 2013 up to 2015. A questionnaire including forty-one risk factors was completed and bone mass densitometry (BMD) was done by the DXA method. Bone density of femur and lumbar spine according to standard curves was calculated for each person and was recorded in the questionnaire as a study outcome. Data were analyzed using SPSS 17 software. Significant level was set at 0.05.
Results: In the present study, 317 cases participated who had mean age of 52.46 years old. BMD revealed 237 (75%) osteopenia or osteoporosis prevalence. Age, menopause age and BMI related to the study outcomes significantly. Cost of each osteoporosis-osteopenia case in 50 years old or older women was 59 Dollars. Osteoporosis-osteopenia was significantly related to age (Pvalue = 0.001) and menopause age (Pvalue = 0.003).
Conclusions: It is reasonable that 75% osteopenia-osteoporosis will be found by BMD screening in 50 years or older Iranian women, especially if BMI be low and in the early menopause age.

Keywords: Osteopenia, Lifestyle, Menopause, Women.
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Introduction

Osteoporosis is considered as a common disease which is characterized by low bone mass, micro-architectural disruption, and skeletal fragility, and therefore results in an increased risk of fracture. People with a low bone mass or osteopenia (T-score between -1 and -2.5) were categorized as osteopenia.[1-4] Osteoporosis and fracture risk could be prevented by early detection of osteopenia. Postmenopausal osteoporosis increases morbidity and mortality. The major importance of detecting osteopenia is that osteoporosis could be prevented.[5]

As the population is becoming older, the risk of fractures is increasing and it is worth mentioning that, these fractures occur in different sites based on personal characteristics of each person. In the United States alone, there was a 17$ billion cost of osteoporosis-related fractures in 2005 and it has shown a

growing pattern which highlights the importance of establishing appropriate prevention and treatment.[6]

The prevalence of osteoporosis is increased by age up to 23% between 50 to 80 years old women that show the importance of screening in the elderly. In Italy, there are 90000/year cases of hip fractures among 50 years or older women. It is notable that four-fifths of overall hip fractures occur in women and one-fifths among men is followed by complications, which result in substantial morbidity and mortality.[7]

Densitometry is the gold standard test for screening osteoporosis but is not appropriate for the general population due to its cost and poor availability. In the present time, densitometry is generally recommended for postmenopausal women with age range between 65 years or older or younger adults with risk factors.[8]

Due to limitations of resources, cost of BMD test, diversity of races and thus the differences in local results, the appropriate time for BMD screening should be studied. Osteopenia besides other above-mentioned risk factors predicts future osteoporosis and bone fracture. This study found out main clinical risk factors and protective characteristics of osteopenia in Iran are as an important precursor of osteoporosis which might slow down lifestyle change. In this regard, the appropriate time of the BMD test to detect osteopenia-osteoporosis can be clarified in the Iranian women.

Materials and Methods

This cross-sectional study was conducted in an outpatient-screening clinic at Imam Hossein medical center, Shahid Beheshti university of medical sciences from 2013 up to 2015. Asymptomatic menopausal among 50 years or older women, has been presented for outpatient screening referred by a charity organization enrolled in the study. Patients, who are unwilling or unable to participate in the study, were excluded. If known disease is related to osteoporosis or drug consumption existed, the case remained in the study and the disease mentioned.

A trained paramedical person filled the questionnaire including 41 demographic and clinical risk factors of bone loss such as: age, level of education, body mass index, menopausal age, parity, nursing, activity level and its type, smoking (active and passive), family history of osteoporosis, history of bone fracture, history of bilateral oophorectomy, history of calcium–vitamin D and dairy product consumption, drug history of thyroid hormone, corticosteroids and hormone replacement

therapy, history of infertility, oligo menorrhea, thyroid or other metabolic disease.

In the next step, the screening test for the bone mass densitometry (BMD) was done by the DXA method and a common instrument in Imam Hossein medical center. Bone density of femur and lumbar spine according to standard curves was calculated for each person and was recorded in the questionnaire.

A BMD criterion of osteopenia was T score between -1 and -2.5 and osteoporosis was below -2.5.

Statistical analyses were done using the program SSPS version 17.0 (SPSS, Inc., Chicago, IL, USA). In the first step, univariate analysis clarified effective factors in osteopenia or osteoporosis. It was the probability of positive case finding which was estimated according to age and above-mentioned parameters using classification and regression tree (CART) model. CART uses recursive partitioning to search systematically for the best variable out of all possible predictors such a way that, at each stage the variable is determined (and its associated cut-point) which is the best subdivides of the data (in terms of optimizing homogeneity). Cross validations were then used to evaluate how many such divisions to adopt.

