

Knowledge and Perception about Osteoporosis among University Students in Lahore, Pakistan using Osteoporosis Knowledge Assessment Tool (OKAT)

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Each author of this article has encountered all 04 criterions of authorship:

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ABSTRACT

Objective: To determine knowledge and perception about osteoporosis in university students using the Osteoporosis Knowledge Assessment Tool (OKAT), a validated instrument for assessing osteoporosis awareness.

Methodology: This descriptive cross-sectional study was carried out at the University of Management and Technology from March 2024 to May 2024. The sample included 206 students aged 18 years and older, excluding those with a current or past diagnosis of osteoporosis. OKAT is a validated tool to assess osteoporosis awareness and was employed in this study. After approval from the Institutional Ethical Board, data collection was done using non-probability consecutive sampling technique and 206 students of both genders, aged 18 years and older who gave informed consent were enrolled. The questionnaire was distributed among the students in the form of an online Google form and all the data was recorded and analyzed.

Results: Mean age of the participants was 22.0+10.2 years with 116 (56.3%) female and 90 (43.7%) male students. Majority of participants were from biotechnology (n 50, 24.3%), architecture (n 48, 23.3%) and physiotherapy (n 22, 10.7%). A positive family history of osteoporosis was reported by 57 (27.7%) participants. The mean OKAT score was 8.3 ± 3.9, with 40.8% having acceptable and 35.4% having average knowledge. There was no significant association of osteoporosis knowledge with age, gender, or family history of osteoporosis (p > 0.05).

Conclusion: Majority of the participants had acceptable or average knowledge about osteoporosis based on the OKAT score. Almost a quarter of the participants (23.3%) had poor knowledge regarding Osteoporosis. It is therefore pertinent to improve osteoporosis awareness through educational programmes, health campaigns and public strategies so that the general public may adopt preventive behaviors to limit osteoporosis disease burden in the future.

Keywords: Osteoporosis, Fracture, Calcium, Vitamin D, Osteoporosis Knowledge Assessment Tool (OKAT).

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INTRODUCTION

Osteoporosis can be termed as a skeletal deformity in which there is a decrease in density (mass/volume) of a normally mineralized bone resulting in an elevated risk of fractures^{1,2}. This is primarily caused by an increased production of osteoclast cells

(components that degrade bone), low oestrogen hormone levels, old age and excessive tobacco consumption^{3,4}. This phenomenon is prevalent in women who have transitioned into their postmenopausal stage. At this stage, their ovaries stop producing oestrogen causing various symptoms

including hot flashes, vulvovaginal atrophy, and sexual dysfunction^{5,6}. Although osteoporosis is not directly related to these symptoms, they share the same origin, which is the cessation of oestrogen hormone production. This condition isn't completely curable, but it can be prevented by implementation of physical activities in daily life, consuming calcium-rich foods and striving for an overall healthier lifestyle^{7,8}. It has been reported that prevalence of osteoporosis is on the rise, affecting over 75 million people in the US, Europe and Japan. Furthermore it is being predicted that by 2050 more than half of the global osteoporotic fractures would be reported in Asia alone. Additionally, majority of patients suffering osteoporotic fractures do not have a pre-existing diagnosis and therefore do not take any preventive medicine. Osteoporotic fractures cause a significant socio-economic burden on patients' families and healthcare resources. Americans paid approximately 17 billion dollars in prescription bills for osteoporotic fractures in 2005 which has been predicted to triple by 2040 due to increased aging population. From Iran, Soheili-Azad et al. reported total expenditure for 16 days of hospitalization due to a single pelvic fracture as \$ 588⁹.

Osteoporosis, in Pakistan, presents a pressing health concern due to prevalent nutritional deficiencies in addition to lack of diagnostic facilities. Limited data is available about osteoporosis prevalence in Pakistan. Furthermore, premenopausal Pakistani females having osteopenia are at an increased risk to suffer osteoporosis later in life¹⁰. Reliable data regarding socio-economic burden of osteoporosis in Pakistan is also missing. There is scarcity of studies regarding osteoporosis in Pakistan and those that have been concluded did not translate to develop practices for prevention of the disease¹¹. A study conducted on students regarding osteoporosis awareness in Quetta called for further bigger scale studies to determine osteoporosis awareness and its parameters¹². A sound knowledge regarding osteoporosis and its preventive strategies in students can play a significant role to subsequently educate the general population and spread awareness¹³. Furthermore maintenance of bone mass and strength in young age of students helps to lower risk of osteoporosis in later on in life. To develop of preventative strategies, assessment of awareness and knowledge regarding osteoporosis and its current practice is required especially in young women¹⁴.

