Original Article

EVALUATION OF RISK FACTORS IN PROGRESSION OF OSTEOPOROSIS AMONG POSTMENOPAUSAL WOMEN IN KARACHI, PAKISTAN

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ABSTRACT:

INTRODUCTION: Osteoporosis is a serious issue and fragility bone fracture in postmenopausal age is often the first sign. The limited availability of resources and aging population in developing countries causes the big challenge for osteoporosis. Even though disease can affect men and women of all races but Asian women especially older women who are post menopause are at highest risk.

OBJECTIVE: The main objective and aim of prospective, analytical cross sectional study to evaluate the association and magnitude of risk factors in progression of osteoporotic fractures in women of Karachi those who crossed the age of menopause, these risk factors includes; lack of exercise, vitamin D deficiency, weight loss, advancing age, smoking and others.

DURATION OF STUDY: The study was conducted during September 2015 - December 2015.

SUBJECTS AND METHODS: Data has been collected from 100 postmenopausal women from different state owned hospitals. Data was analyzed through SPSS 19 by using logistic regression, Z-score and Test of proportion.

RESULTS AND CONCLUSIONS: Among 100 participants, the mean age was 51 years (Age range was from 40-70 years). The results suggest that the most contributing and significant risk factors for Osteoporosis among postmenopausal women of Karachi are lack of exercise 89% ($p< 0.05$, significant as per t-Test), vitamin D deficiency 60% ($p< 0.05$, significant as per t-Test) and weight loss 58% ($p< 0.05$, significant as per t-Test). Logistic regression analysis determined that advancing age ($p=0.008$), family history of fracture ($p=0.045$), corticosteroids use ($p=0.043$) and eating disorder ($p=0.03$) are strongly related to Osteoporotic fracture.

KEY WORDS: Osteoporosis, risk factors, fractures, postmenopausal women, logistic regression

INTRODUCTION:

Osteoporosis is characterized as porous and fragile bones, requires medical management as bones become brittle and weak so low trauma fractures are common. It is believed that there is imbalance between osteoblastic and osteoclastic activity. International osteoporosis foundation provided statistics and mentioned that among 3 women 1 will have osteoporotic fracture while among 5 men one will have osteoporotic fracture as age leads to changes in bone mass. Moreover, estimation says that osteoporotic fracture occurs every 3 seconds. Osteoporosis causes more than 8.9 million fractures annually worldwide [1]. The limited availability of resources and aging population in developing

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countries causes the big challenge for osteoporosis. Another important risk factor which must be counted is ethnic group[2]. Number of fractures in postmenopausal women and senile age of men are best way to estimate the incidences while prevalence can be determined deformity of vertebrae as well as measurement of Bone Mineral Density [3]. Since there is no outward science of osteoporosis developing, diagnostic testing depending on age and other risk factors of the disease is recommended [4]. It has been observed that the risk of osteoporotic fracture is much higher in those who have more number of risk factors [5].

Two types of risk factors are associated with Osteoporosis - fixed and modifiable. Fixed risk factors include: age, ethnicity, female gender, menopause, hysterectomy, and fractures due to mild trauma, family history of osteoporosis, long term corticosteroid therapy and Rheumatoid arthritis [6-9]. Modifiable risk factors include: eating disorders, poor nutrition, low calcium in diet, deficiency of vitamin D, BMI below normal, insufficient exercise, frequent falls, smoking and alcohol consumption [10,11].

The occurrence of postmenopausal osteoporotic fracture is very common in Karachi. That is why current study aims to assess the extent to which risk factor (Table – 1) like low BMI, frequent falls, physical inactivity, Rheumatoid arthritis and others are associated with the development of Osteoporosis in these women. Furthermore, literature is very limited which clearly mentioned that which risk factors have significant role in the development of osteoporosis in the postmenopausal women of Karachi.

MATERIALS AND METHODS:

This descriptive, analytical, qualitative and quantitative cross sectional study was conducted in Karachi, Pakistan during September 2015 - December 2015. The data has been collected of postmenopausal women from three large state owned hospitals of Karachi by validated questionnaire and all the questions were close ended. Design of questionnaire was in a manner to gather the qualitative and quantitative data of predisposing factors related to osteoporosis in women of Karachi those who have crossed the age of menopause. When women were recruited for an interview and data, they were informed about the aim of study and benefit for the individual and the community as a whole. Participants were ensured of complete confidentiality and consent was taken formally from these women to get their agreement to participate in the study. Keeping level of significance (∞) 0.05 with confidential interval 95%, minimum sample size was determined by precision analysis method. The final analysis of data was done on SPSS 19 software.