The results were expressed as a mean ± standard deviation (SD), and/or number (Percent). Pvalues of less than 0.05 considered statistically significant.

In 2013, this study followed the principles of the Declaration of Helsinki approved by the ethics committee of Shahid Beheshti university of medical sciences, Tehran, Iran. All information about the subjects was kept fully confidential, and all information will be released as a group without the participants' name. Study participants did not incur any costs and the study protocol did not have any harm to participants. Written informed consent was obtained from volunteers and details and purpose of the study were disclosed.

Results

317 menopause cases participated in the present study. Mean age of the study population was 55.23 ± 5.70 years old. In these 317 asymptomatic 50 years or older women, BMD revealed 237 osteopenia or osteoporosis prevalence (75%) and 80 healthy cases (25%) in both lumbar spine and femur regions. Osteoporosis-osteopenia was significantly related to age (Pvalue = 0.001) and menopause age (Pvalue = 0.003), but the Pvalue of BMI was less than 0.001.

Cost of each BMD test in a public setting, by the change of local currency to Dollars, equaled to 44 Dollars. In this regard, the cost of each osteoporosis-osteopenia case finding in 50 years or older women was 59 Dollars. In the prediction of osteoporosis – osteopenia, figure 1 shows the decision tree. According to findings presented in figure 1, in different clinical settings including age, menopause age, and BMI, positive BMD test probability and cost of each case finding have been presented in table 1.
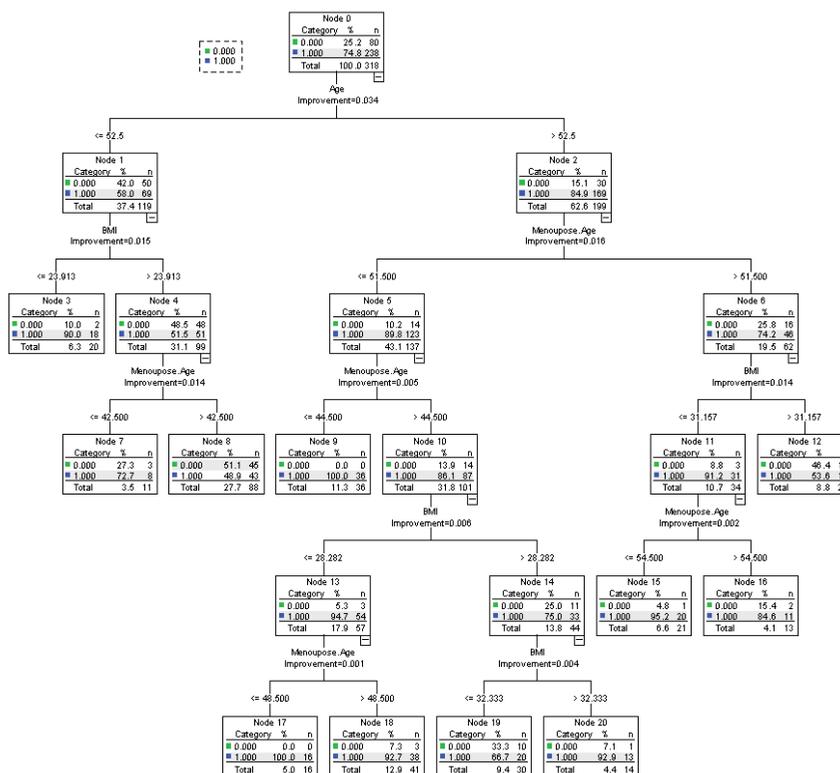

Figure 1. Shows the decision tree of osteoporosis-osteopenia based on 5 effective factors in 50 years or older women (0 represents normal cases and 1 represents osteoporosis-osteopenia cases in the tree)

Table 1. Shows the cost and the probability of osteoporosis-osteopenia case finding according to clinical factors

