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Original Article

Determination of Risk Factors of Osteoporosis in the Community of Post-Menopausal Age

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ABSTRACT

Osteoporosis is a major and significant health problem in old aged people and especially in female. Osteoporosis is characterized by low bone mineral density (BMD). The associated factors of osteoporosis are not well-understood in local population specifically in females. **Objective:** To determine the risk factors of osteoporosis in community of post-menopausal age. **Methods:** This cross-sectional study was conducted at H-Block Nishat Colony, Lahore Cantonment Area, Lahore during March 2020 to June 2020, the study population was post-menopausal women of age between 45 years to 65 years and women who fulfilled the inclusion criteria were recruited as sample using convenience sampling. A self-designed questionnaire was used to get demographic and diseased related factors. Chi-square ($\chi 2$) was used to measure association between disease and risk factors. **Results:** Among 200 women of post-menopausal age 61.2% were found with osteoporosis, mostly were aged between 51-54 years. There was a significant association with increasing age ($p<0.001$) Other significant factors were marital status, family history of osteoporosis, physical activity, soda intake and medication. **Conclusions:** In conclusion, this our discussion sheds light on the risk factors associated with osteoporosis within the postmenopausal community. The identified risk factors, including diminished BMD, emphasize the importance of proactive measures and targeted interventions to mitigate the consequences of osteoporosis in postmenopausal age group. Addressing these risk factors not only holds the potential to enhance the overall well-being of individuals but also contributes to a broader community-wide approach to promoting bone health.

INTRODUCTION

Osteoporosis (OP) is an advancing skeletal condition characterized by diminished bone mineral density (BMD), leading to heightened bone fragility and susceptibility to fractures in the hip, spinal vertebrae, and wrist [1]. Current research suggests a substantial prevalence of osteoporosis (OP) in this region, with rates ranging from 5.6% to 17.8% among pre-menopausal females and 25% to 49.3% in postmenopausal females. The clinical importance of OP is underscored by the fractures it induces [2]. Fractures resulting from osteoporosis, known as fragility fractures, are characterized by low trauma and occur with a force equivalent to or less than a fall from standing height. An osteoporosis-related fracture, specifically those affecting the hip and spine, serves as an autonomous indicator of subsequent fractures and is linked to heightened morbidity and mortality [3]. Primary clinical manifestations of osteoporosis (OP) encompass hip fracture, pain, physical impairment, and wrist fracture. Among these symptoms, hip fracture stands out as the most severe outcome, resulting in diminished daily activities, compromised quality of life, and an elevated risk of mortality for patients [4]. Quality of life (QOL) is affected with reliance on others and patient suffer with lack of independence in performing ADLs, nursing home

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recommendation, and increased hazard of geriatric conditions like delirium [3, 5]. Common risk factors which contribute to OP are modifiable and non-modifiable risk factors. Non-Modifiable risk factors of OP includes postmenopausal women, persons >65 years of age, white people, female gender, family history, people of Asian descent, and people with small body stature [6-8]. While modifiable risk factors include dietary intake of calcium and vitamin D, physical activity, low body mass index (BMI), undue alcohol use, and smoking [8, 9]. Osteoporosis is measured only through bone density test. The Dual Energy X-Ray Absorptiometry (DXA) scan is considered gold standard for the assessment of BMD especially of hip and spine. Other test includes peripheral dual energy x-ray absorptiometry (pDXA), quantitative ultrasound (QUS) and peripheral quantitative computed tomography (pQCT). In Pakistan, women health is a major issue with a significant increasing trend of osteoporosis. It is evident that OP is a silent health problem and a major predictor of bone fracture in elderly people especially women of age more than 60 years. The process of OP goes faster in women with menopausal transition. Various studies have been conducted in different parts of the world to answer the question why women are trapped by OP and what are the associated factors which are associated with increased risk of osteoporosis. Pakistani female population is at high risk of developing osteoporosis, because of the sedentary life style and increasing inclination of old aged population especially females.

The purpose of this study was to determine risk factors which contribute to high risk of OP in menopausal women.