This silent condition affects all strata of the society and its rate of escalation requires urgent

attention and intervention. The upcoming generation fosters numerous leaders who are anticipated to shape the future in many influential ways. It is crucial for us to educate and enlighten people about the severity of osteoporosis so that they can incorporate preventive protocols in their day to day routine. Although osteoporosis is more likely to occur in old age, promoting awareness and prevention strategies from a young age is important. Encouraging physical activities and consumption of calcium-rich foods from natural sources should be advocated^{15,16}. The purpose of this research was to evaluate the understanding of osteoporosis among a younger demographic utilizing the osteoporosis knowledge assessment tool (OKAT), focusing specifically on university students in Lahore. Osteoporosis, characterized by decreased bone density and increased fracture risk, poses a significant public health challenge globally and in Pakistan. Raising awareness and understanding among young adults is crucial for early prevention and intervention. This study aims to evaluate the knowledge and perception of osteoporosis among university students using the Osteoporosis Knowledge Assessment Tool (OKAT).

METHODOLOGY

This present descriptive cross-sectional study was carried out at the University of Management and Technology (UMT) Lahore Pakistan from March 2024 to May 2024 to determine the knowledge and perception of osteoporosis among the university students of various disciplines. 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 treatment¹⁷. 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)¹⁸. Keeping 7% margin of error and 95% confidence interval, a sample size of 196 was calculated using expected frequency 50% for a descriptive survey. OpenEPI online calculator was used for sample size calculation.

This descriptive cross-sectional study used non-probability consecutive sampling to enroll 206 university students. Ethical approval was obtained, and informed consent was secured from all participants. Baccalaureate students of both genders, aged 18 years and older who gave informed consent

were included in this study. Students with present or past history of osteoporosis were excluded. Demographic information including age, gender, discipline of study and family history of osteoporosis was noted. The OKAT questionnaire was distributed online via Google Forms. Participants were reminded weekly through WhatsApp groups to ensure a high response rate. A total of 206 responses were included in the study. Data were analyzed using SPSS version 23. Descriptive statistics were used to summarize the data. Chi-square tests were applied to assess the association between osteoporosis knowledge and demographic variables, with a significance level set at $p < 0.05$.

RESULTS

Of the 206 participants (56.3% female, 43.7% male), the mean age was 22.0 ± 10.2 years. Most were from biotechnology (24.3%) and architecture (23.3%) As shown in Table 1, the distribution of participants by discipline is diverse. A positive family history of osteoporosis was reported by 57 (27.7%) participants. The mean OKAT score was 8.3 ± 3.9 , with 40.8% having acceptable knowledge and 35.4% average knowledge. Table 2 illustrates the breakdown of OKAT scores, indicating varying levels of knowledge among participants. The OKAT questionnaire, correct answers and individual question response of the participants are shown in Table 3. Stratification of data did not reveal any significant statistical association of Osteoporosis knowledge with age (p -value 0.106), gender (p -value 0.325) and family history of osteoporosis (p -value 0.151).

DISCUSSION

Pakistan has one of the highest population surge rates in the world. On average, women in Pakistan have borne approximately six children, contributing to an annual population growth rate of 3%¹⁹. This implies that as population increases, there will be a rise in cases of osteoporosis. Results from a Pakistani study conducted in 2008 revealed that younger women had less knowledge about osteoporosis than older women¹⁴. This suggests that the younger women who were part of that demographic in 2008 may now be older and likely be diagnosed with osteoporosis. In the survey conducted by Manzoor et al. in Lahore, mean OKAT score was 12.16 ± 2.37 with majority of participants having average knowledge²⁰. Ahmed et al. reported poor osteoporosis awareness in 22% of female