Age	Menopause age	BMI	Probability (%)	Cost of each case finding (Dollars)
>52.5			84.9	51.82
50-52.5			58.0	75.85
>52.5	After 51.5		74.2	59.29
>52.5	Before 51.5		89.8	48.99
>52.5	44.5-51.5		86.1	51.10
>52.5	Before 44.5		100.0	44.00
50-52.5		>23.90	51.5	85.43
50-52.5		<23.90	90.0	48.88
>52.5	44.5-51.5	>28.28	75.0	55.66
>52.5	44.5-51.5	<28.28	94.7	46.46
>52.5	44.5-51.5	28.28-32.33	66.7	65.96
>52.5	44.5-51.5	>32.33	92.9	47.36
>52.5	After 51.5	>31.15	53.6	82.08
>52.5	After 51.5	<31.15	91.2	48.24
>52.5	After 54.5	<31.15	84.6	52.00
>52.5	51.5-54.5	<31.15	95.2	46.21
>52.5	44.5-48.5	<28.28	100.0	44.00
>52.5	48.5-51.5	<28.28	92.7	47.46
50-52.5	After 42.5	>23.90	48.9	89.97
50-52.5	Before 42.5	>23.90	72.7	60.52

Discussion

In the present study, age was a significant risk factor of osteopenia and menopause age and BMI were protective factors. In the study of (Arab et al.,) the appropriate age of BMD screening was 56.5 years old.[9] Another study revealed BMI cutoff equal to 31.8 as the threshold of BMD study.[10] (Schousboe et al.,) evaluated body weight threshold of BMD screening in the age group of 55-65 women in their study. Due to the higher prevalence of osteoporosis in low weight women, BMD test in thin women is more cost-effective. In this study, adjusting age and weight for cost-effective BMD screening was 55 years old less than 74 kg, 65 years old less than 90 kg and 80 years old less than 100 kg. In this study for the Osteoporosis Self-Assessment Tool (OST), age and weight were the only selected factors to estimate osteopenia-osteoporosis probability.[11] Studies show that about 50% of postmenopausal women may have fractures related to osteoporosis, so that's why early diagnosis of osteoporosis can reduce the cost and burden of disease in the society. It is crucial for a screening test to be cost-effective furthermore, it is important to determine at what age a screening test should be applied.[12]

Results of the decision tree in the present study (figure1 and table 1) have combined age and effective risk factors such as menopausal age, and BMI to determine case finding the probability. Studies revealed 55% prevalence of osteopenia-osteoporosis in 50 years or older women in the United States.[13] In the present study about Iranian women, we found osteopenia-osteoporosis in 75% of the studied female population. High prevalence of osteopenia-osteoporosis in our study indicates probable different risk factors such as less sunshine exposure, less exercise, and daily activity, Caucasian race and less vitamin D usage. Regarding the role of race in osteopenia-osteoporosis and bone fracture, in Asia, comparison of lifetime risk of fracture in 50 years or older women in different countries revealed 2.4% in China, 11.4% in Greece and 1% in Turkey. These discrepancies even in neighboring countries are considerable.[14]

In the present study, as it was mentioned before, 75% of osteopenia-osteoporosis cases were found in BMD study of 50 years or older women. Cost of each osteopenia case finding was 44 dollars, which is cost-effective with consideration of available preventive modalities. That is, a BMD test might be a cost-effective test in all women more than 50 years old. In the budget shortage of health system, table 1 would help in decision-making.

Among prevention of disease in elderly, osteoporosis prevention in postmenopausal women results in a definite reduction of the bone fracture. Physical activity programs in old age, target osteoporosis, and bone fracture.[15] In Spain, there is a low risk of osteoporosis for people; so, a different lifestyle and special attention of Spanish medical practitioners to osteoporosis prevention are the main reasons for low risk of osteoporosis[5]. According to the findings of the present study, combination of age and risk factors such as menopause age and BMI, predict osteoporosis probability to be sometimes equal to 100%.

In conclusion, it seems reasonable to recommend BMD testing in 50 years or older Iranian women with a probable 75% risk of osteopenia-osteoporosis, which each osteopenia case finding the cost, is 44 Dollars and this finding might prevent osteoporosis. Osteoporosis is not the sole cause of fracture but contributes to its risk. Every person with a history of fragility fracture, low BMI or use of corticosteroids should undergo screening for osteoporosis by BMD test and treatment is advised, if the result is below of certain threshold.[16]

This study was done in Tehran and relatively low socioeconomic population. If this study was designed in a broader geographic region, for instance in multi-centers and different cities, a generalization of results was more possible. The lack of a large sample size of the population could be mentioned as another potential limitation.

