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Original Article

Osteoporosis Awareness among Female University Students in Lahore Pakistan using Osteoporosis Knowledge Assessment Tool (OKAT)

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ABSTRACT

Objective: To determine awareness about osteoporosis in female university students in Lahore Pakistan using Osteoporosis Knowledge Assessment Tool (OKAT) and to compare osteoporosis awareness among medical (MBBS) and non-medical students.

Methodology: This descriptive cross-sectional study was carried out at Superior University Lahore from February to April 2024. OKAT is a validated tool to assess osteoporosis awareness and was employed in this study. Using non-probability consecutive sampling technique, 110 medical (MBBS) female students and 110 non-medical female students aged 18 years and older who gave informed consent were enrolled. Students with present or past history of osteoporosis were excluded. Demographic information including age, discipline of study and family history of osteoporosis was noted. The OKAT questionnaire was distributed among the students in the form of an online Google form. All the data was recorded and analyzed using SPSS version 23.

Results: Mean age of the participants was 21.5±4.0 years and 65 (29.5%) reported positive family history of osteoporosis. The mean OKAT score was 10.5±3.9 with 95 (43.2%) and 78 (35.5%) participants having average and acceptable knowledge about osteoporosis. Stratification of data revealed significant statistical association of Osteoporosis knowledge with age (p-value 0.015) and discipline of study (p-value <0.001) but not with family history of osteoporosis (p-value 0.229)

Conclusion: Age and discipline of study significantly influenced osteoporosis knowledge, while family history had no correlation. Despite an average OKAT score of 10.5, there is considerable potential for improving overall osteoporosis awareness.

Keywords: Osteoporosis, Fractures, Bone Density, Calcium, Vitamin D, Prevention and Control

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INTRODUCTION

Osteoporosis is a major health issue in Pakistan, worsened by widespread nutritional deficiencies and limited diagnostic resources. There is little data on its prevalence, and premenopausal women with osteopenia are at a higher risk of developing osteoporosis in the future [1]. Furthermore, reliable data on its socio-economic impact is also lacking. While some studies have been conducted, they have not led to effective prevention strategies [2]. A study on osteoporosis awareness among students in Quetta highlighted the need for further research to assess awareness and its contributing factors [3]. Educating students about osteoporosis and prevention can help raise awareness in the general population [4,5], and maintaining bone health in youth can reduce the risk of osteoporosis later in life. To create effective prevention strategies, assessing osteoporosis knowledge, especially among young women, is crucial [5,6]. Osteoporosis is a condition where reduced bone density increases fracture risk, primarily caused by high osteoclast activity, low estrogen levels, aging, and tobacco use [7,8]. It is common in postmenopausal women due to estrogen loss, leading to symptoms like hot flashes and sexual dysfunction [9,1]. While not curable, osteoporosis can be prevented through physical activity, calcium-rich diets, and healthy lifestyles [11,12].

The condition is rising globally, with over 75 million affected in the US, Europe, and Japan, and predictions suggest Asia will account for over half of osteoporotic fractures by 2050. Most people with osteoporotic fractures lack prior diagnosis and preventive treatment. Osteoporotic fractures impose a major socio-economic burden, with US prescription costs for these fractures expected to triple by 2040, while Iran reported hospitalization costs of $588 for a pelvic fracture [13]. The present study is driven by the global impact of osteoporosis, especially among women, and aims to address the lack of awareness about the condition and its prevention, particularly among young adults. By assessing female university students' knowledge, the study seeks to identify gaps and inform educational strategies, ultimately improving public health outcomes and reducing osteoporosis-related complications.

METHODOLOGY

This descriptive cross-sectional study was carried out at Superior University Lahore from February to April 2024 to determine the knowledge about osteoporosis among female university students and to compare osteoporosis awareness among medical (MBBS) and non-medical students. Osteoporosis Knowledge Assessment Tool (OKAT) is a validated tool to assess osteoporosis awareness and was employed in this study. The OKAT is a 20 point questionnaire with 'true', 'false' and 'I don't know' options; and assesses various aspects including osteoporosis risk factors, methods of prevention and treatment [14]. The maximum possible score on OKAT is 20. Based on the OKAT score, the osteoporosis knowledge is categorized as poor (score 0-5), acceptable (score 6-10), average (score 11-15) and good (score 16-20) [6].

The present was conducted in accordance to the ethical standards laid down in the 1964 Declaration of Helsinki, revised in the year 2000. Ethical approval was obtained, and informed consent was secured from all the participants. A total of 220 female university students were included in the study. Using non-probability consecutive sampling technique, 110 medical (MBBS) female students and 110 non-medical (from disciplines of architecture, business, computer studies, chemistry, education, IT, physics and software engineering) female students aged 18 years and older were enrolled. Students with present or past history of osteoporosis were excluded. Demographic information including age, discipline of study and family history of osteoporosis was noted. The OKAT questionnaire was distributed among the students in the form of an online Google form through WhatsApp groups and weekly reminders were sent. All the data was recorded and analyzed using SPSS version 23. Mean and standard deviation were generated for qualitative data whereas quantitative data was represented as frequency and percentage. Chi-Square test was applied keeping p-value <0.05 as significant.