Table: 1

OSTEOPOROSIS RISK FACTORS
Low Body Mass Index (BMI)
Weight Loss
Personal History of osteoporotic fracture
Family History of osteoporotic fracture
Smoking
Lack of exercise
Lack of fruits and vegetables in diet
Calcium deficiency
Vitamin D deficiency
Corticostreoid medication
Rheumatoid arthritis
Frequent falls
Eating disorder
Height loss
Bone/ Joint pain

OBSERVATION AND RESULTS:

The finding of present study demonstrates the contribution of individual predisposing factors of osteoporosis in those women of Karachi who crossed the age of menopause and their significance by using test of proportion. (Figure 1)

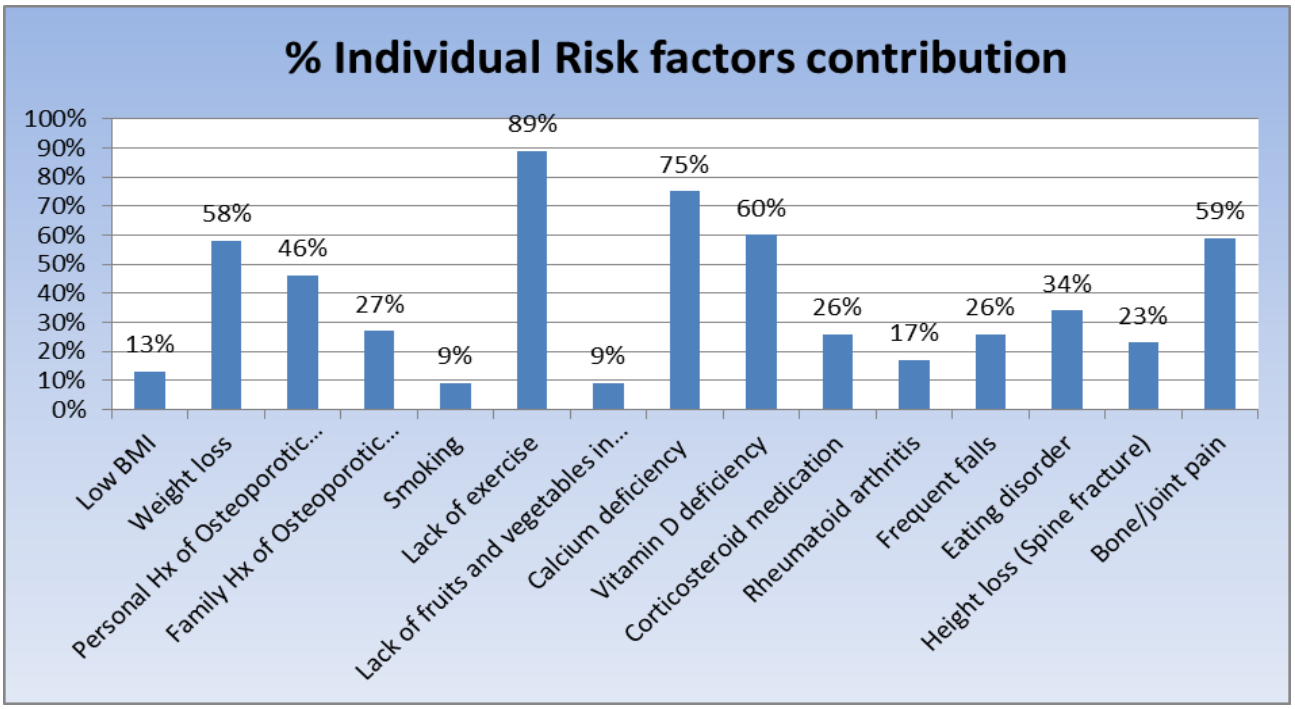

Figure 1

TABLE: 2 RISK FACTORS	% Contribution	p-Value
Low BMI	13%	>0.05
Weight loss	58%	<0.05
Personal Hx of Osteoporotic fracture	46%	<0.05
Family Hx of Osteoporotic fracture	27%	<0.05
Smoking	9%	<0.05
Lack of exercise	89%	<0.05
Lack of fruits and vegetables in diet	9%	>0.05
Calcium deficiency	75%	<0.05
Vitamin D deficiency	60%	<0.05
Corticosteroid medication	26%	<0.05
Rheumatoid arthritis	17%	>0.05
Frequent falls	26%	>0.05
Eating disorder	34%	>0.05
Height loss (Spine fracture)	23%	
Bone/joint pain	59%	