participants included from throughout Pakistan while 34% had good awareness²¹. Good awareness was associated with educational level, employment status and province of residence but not with age, marital status or being postmenopausal²¹. Bilal et al. enrolled 400 female medical entrants in Karachi to investigate osteoporosis awareness using OKAT²². Only 8.0% had good OKAT score where as 49.0% had poor score demonstrating insufficient knowledge and inadequately applied preventative practices²². In Hyderabad, poor osteoporosis knowledge was reported in healthy, osteopenic and osteoporotic women by Kerrio et al²³. Similarly, a cross sectional study of 2018, conducted at King Abdullah City for Female Students, Al-Imam Mohammad ibn Saud Islamic University concluded that 79.4% out of 1,012 surveyed individuals lacked basic knowledge of this illness²⁴. Another questionnaire was circulated amongst 160 nurses of the orthopaedic ward of hospitals affiliated to Shiraz University of Medical Sciences out of which 143 responded. This survey revealed that only 27.3% of nurses were aware of the osteoporosis guidelines²⁵.

In the present study, only one participant (0.5%) had good knowledge (OKAT score 16-20) regarding osteoporosis and almost a quarter of the participants (23.3%) had poor knowledge (OKAT score 0-5). This highlights the fact that osteoporosis remains a topic of deficient awareness among the Pakistani population. Although 83.5% of the study population correctly stated that osteoporosis leads to an increased risk of bone fractures, only 6.8% participants were aware of the fact that osteoporosis does not cause any symptoms (e.g. pain) before fracture occurs. Similarly, only 10.7% participants knew the impact of bone loss in 10 years following the onset of menopause was substantial. It should be noted that 21.8% participants did not know that having a higher peak bone mass at the end of childhood gave protection against the development of osteoporosis in later life. Although the importance of increasing age and fall in causing osteoporotic bone fractures were correctly answered by 73.3% and 63.6% participants respectively, when questioned about the role of exercise only 15.5% participants knew that not all types of exercise were beneficial in osteoporosis. Regarding dietary factors, 64.1% participants knew the importance of 2 glasses of milk while 50.0% knew the role of sardines and broccoli as adequate sources of calcium. Furthermore 37.4%, 38.3% and 44.2% participants correctly answered about association of cigarette smoking, alcohol use and high salt diet with osteoporosis

respectively. Almost half (53.4%) knew that having an osteoporotic family member increased their own risk of osteoporosis later in life. However knowledge regarding osteoporosis treatment availability in

Pakistan was seen in 34.0% participants only. The level of osteoporosis awareness in our study was not affected by age, gender or family history of osteoporosis.

Table 1: Discipline of Study of the participants

Discipline of Study	Frequency (n)	Percentage (%)
Biotechnology	50	24.3
Architecture	48	23.3
Doctor of Physiotherapy (DPT)	22	10.7
Doctor of Pharmacy (Pharm-D)	16	7.8
Chemistry	13	6.3
Microbiology	11	5.3
City and Regional Planning	09	4.4
Computer Science	08	3.9
Nutrition	06	2.9
Physics	06	2.9
Software Engineering	05	2.4
Information Technology	04	1.9
Business, Management & Accounting	03	1.5
Artificial Intelligence	03	1.5
Education	02	1.0

Table 2: Osteoporosis knowledge of the participants according to OKAT score

OKAT Score Category	Frequency (n)	Percentage (%)
Poor Knowledge (score 0-5)	48	23.3
Acceptable Knowledge (Score 6-10)	84	40.8
Average Knowledge (score 11-15)	73	35.4
Good Knowledge (score 16-20)	01	0.5

Table 3: Osteoporosis Knowledge Assessment Tool (OKAT) Responses

OKAT Statement	Correct Answer	Frequency (n)	Percentage (%)
Osteoporosis leads to an increased risk of bone fractures.	True	172	83.5
Osteoporosis usually causes symptoms (e.g. pain) before fractures occur.	False	14	6.8
Having a higher peak bone mass at the end of childhood gives no protection against the development of osteoporosis in later life.	False	45	21.8
Osteoporosis is more common in men.	False	117	56.8
Cigarette smoking can contribute to osteoporosis.	True	77	37.4
White women are at highest risk of fracture compared to other races.	True	61	29.6
A fall is just as important as low bone strength in causing fractures.	True	131	63.6
By age 80, the majority of women have osteoporosis.	True	151	73.3
From age 50, most women can expect at least one fracture before they die.	True	86	41.7
Any type of physical activity is beneficial for osteoporosis.	False	32	15.5
It is easy to tell whether I am at risk of osteoporosis by my clinical risk factors.	True	89	43.2
Family history of osteoporosis predisposes a person to osteoporosis.	True	110	53.4
An adequate calcium intake can be achieved from two glasses of milk a day.	True	132	64.1
Sardines and broccoli are good sources of calcium for people who cannot take dairy products.	True	103	50.0
Calcium supplements alone can prevent bone loss.	False	78	37.9
Alcohol in moderation had little effect on osteoporosis.	True	79	38.3
A high salt intake is a risk factor for osteoporosis.	True	91	44.2
There is a small amount of bone loss in the 10 years following the onset of menopause.	False	22	10.7
Hormone therapy prevents further bone loss at any age after menopause.	True	84	40.8