METHODS

This descriptive cross-sectional study was conducted from March 2020 to June 2020 among women of post-menopausal age. Data were collected from H-Block Nishat Colony, Lahore Cantonment. A sample of 200 post-menopausal women was used to collect data. Post-Menopausal Women between age 45 to 65 were included in the study while women with age <45 years or >65 years and history of any comorbidity such as polycystic ovary syndrome, hysterectomy or infertility etc., were excluded from the study. Convenience Sampling technique was used to collect data. Sample size was calculated using following formula:

$$N=\frac{z^2}{d^2}p(1-p)$$

Z=Confidence Interval taken as 95%=1.96
P=Prevalence of osteoporosis taken as 25%=0.25
d= margin of error=0.06
N=200

A self-designed proforma was used in this study which was constructed by reviewing the literature. The main section was included general demographic characteristic (age, weight, height, education, socioeconomic status), osteoporosis information, history of fracture, DM, hypertension, modifiable risk factors of disease (dietary intake, use of calcium supplement, physical exercise, hormonal therapy etc.) and risk reducing practices against osteoporosis development. Women were interviewed face to face. In addition, the purpose of the study was explained to women. Informed consent was taken from all the women who fulfilled the inclusion criteria before filling the questionnaire. Confidentiality of information was strictly maintained. Ever osteoporosis diagnosed was asked with in-take of any treatment. The data were entered and analyzed using software Statistical Package for the Social Sciences (SPSS) version-23 (IBM-SPSS, Inc USA). The categorical variables like family history, risk factors are represented in the form of frequencies and percentages. Any association between variables was addressed using chi-square ($\chi 2$) test. A p-value ≤ 0.05 was considered as statistical significance. Ethical clearance was obtained from ethical committee of College of Nursing, FJMU Sir Ganga Ram Hospital, Lahore.

RESULTS

Demographic features of the subjects are described in table 1. 200 women of post-menopausal age participated in which 122 (61%) were educated while 78 (39%) were uneducated. Majority of the women 81 (31.5%) were between age 50-54years. BMI was raised in majority of women ranging from 25kg/m2 to 29.9kg/m2 marked in over weight category.179 (89.5%) women were married while 21 (10.5%) were unmarried. A large women belong to middle class families 63% while 25% belong to upper middle class and 12% to poor class. Results showed that osteoporosis was present in 123 (61.5%) out of 200 women of post-menopausal age.

Table 1: Demographic features of respondents

Variables	Description	Frequency (%)
BMI	Normal (Less than 24.9)	67 (33.5%)
	Overweight (25-29.9)	89 (44.5 %)
	Obese (30 and above)	44 (22.0%)
Age Group	45-49 years	49 (24.5%)
	50-54 years	81 (31.5%)
	55-59 years	41 (16.5%)
	60-65 years	29 (14.5%)
Education	Literate	122 (61%)
	illiterate	78 (39%)
Marital Status	Married	179 (89.5%)
	Single	21 (10.5%)
Socioeconomic status	Poor class	24 (12.0%)
	Middle class	126 (63.0%)
	Upper middle class	50 (25.0%)

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Osteoporosis	Present	123 (61.5%)
	Absent	77 (38.5%)
Treatment	Taken	116 (94%)
	Not Taken	7 (6%)

The factors associated with osteoporosis are discussed in table 2. Some factors were significantly associated with osteoporosis and some were not significantly associated. Age, BMI, marital status of women, family history of osteoporosis was found statistical association with osteoporosis (p-value <0.05). Other significant associated factors were excessive use of soda, DM, obesity and use of medicine. The insignificant factors were physical activity, hypertension and coffee (p-value>0.05).

Table 2: Association of risk factors and osteoporosis

Variables	Description	Osteoporosis	Normal	p-value
Age	45-49 years	25	24	0.001
	50-54 years	46	35	
	55-59 years	33	8	
	60-65 years	19	10	
BMI	Normal	12	55	0.003
	Overweight	73	16	
	Obese	38	6	
Marital Status	Single	8	13	0.041
	Married	115	64	
Family history of osteoporosis	Yes	37	10	0.031
	No	86	67	
History of fracture	Yes	15	18	0.127
	No	108	59	
Physical activities	Yes	12	9	0.052
	No	111	68	
Excessive use of coffee	Yes	9	4	0.129
	No	114	73	
Excessive use of soda	Yes	72	64	0.032
	No	51	13	
Taking calcium supplement	Yes	34	9	0.314
	No	89	68	
Hypertension	Yes	113	24	0.079
	No	10	53	
Obesity	Yes	109	24	0.019
	No	14	53	
Diabetes Mellitus (DM)	Yes	116	13	0.035
	No	7	64	
Use of medicine (hormonal, steroid)	Yes	35	36	0.031
	No	88	41	