RESULTS

A total of 220 female university students were enrolled in the study. Mean age of the participants was 21.5±4.0 years and majority of the participants (127, 57.7%) were aged 21 years or more as shown in Table 1. A positive family history of osteoporosis was reported by 65 (29.5%) participants. The mean OKAT score of the participants was 10.5±3.9 with 95 (43.2%) and 78 (35.5%) participants having average and acceptable knowledge about osteoporosis as shown in Table 1. Mean OKAT score of medical students was 12.2±3.5 whereas mean OKAT score of non-medical students was 8.8±3.6. Stratification of data revealed significant statistical association of Osteoporosis knowledge with age (p-value 0.015) and discipline of study (p-value <0.001) but not with family history of osteoporosis (p-value 0.229) as shown in Table 2. The OKAT questionnaire, correct answers and individual question response of the participants according to medical/non-medical groups are shown in Table 3.

Table 1: Demographic information of the participants

Demographic Variables		Frequency (n)	Percentage (%)
Age	20 years or less	93	42.3
	21 years or more	127	57.7
Family History of Osteoporosis	Present	65	29.5
	Absent	155	70.5
OKAT Score Category	Poor Knowledge (score 0-5)	26	11.8
	Acceptable Knowledge (Score 6-10)	78	35.5
	Average Knowledge (score 11-15)	95	43.2
	Good Knowledge (score 16-20)	21	9.5

Table 2: Stratification of Osteoporosis Knowledge according to demographic variables

Demographic Variables	OKAT Osteoporosis knowledge category				p-value
	Poor	Acceptable	Average	Good	
Age:					0.015
20 years or less	14 (15.1%)	39 (41.9%)	37 (39.8%)	03 (3.2%)	
21 years or more	12 (9.4%)	39 (30.7%)	58 (45.7%)	18 (14.2%)	
Family history of Osteoporosis:					0.229
Absent	18 (11.6%)	59 (38.1%)	67 (43.2%)	11 (7.1%)	
Present	08 (12.3%)	19 (29.2%)	28 (43.1%)	10 (15.4%)	
Study discipline:					<0.001
Medical (MBBS)	04 (3.6%)	28 (25.5%)	58 (52.7%)	20 (18.2%)	
Non-Medical	22 (20.0%)	50 (45.5%)	37 (33.6%)	01 (0.9%)	

Table 3: Osteoporosis Knowledge Assessment Tool (OKAT) responses according to participant's study discipline

OKAT Statement	Correct Answer	Medical (MBBS) n(%)	Non-Medical n(%)
"Osteoporosis leads to an increased risk of bone fractures."	True	109 (99.1)	95 (86.4)
"Osteoporosis usually causes symptoms (e.g. pain) before fractures occur."	False	20 (18.2)	09 (8.2)
"Having a higher peak bone mass at the end of childhood gives no protection against the development of osteoporosis in later life."	False	52 (47.3)	25 (22.7)
"Osteoporosis is more common in men."	False	101 (91.8)	73 (66.4)
"Cigarette smoking can contribute to osteoporosis."	True	77 (70.0)	44 (40.0)
"White women are at highest risk of fracture compared to other races."	True	57 (51.8)	27 (24.5)
"A fall is just as important as low bone strength in causing fractures."	True	86 (75.5)	79 (71.8)
"By age 80, the majority of women have osteoporosis."	True	102 (92.7)	89 (80.9)
"From age 50, most women can expect at least one fracture before they die."	True	58 (52.7)	43 (39.1)
"Any type of physical activity is beneficial for osteoporosis."	False	23 (20.9)	17 (15.5)
"It is easy to tell whether I am at risk of osteoporosis by my clinical risk factors."	True	85 (77.3)	51 (46.4)
"Family history of osteoporosis predisposes a person to osteoporosis."	True	80 (72.7)	64 (58.2)
"An adequate calcium intake can be achieved from two glasses of milk a day."	True	81 (73.6)	73 (66.4)
"Sardines and broccoli are good sources of calcium for people who cannot take dairy products."	True	79 (71.8)	48 (43.6)
"Calcium supplements alone can prevent bone loss."	False	69 (62.7)	52 (47.3)
"Alcohol in moderation has little effect on osteoporosis."	True	60 (54.5)	41 (37.3)
"A high salt intake is a risk factor for osteoporosis."	True	48 (43.6)	48 (43.6)
"There is a small amount of bone loss in the 10 years following the onset of menopause."	False	16 (14.5)	10 (9.1)
"Hormone therapy prevents further bone loss at any age after menopause."	True	92 (83.6)	47 (42.7)
"There are no effective treatments for osteoporosis available in Pakistan."	False	50 (45.5)	37 (33.6)

