

# Evaluation of Osteoporosis Awareness among Healthcare Professionals in Tertiary Care Hospitals of Islamabad and Rawalpindi: A Comprehensive Analysis using the Osteoporosis Knowledge Assessment Tool (OKAT)

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## Abstract

**Objective:** The study aimed to assess the knowledge of healthcare professionals regarding this disease.

**Method:** This was a descriptive cross-sectional study. It was conducted in five tertiary care hospitals; namely Federal Government Polyclinic Hospital, Pakistan Institute of Medical Sciences, Khan Research Laboratories Hospital in Islamabad and Holy Family Hospital and Benazir Bhutto Hospitals from Rawalpindi. The study was completed in six months from October 2022 to March 2023. A total of 335 healthcare providers, after consent, filled out the OKAT questionnaire containing twenty questions related to osteoporosis. The data was analyzed using SPSS version 23.

**Results:** 335 medical professionals participated in this study with 117 (34.9%) males and 218 (65.1%) females having a mean age of  $28.8 \pm 4.6$  years (range 21 – 49 years). 225 (67.2%) had a post-graduate level of education, while 110 (32.8%) were graduates. The mean OKAT score was  $11.75 \pm 2.46$  out of 20; the average score had a weak significant correlation with the age of the participants ( $r=0.130$ ,  $p=0.018$ ). ANOVA showed that the knowledge score was significantly higher in post-graduate participants vs. graduate participants ( $p=0.028$ ). It was also noted that rheumatology and endocrinology specialities were found to have the highest score of  $14.86 \pm 1.95$  as compared to all other specialities ( $p=0.006$ ).

**Conclusion:** The healthcare providers had average to good knowledge about osteoporosis. The overall knowledge is affected by age, post-graduate qualification and speciality of the health care provider.

**Key Words:** Osteoporosis, osteoporosis knowledge assessment questionnaire (OKAT), Analysis of variance (ANOVA).

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## 1. Introduction

Osteoporosis is a condition in which low bone mass and microstructural deterioration of bone tissue lead to an increase in bone fragility.<sup>1</sup> Impaired bone mineral density results in an increased risk of fragility fractures, causing great morbidity, impaired quality of life and even increased mortality.<sup>2,3</sup> The most common site of osteoporosis-related fractures are the hip, wrist and spine. It is a major cause of fractures in the elderly, especially post-menopausal females. Family history, vitamin D deficiency, sedentary lifestyle, smoking, alcoholism, paralysis and low BMI are other risk factors for this disease.<sup>4</sup>

Osteoporosis leading to fractures is a global health issue because of the mortality and morbidity that it causes. By the year 2020, approximately 14 million adults were expected to be suffering from this disease. Around 200 million women, across the globe, suffer from osteoporosis.<sup>5,6</sup> In 2019, it was reported that the global burden of disability-adjusted-life-years (DALY) and mortality associated with osteoporosis

and its related fractures has increased by 93.82% and 116.18% respectively since 1990.<sup>7</sup> Asia is expected to endure half of the global burden for hip fractures by 2050.<sup>8,9</sup> In 2019, India and China were at the top of the list of countries with the highest disease burden of osteoporosis-related fractures.<sup>7</sup>

Prevention of fragility fractures related to osteoporosis is now possible with the availability of new and effective treatment<sup>10</sup>. However, it has been reported that osteoporosis is underdiagnosed and undertreated globally, including in Asia.<sup>11</sup> An International Osteoporosis Foundation survey carried out in 11 countries, showed that refutation of personal risk by postmenopausal females, lack of communication regarding osteoporosis with their doctors, and limited access to diagnosis and treatment before the initial fracture were the leading causes of underdiagnosis and undertreatment of such disease.<sup>12</sup> Community awareness, knowledge, and beliefs regarding any disease play a crucial role in the primary and secondary prevention of that disease. However, equally important is the need to ensure that healthcare



providers working at all levels are well-versed with the disease's diagnosis, treatment and prevention. A treatment gap in osteoporosis has been detected in secondary fracture prevention in both public and private settings.<sup>13,14</sup>

The survey of the knowledge, attitude and practice study should be executed periodically, as a part of the prevention strategy of osteoporosis; as its results can be used for improving physicians' performance, thereby preventing the disease and its related economic burden more efficiently. A study in Malaysia reported inadequate knowledge and inadequate osteoporosis screening and emphasized the need for a nationally organized health program to address the knowledge gap<sup>15</sup>. Another study indicated the need to escalate efforts to improve the awareness of primary care physicians about osteoporosis, in general; and osteoporosis pharmacotherapy, in particular.<sup>16</sup>

Very few studies have been performed in Southeast Asia and Pakistan particularly to analyze the knowledge and practices of healthcare providers about osteoporosis treatment, prevention and screening. A study carried out in four tertiary referral hospitals of Lahore concluded that there is a dire need for the re-orientation of the health care physicians regarding osteoporosis.<sup>17</sup> but the data is scant. The rationale of our study was to assess the osteoporosis knowledge; its diagnosis, treatment and prevention; among healthcare providers working in tertiary care hospitals in Islamabad and Rawalpindi.