DISCUSSION

This study was carried out to determine the risk factors of osteoporosis in women of age 45-65 years both married and single. A total of 200 women were enrolled in this study. In this study basic characteristics age, marital status, education, family history of osteoporosis, BMI, any experience of fracture was included. Osteoporosis related to modified and non-modified factors like drinking (tea, coffee, soda), medicine and vitamins were also included. The prevalence of osteoporosis in women was found as 61.5%. As per the literature, prevalence of osteoporosis was found to be 37.5%, osteopenia 44.7% while of osteoporotic fractures 82.2%. The prevalence of vitamin D insufficiency in vitamin D enriched food countries is 1.6%–14.8%. In other European countries, among middle-aged and elderly people, 59.6% in Boston was 24.1% [10]. In this study, older age, BMI, history of osteoporosis and history of fracture are associated with osteoporosis which is well known and reported in various studies. Marital status was also found as significant factor of osteoporosis, as was discussed by Wang et al [5]. Other study also discussed that marital disruption is strongly associated with osteoporosis [11]. In contrast to other studies, smoking was found insignificant factor of osteoporosis it is because in local setting female respondents are hesitant to reply that they are used to smoke. Bad dietary habits are common manifestation of osteoporosis, meat, egg, milk and fruits have strong protective factors of osteoporosis [12]. Calcium supplement is a beneficent and protective predictor which prevent from osteoporosis to all but especially elderly females [13]. Fractures are main outcome of osteoporosis and further fracture may lead to morbidity, poor QOL and mortality [14]. Fracture history and family history are independently associated with osteoporosis as this supported by various studies . Drinking green tea has strong association with osteoporosis, some studies have reported that green tea reduce the risk of developing osteoporosis in old aged people [4]. Physical exercise has inverse association with osteoporosis, but our results showed that there is no association between physical activities and osteoporosis, it is because our life style is sedentary and limited resources of physical activities in schools, colleges, universities and public areas and also due cultural barriers, which is a serious social and health concerns, ultimately becomes a reason to increase disease burden and health budget [16]. This result is contrary to the other studies and also with our expectations. In this study, taking calcium supplement has strong positive association with patients having osteoporosis and it prevents from further bone fracture. Calcium supplements are cost-effective in the management of osteoporosis and easily available in nearby house medical stores and pharmacies. Sun is every-time available in Pakistan and free source of vitamin-D, which is natural remedy of osteoporosis. Females should be educating to take calcium enriched foods and expose to sun on daily basis in cities and modern societies [17]. Obesity and BMI, both are significantly associated with osteoporosis, nearly all previous studies reported that

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obesity badly affects the bone quality which ultimately leads to osteoporosis [18]. Obesity is big health not worldwide in female but also a major health problem in Pakistan, Obesity is a consequence of sedentary life style, irregular and poor eating habits. Obesity also leads to diabetes mellitus(DM)and hypertension. Social intolerance develops due to hypertension. A healthy eating habits should be promoted especially in children and old aged people. Milk, yogurt, fruit and vegetable should the part of girls' and females' diet because they reproduce next generation. Some studies reported that hormonal disturbance in females may lead to bone problems which is ultimately a cause of osteoporosis in females, so females should not take any hormonal therapy or diet especially chicken products (prepared in form). Physical activity is also a factor in managing OP [19, 20]. In older adults, the results from cross-sectional studies show that exercise can boost cortical width and bone power at weight bearing sites, which seems to be prominent due to the growth in the periosteal apposition[16].

CONCLUSIONS

In conclusion, our discussion sheds light on the risk factors associated with osteoporosis within the postmenopausal community. The identified risk factors, including diminished bone mineral density, emphasize the importance of proactive measures and targeted interventions to mitigate the consequences of osteoporosis in the postmenopausal age group. Addressing these risk factors not only holds the potential to enhance the overall well-being of individuals but also contributes to a broader community-wide approach to promoting bone health and preventing the associated complications in this vulnerable population.

Authors Contribution

Conceptualization: RP
Methodology: AS, ZA, AZ
Formal analysis: AZ
Writing-review and editing: RP, AS, ZA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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