DISCUSSION

Osteoporosis awareness is inadequate, particularly in underdeveloped countries like Pakistan, where health education is vital for long-term knowledge and prevention[15,16]. Awareness efforts typically focus on understanding risk factors and how they influence preventive actions. A person's attitude toward osteoporosis is often shaped by their beliefs and perceived risk [17]. Key prevention strategies include increasing bone mass during youth through physical activity, proper calcium and vitamin D intake, and avoiding smoking and alcohol [18,19]. Studies globally show low awareness, including among women over 25 in the U.S. [20], 55% of female students in Iran [21], and 32.6% of health workers in Sindh, Pakistan [22]. In rural areas, limited healthcare resources often result in undiagnosed and untreated osteoporosis, with fractures managed by local healers [22,23]. Osteoporosis

affects all genders and races, with its prevalence increasing with age, especially in women. Risk factors include age, gender, family history, prolonged immobility, and conditions like rheumatoid arthritis [24]. Modifiable risks include alcohol, smoking, poor diet, inactivity, low body mass, inadequate calcium and vitamin D intake, and poor awareness [16].

The findings of the present study reveal significant differences in osteoporosis knowledge based on age, family history, and study discipline. Participants aged 21 years or older demonstrated better knowledge of osteoporosis compared to those aged 20 years or younger, with a higher percentage of the older group displaying "Average" or "Good" knowledge (p-value 0.015). Interestingly, family history of osteoporosis did not show a significant correlation with better awareness (p-value 0.229) suggesting that having a family history does not necessarily influence an individual's knowledge about the disease. Most notably, a strong association was found between study discipline and osteoporosis knowledge (p-value <0.001), with medical students (MBBS) exhibiting significantly better understanding compared to non-medical students. Medical students scored higher across a range of questions, demonstrating a greater understanding of osteoporosis risk factors, prevention strategies, and its impact on health. For example, nearly all medical students (99.1%) correctly identified the increased fracture risk associated with osteoporosis, whereas only 86.4% of non-medical students did. Similarly, medical students showed a better understanding of the role of calcium, physical activity, and hormone therapy in osteoporosis prevention. These findings underscore the importance of targeted educational interventions for non-medical students and the need to incorporate osteoporosis education into medical curricula to ensure that future healthcare providers are equipped to educate patients on bone health.

Pakistan's rapidly growing population, with women having an average of six children and a 3% annual growth rate, suggests an increase in osteoporosis cases [25]. Studies reveal significant gaps in osteoporosis awareness, particularly among younger women. A 2008 study found that younger women had less knowledge about osteoporosis than older women, implying that these younger women may now be at greater risk as they age [26]. In Lahore, a study by Manzoor et al. found average knowledge among participants, with a mean OKAT score of 12.16 ± 2.37 [27]. Ahmed et al. reported that 22% of women across Pakistan had poor awareness, while 34% had good awareness, with education, employment, and location influencing knowledge, but age, marital status, and menopausal status showing no correlation [1]. Bilal et al. in Karachi found that only 8% of medical students had good OKAT scores, while 49% had poor scores, indicating inadequate knowledge and preventive practices [28]. In Hyderabad, poor knowledge was reported among healthy, osteopenic, and osteoporotic women [29], and a 2018 study at King Abdullah City for Female Students found that 79.4% of participants lacked basic osteoporosis knowledge [30]. Additionally, a survey of 160 nurses from Shiraz University revealed that only 27.3% were aware of osteoporosis guidelines [31]. These findings highlight the need for improved education and awareness programs.

The present study's strengths include using the validated OKAT questionnaire and a relatively large sample of 220 female university students, ensuring reliable and statistically powerful results. The online data collection method allowed for wide reach. However, the study has limitations, including its focus on a single institution, which affects the generalizability of the findings, and the cross-sectional design, which limits the ability to establish causal relationships. Future research should involve larger, multi-center studies to validate these results and explore effective educational strategies. The study recommends implementing comprehensive educational programs on osteoporosis in medical curricula, targeting modifiable risk factors such as calcium intake, physical activity, and smoking/alcohol consumption. Additionally, collaboration with community organizations can help spread awareness more broadly. In underdeveloped Asian countries, where osteoporosis often goes undiagnosed due to limited healthcare resources, public education campaigns are crucial for better prevention and management.

CONCLUSION

The present study found that age and discipline of study significantly influenced participants' knowledge about osteoporosis, with older participants and those from medical discipline demonstrating better awareness of the condition. In contrast, having a family history of osteoporosis did not correlate with higher knowledge levels. The overall mean OKAT score of 10.5 suggests that while most participants had average to acceptable knowledge about osteoporosis, there is considerable room for improvement in awareness. These findings highlight the importance of age-specific and discipline-targeted educational interventions to enhance osteoporosis knowledge, particularly among younger individuals and those in fields with limited focus on health topics.

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