## 2. Materials & Methods

This descriptive cross-sectional study was carried out from October 2022 to March 2023 in 5 tertiary care hospitals in Islamabad and Rawalpindi. The hospitals included were Federal Government Polyclinic (FGPC) Islamabad, Pakistan Institute of Medical Sciences (PIMS) Islamabad, KRL Hospital Islamabad, Holy Family Hospital (HFH) Rawalpindi and Benazir Bhutto Hospital, Rawalpindi. To eliminate bias, equal representation of each hospital was ensured.

All doctors working in the above-listed hospitals with basic qualification of MBBS were included in the study through non-probability consecutive sampling. Hence, the study population comprised house officers, medical officers, postgraduate trainees and consultants in various specialities serving in different capacities.

A previous study reported the prevalence of satisfactory knowledge regarding osteoporosis screening and management among physicians to be 31.4%<sup>15</sup>. Our study population was finite; the number of licensed doctors working in Pakistan in the year 2022 is 274135 as declared by the Pakistan Medical Commission. A sample size of 331 was calculated using an open EPI calculator, with a 95% confidence interval and 5% precision. For convenience, the sample size was rounded off to 340.

The Osteoporosis Knowledge Assessment Tool (OKAT) is a validated questionnaire used to assess the knowledge regarding osteoporosis risk factors, symptoms, prevention and management. It was devised and first validated by Winzenberg et al<sup>18</sup>. It consists of 20 questions, each question to be answered as True, False or Don't know. Each correct answer was scored as 1 point. Incorrect response and 'Don't know' were scored as 0. Hence participants will have their score from a maximum of 20 points. The final score of each participant was recorded as a percentage for convenient interpretation. Participants were then graded according to their score as follows: 20% = very poor, 21%-40% = poor, 41%-60% = average, 61%-80% = good, and 81% and above = very good.

Approval from the hospital Ethical Review Board was sought before initiation of the study. Verbal informed consent was taken from the participants. Demographic details including age, qualification, post, place of work years of clinical experience and speciality were recorded. OKAT proforma was then filled out by the participants; the anonymity and confidentiality of all the participants were ensured.

Data analysis was carried out using SPSS version 23. Categorical variables were reported as percentages and frequencies whereas continuous variables were recorded as mean and standard deviation (SD). The association between socio-demographic characteristics and level of knowledge were calculated using the Pearson Chi-square test. A p-value < 0.05 was considered statistically significant. Participants were divided into three groups; those with poor knowledge (score <10), those with satisfactory knowledge (score 10-15) and those with good knowledge (score > 15). ANOVA was applied to find out the association of the level of knowledge with the qualification and speciality of the responders.

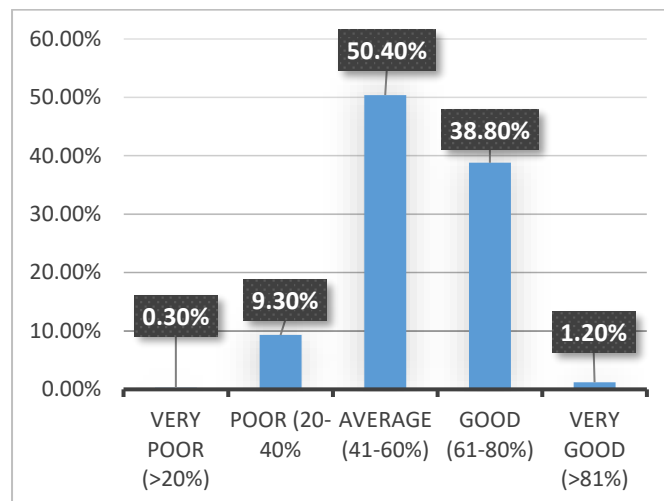
### 3. Results

335 medical professionals participated in this study. There were 117 (34.9%) males and 218 (65.1%) females with a mean age of  $28.8 \pm 4.6$  years (age range 21 – 49 years). Out of these, 225 (67.2%) had a postgraduate level of education, while 110 (32.8%) were graduates. The majority of the participants 102 (30.4%) and 175 (52.2%) were working as house officers and trainees respectively, while 25 (7.5%) were medical officers, 14 (4.2%) consultants and 19 (5.7%) speciality registrars. Out of 335, most of the participants 282 (84.2%) had less than 5 years of working experience, followed by 41 (12.2%) with 6-10 years of experience. The demographic characteristics of the study participants are given in Table 1.