Among postmenopausal women contribution of each risk factor and there significance as per test of proportion is mentioned in Table 2:

Regression analysis determined the association between Personal histories of osteoporotic fractures with each risk factor in postmenopausal women. In general significance has been observed in advancing age

where Odds Ratio of advancing age is 1.087 times larger than other risk factors (p=0.008) for causing fracture of osteoporosis, Odd ratio of family history of fracture is 2.995 times larger than other risk factors in causing osteoporotic fracture (p=0.045), Odd ratio of corticosteroids use is 1.861 times larger than other risk factors in causing osteoporotic fracture (p=0.043) and Odd ratio of eating disorder is 3.452 times larger than other risk factors in causing osteoporotic fracture(p=0.03). Odds ratio of non-significant risk factors are low BMI 0.778 times larger than other risk factors (p=0.729), odds ratio of weight loss is 1.159 times larger than other risk factors (p=0.785), smoking is 2.124 times larger than other risk factors (p=0.408), lack of exercise is 0.471 times larger than other risk factors (p=0.328), lack of fruit and vegetables in diet is 2.855 times larger than other risk factors (p=212), calcium deficiency is 2.158 times larger than other risk factors (p=0.203), vitamin D deficiency is 0.666 times larger than other risk factors (p=0.453), rheumatoid arthritis is 0.249 times larger than other risk factors (p=0.140), frequent fall is 1.029 time larger than other risk factors (p=0.957), height loss/spine fracture is/are 1.547 times larger than other risk factors (p=0.367) and bone pain/joint pain is/are 0.286 times larger than other risk factors (p=0.231) in causing osteoporotic fracture. – Table 03

Table: 03

Dependent Variable: Personal History of Osteoporotic Fracture								
		Coefficient	S.E.	Chi Square Statistics	p-value	Odds Ratio	95% C.I.for Odds Ratio	
							Lower	Upper
Independent Variables	**Age**	0.084	0.031	7.126	**0.008**	1.087	1.023	1.156
	Low BMI	-0.250	0.723	0.120	0.729	0.778	0.189	3.209
	Weight Loss	0.148	0.543	0.074	0.785	1.159	0.400	3.359
	FHxFx*	1.097	0.560	3.843	**0.045**	2.995	1.000	8.970
	Smoking	0.753	0.910	0.685	0.408	2.124	1.157	12.641
	LoE*	-0.753	0.769	0.958	0.328	0.471	0.104	2.126
	LoFV*	1.049	0.841	1.557	0.212	2.855	0.550	14.828
	CalDef*	0.769	0.605	1.618	0.203	2.158	0.660	7.061
	VitDDef*	-0.407	0.542	0.564	0.453	0.666	0.230	1.924
	Corticosteroids	0.521	0.809	0.589	**0.043**	1.861	1.081	9.094
	RA*	-1.391	0.942	2.181	0.140	0.249	0.039	1.576
	FF*	0.028	0.520	0.003	0.957	1.029	0.371	2.853
	ED*	1.239	0.571	4.709	**0.030**	3.452	1.127	10.569
	HLSFx*	0.436	0.484	0.812	0.367	1.547	0.599	3.996
	BPJP*	-1.252	1.045	1.435	0.231	0.286	0.037	2.217
	Overall Statistics			20.929	0.048			

*FHxFx=Family History of Fracture, LoE=Lack of Exercise, LoFV=Lack of use of fruits and vegetables, CalDef=Calcium Deficiency, VitDDef=Vitamin D Deficiency, RA=Rheumatoid Arthritis, FF=Frequent falls, ED=Eating disorder, HLSFx=Height loss/spine fractures, BPJP=Bone pain/Joint pain

DISCUSSION:

Findings of current study support the reported literature. The mean age of the participants was 51 years and averagely it is an age of menopause. According to one literature among Pakistani postmenopausal women, magnitude of prevalence of osteopenia and osteoporosis is large and mainly related to those risk factors which are modifiable [12].

Current study focused the significantly contributing osteoporotic risk factors, some of which are modifiable. The risk factors can be associated with osteoporosis includes weight loss, reduced physical activity/exercise, deficiency of vitamin D and calcium, history of mild trauma fracture, smoking and long term corticosteroid use. Research identified the most contributing risk factors of osteoporosis in Karachi, Pakistan; vitamin D deficiency, weight loss and personal history of osteoporotic fracture or combination of them. Numerous researchers reported low BMI as major risk factor for the development of osteoporosis.