In 50 years or older women, BMD revealed 75% osteopenia-osteoporosis. In the present study, age, BMI, and menopausal age, are predictive of osteopenia, osteoporosis and increased rate of fracture and its complications. Because of the higher prevalence of osteopenia-osteoporosis in certain races, including Caucasians, this is cost-effective to apply BMD screening in 50 years or older Iranian women to prevent further

complications. According to this study, it is possible to modify the age at which the screening should take place based on each region's resources, facilities, women's BMI and menopausal age.

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Conflict of Interest

The author declares that she has no conflicting interest.

References

1. Ballane G, Cauley JA, Luckey MM, El-Hajj Fuleihan G. Worldwide prevalence and incidence of osteoporotic vertebral fractures. Osteoporos Int 2017;28:1531-42. doi:10.1007/s00198-017-3909-3

2. Cummings SR, Nevitt MC, Browner WS, Stone K, Fox KM, Ensrud KE, et al. Risk factors for hip fracture in white women. Study of osteoporotic fractures research group. N Engl J Med 1995;332:767-73. doi:10.1056/NEJM199503233321202

3. Johansson H, Oden A, Johnell O, Jonsson B, de Laet C, Oglesby A, et al. Optimization of BMD measurements to identify high risk groups for treatment--a test analysis. Journal of bone and mineral research. J Bone Miner Res 2004;19:906-13. doi:10.1359/jbmr.2004.19.6.906

4. Kanis JA, Oden A, McCloskey EV, Johansson H, Wahl DA, Cooper C, et al. A systematic review of hip fracture incidence and probability of fracture worldwide. Osteoporos Int 2012;23:2239-56. doi:10.1007/s00198-012-1964-3

5. Mendoza N, Sanchez-Borrego R, Villero J, Baro F, Calaf J, Cancelo MJ, et al. 2013 Up-date of the consensus statement of the Spanish menopause society on postmenopausal osteoporosis. Maturitas 2013;76:99-107. doi:10.1016/j.maturitas.2013.05.021

6. Burge R, Dawson-Hughes B, Solomon DH, Wong JB, King A, Tosteson A. Incidence and economic burden of osteoporosis-related fractures in the United States, 2005-2025. J Bone Miner Res 2007;22:465-75. doi:10.1359/jbmr.061113

7. Cianferotti L, Brandi ML. Guidance for the diagnosis, prevention and therapy of osteoporosis in Italy. Clin Cases Miner Bone Metab 2012;9:170-8.

8. Mueller D, Gandjour A. Cost-effectiveness of using clinical risk factors with and without DXA for osteoporosis screening in postmenopausal women. Value Health 2009;12:1106-17. doi:10.1111/j.1524-4733.2009.00577.x

9. Arab MHS, Jamshidi L, Yaseri M. Appropriate age of Iranian menopausal women for bone mass densitometry testing. Australian Journal of Basic and Applied Sciences 2011;5:2106-8.

10. Arab M, Hojjatoleslami S, Jamshidi L, Yaseri M, Maktabi M, Sheibani K. Impact of body mass index on bone density of menopausal women in Hamadan province, Iran. Australian Journal of Basic and Applied Sciences 2012;6:136-9.

11. Schousboe JT, Gourlay M, Fink HA, Taylor BC, Orwoll ES, Barrett-Connor E, et al. Cost-effectiveness of bone densitometry among Caucasian women and men without a prior fracture according to age and body weight. Osteoporos Int 2013;24:163-77. doi:10.1007/s00198-012-1936-7

12. Nayak S, Roberts MS, Greenspan SL. Cost-effectiveness of different screening strategies for osteoporosis in postmenopausal women. Ann Intern Med 2011;155:751-61. doi:10.7326/0003-4819-155-11-201112060-00007

13. Johnell O, Kanis JA. An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. Osteoporos Int 2006;17:1726-33. doi:10.1007/s00198-006-0172-4

14. Cauley JA. Defining ethnic and racial differences in osteoporosis and fragility fractures. Clin Orthop Relat Res 2011;469:1891-9. doi:10.1007/s11999-011-1863-5

15. Kemmler W, Kohl M, von Stengel S. Long-term effects of exercise in postmenopausal women: 16-year results of the Erlangen fitness and osteoporosis prevention study (EFOPS). Menopause 2017;24:45-51. doi:10.1097/GME.0000000000000720

16. Kanis JA, Borgstrom F, De Laet C, Johansson H, Johnell O, Jonsson B, et al. Assessment of fracture risk. Osteoporos Int 2005;16:581-9. doi:10.1007/s00198-004-1780-5