There are no effective treatments for osteoporosis available in Pakistan.	False	70	34.0
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Table 4: Stratification of Osteoporosis Knowledge according to age, gender and family history

Variables	Osteoporosis knowledge category according to OKAT score				p-value
	Poor	Acceptable	Average	Good	
Age:					
<20 years	17 (16.8%)	41 (41.6%)	41 (40.6%)	01 (1.0%)	0.106
>21 years	31 (29.5%)	42 (40.0%)	32 (30.5%)	00 (0.1%)	
Gender:					
Female	22 (19.0%)	50 (43.1%)	43 (37.0%)	01 (0.9%)	0.325
Male	26 (28.9%)	34 (37.8%)	30 (33.3%)	00 (0.0%)	
Family history of Osteoporosis:					
Absent	38 (25.4%)	64 (43.0%)	46 (30.9%)	01 (0.7%)	0.151
Present	10 (17.5)	20 (35.1%)	27 (47.4%)	00 (0.0%)	

Lack of knowledge on osteoporosis was reported in females aged more than 25 years in United States²⁶. Ghaffari et al. demonstrated poor awareness of osteoporosis in 55% of female students in Kolaleh Gorgan, Iran²⁷. Similarly female students in Tehran also had poor awareness of osteoporosis²⁸. Liew et al. reported low calcium intake and poor knowledge of osteoporosis among Asian women residing in Australia²⁹. Our findings align with previous studies indicating low osteoporosis awareness among young adults. Similar studies in Saudi Arabia and Iran also revealed significant gaps in osteoporosis knowledge among students and healthcare professionals. The low level of osteoporosis knowledge highlights the need for targeted educational interventions. Universities should integrate osteoporosis education into their health curricula to foster early preventive behaviors. Osteoporosis substantially contributes to low bone mineral density (LBMD). Fractures and demise rates associated with LBMD have shown an eminent increase since 1990 [30]. Individuals who suffer from osteoporosis most often lose their ability to walk later in their life³¹. They are also at high risk of developing many acute conditions such as pneumonia and urinary tract infections^{15,32}.

Most of the Asian countries are underdeveloped, and rise in osteoporosis puts a significant strain on the already limited healthcare resources¹². Therefore osteoporosis may often be left undiagnosed and thus untreated in Asian countries. Even the patients at highest osteoporosis risk and those with previous osteoporotic fractures may be unable to attain proper

management due lack of both resources and awareness. In rural settlements, this issue is especially more severe. In countries like India, China and Pakistan, majority of the population lives in rural areas where people tend to manage hip fractures from home by local healers rather than at hospitals. The present study has certain limitations that need to be considered. Limitations include the single-institution setting and relatively small sample size. Future research should involve larger, multi-center studies to validate these findings and explore effective educational strategies. The present study highlights the need not only to spread osteoporosis awareness among the young population but also to promote preventive measures for this disease. These strategies include educational programmes, health campaigns and public education about osteoporosis and its risk factors, especially modifiable ones such as calcium intake, physical activity, smoking and alcohol use^{33,34}.

CONCLUSION

The majority of participants had acceptable or average knowledge about osteoporosis, with a significant minority showing poor understanding. Enhancing osteoporosis awareness through targeted educational programs is essential to reduce future disease burden. Majority of the participants in our study had acceptable (40.8%) or average (35.4%) knowledge about osteoporosis based on the OKAT score. Only one participant (0.5%) had good knowledge. Furthermore, almost a quarter of the

participants (23.3%) had poor knowledge regarding Osteoporosis. It is therefore pertinent to improve osteoporosis awareness through educational programmes, health campaigns and public strategies so that the general public may adopt preventive behaviors to limit osteoporosis disease burden in the future.

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