In the similar way, the Indian literature does not reflect actual statistics of prevalence of osteoporosis because of lack of availability of sufficient data. The one rough estimation says that osteoporosis among Indians could be greater than 61 million and females may contributes about 80% of this figure [13].

Lack of exercise is another significant cause of osteoporosis with the prevalence of 89%. Several researchers reported in their literature that Regular weight-bearing exercise such as walking, dancing, or climbing stairs can reduce the risk of osteoporosis. The world health organization recommends that at least 30 minutes moderate activity is essential for healthy life, well-being and self-esteem. Unfortunately, about 60% of population of world don't achieve exercise quota and majority in this 60% is from female gender. It is highly recommended that encourage the girls to engage in physical activities to decrease the risk of osteoporosis later in life [14].

Calcium and vitamin D deficiency are other important risk factors for osteoporosis. Calcium, vitamin D are the most imperative available dietary supplement options that have been shown to have a preventive effect on osteoporosis-attributed events. Calcium deficiency was found in 75% of postmenopausal women but interestingly, this factor was found to be non-significant as per t-Test ($p>0.05$), whereas vitamin D deficiency was found in 60% of postmenopausal women and is significant risk factor ($p<0.05$) in Karachi, Pakistan. Two main sources of vitamin D are food and sunlight. In one literature it has been reported that the deficiency of vitamin D is 56.2% among female and 15.3% among male [15]. House hold work and improper exposure to sun light might be a probable reason of vitamin D deficiency among female gender. Even if they go out most of their body is covered with clothes or Hijab. Another contributing factor for the deficiency of vitamin D may be imbalance diet and over cooked food. It is highly recommended that campaigns should be arranged for public awareness about vitamin D supplements and its importance on national level.

Another contributing significant risk factor to osteoporosis is having mild trauma fracture history which accounts around 46% in postmenopausal women. In one research, it is reported that supplementation of vitamin D and calcium may significantly reduce the risk of an osteoporosis-attributed bone fracture [16].

History of weight loss was positive in 58% of postmenopausal women. Similarly, in current study 34% of women were found to be suffering from eating disorder. Major cause of weight loss among these women is an eating disorder which is another risk factor for osteoporosis. Physiologic factors that can contribute to eating disorders are low self-esteem, feeling of inadequacy, depression, anxiety and stress [17].

Findings of current study also emphasize that development of osteoporosis may also be significantly related to mild trauma fracture and history of osteoporosis, 27% of women

had family history of mild trauma fracture which support the previous literature according to which in hip fracture patients the main risk factor was found be the history of family with osteoporosis[18]. Genetic predisposition and low bone mass are associated with osteoporosis in those women who have family history. So it is recommended that such behaviors should be adopted to prevent osteoporosis and related fractures for future life [19].

Smoking was also identified as another significant risk factor. In previous studies smoking was reported as less significant risk factor [20]. However, in some recent studies, smoking increases the prevalence of osteoporosis and it is also one of the contributing risk factor for lung cancer and coronary heart disease [21]. Nicotine and toxins in cigarette affect bone health. Huqqa is also another source of tobacco which some women use. In One reference urban community with low socioeconomic status have 52% tobacco use prevalence [22]. This increasing prevalence rate of smoking in women might be because the smoking among females neglected outright and considered as least problematic.

Long term corticosteroid use was also found to be one of the significant risk factor for osteoporosis. 26% of women had or were using either prednisone or dexamethasone for a long period. There are so many medical conditions where patients use corticosteroids more than 6 months includes; rheumatoid arthritis, skin disorders and chronic asthma. Corticosteroids interfere with bone rebuilding process. Steroids may also be available in some homeopathic medicines. It is highly recommended that steroids must be used in judiciously and patient should aware the long term consequences of its use [18].

Rheumatoid arthritis, frequent falls and lack of fruits and vegetables contributes as risk factors 17%, 26% and 9% respectively and found to be the significant with $p<0.05$.

It has been observed in current study that osteoporotic fractures in postmenopausal women are significantly associated with increase age, family history of osteoporotic fracture, use of corticosteroids and eating disorder, which might be related with deficiency of vitamin D and Calcium.

CONCLUSION:

It has been observed that osteoporosis in postmenopausal women is increasing and their incidences are growing, moreover, significance has be noted for most of the risk factors in current study. Preventive measures for risk factors and screening parameters are of paramount importance to reduce the number of cases of osteoporotic fracture and improve the quality of life. In addition, changing lifestyle could be a big step toward osteoporosis prevention. By taking all necessary preventive measure and by adopting healthy lifestyle, osteoporosis can be prevented.

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