**Table 1: Summary of baseline demographic characteristics of the study group (n=335)**

| Characteristics                | Frequency (n)  | Percentage (%) |
|--------------------------------|----------------|----------------|
| Mean Age                       | 28.8±4.6 years |                |
| Age range                      | 21 – 49 years  |                |
| Gender                         |                |                |
| Males                          | 117            | 34.9%          |
| Females                        | 218            | 65.1%          |
| Level of education             |                |                |
| Graduates                      | 110            | 32.8%          |
| Post-graduates                 | 225            | 67.2%          |
| Working status                 |                |                |
| House officers                 | 102            | 30.4%          |
| Trainees                       | 175            | 52.2%          |
| Medical officers               | 25             | 7.5%           |
| Consultants                    | 14             | 4.2%           |
| Specialty registrar            | 19             | 5.7%           |
| Years of work experience       |                |                |
| <5 years                       | 282            | 84.2%          |
| 6-10 years                     | 41             | 12.2%          |
| 11-15 years                    | 6              | 1.8%           |
| >15 years                      | 6              | 1.8%           |
| Specialty                      |                |                |
| Surgery and allied             | 78             | 23.3%          |
| Medicine and allied            | 127            | 37.3%          |
| Pediatrics                     | 50             | 14.9%          |
| Gynecology                     | 43             | 12.8%          |
| Rheumatology and endocrinology | 7              | 2.7%           |
| Others                         | 30             | 9.0%           |
| Hospitals                      |                |                |
| BBH                            | 74             | 22.1%          |
| FGPC                           | 69             | 20.6%          |
| Holy Family                    | 63             | 18.8%          |
| KRL                            | 66             | 19.7%          |
| PIMS                           | 63             | 18.8%          |

The overall mean knowledge score among 335 participants was  $11.75 \pm 2.46$ , out of a maximum score of 20. The maximum score recorded was 19, while the minimum was 4 out of 20. As per knowledge score classification, the mean score was in the satisfactory category (score 10-15) and average percentage (41-60%). The majority of the participants, 169 (50.4%) and 130 (38.8%) had average (41-60%) and good (61-80%) scores the percentage distribution of very poor (<20%), poor (20-40%), average (41-60%), good (61-80%) and very good (>80%) knowledge score is given in figure 1.



**Figure 1: Percentage distribution of very poor, poor, average, good and very good knowledge score**

Table 2 describes the percentage of correct and incorrect responses to each question included in the knowledge assessment tool. Some of the items in which the majority of the participants provided incorrect responses included: Osteoporosis usually causes symptoms (e.g pain) before a fracture occurs, any type of physical activity is helpful for osteoporosis, and there is a small amount of bone loss in the ten years following the onset of menopause. There was one item for which the majority of the participants did not know the answer, the item was: a high salt intake is a risk factor for osteoporosis.

There was a very weak significant correlation found between the age of the participant and the mean knowledge score ( $r=0.130$ ,  $p=0.018$ ) which means as age increases, the mean knowledge score increases slightly. Analysis of variance revealed significant association between knowledge and qualification, and knowledge and specialty.

The mean knowledge score was significantly higher for post-graduate participants as compared to graduate participants ( $p=0.028$ )

**Table 2: Correct and incorrect response percentages to the different questions of the OKAT knowledge assessment tool**

| Questions                                                                                                                            | Correct Response % | Incorrect Response % | Don't Know % |
|--------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------|--------------|
| 1. Osteoporosis leads to increased risk of bone fractures.                                                                           | True<br>99.4%      | False<br>0.3%        | 0.3%         |
| 2. Osteoporosis usually causes symptoms (e.g. pain) before fractures occur.                                                          | False<br>17.6%     | True<br>77%          | 5.4%         |
| 3. Having a higher peak bone mass at the end of childhood gives no protection against the development of osteoporosis later in life. | False<br>54.3%     | True<br>21.8%        | 23.9%        |
| 4. Osteoporosis is more common in men.                                                                                               | False<br>93.7%     | True<br>4.5%         | 1.8%         |
| 5. Cigarette smoking can contribute to osteoporosis.                                                                                 | True<br>63%        | False<br>18.5%       | 18.5%        |
| 6. White women are at a higher risk of osteoporosis as compared to other races.                                                      | True<br>38.5%      | False<br>26.9%       | 34.6%        |
| 7. A fall is as important as low bone strength in causing a fracture.                                                                | True<br>69.9%      | False<br>19.7%       | 10.4%        |
| 8. By age 80, the majority of the women have osteoporosis.                                                                           | True<br>92.8%      | False<br>3.9%        | 3.3%         |
| 9. From the age of 50 most women can expect at least one fracture before they die.                                                   | True<br>41.5%      | False<br>37.9%       | 20.6%        |
| 10. Any type of physical activity is helpful for osteoporosis.                                                                       | False<br>23%       | True<br>64.2%        | 12.8%        |
| 11. It is easy to tell whether I am at risk of osteoporosis by my clinical risk factors.                                             | True<br>75.2%      | False<br>11.9%       | 12.9%        |
| 12. A family history of osteoporosis strongly predisposes a person to osteoporosis.                                                  | True<br>63.6%      | False<br>21.5%       | 14.9%        |
| 13. An adequate calcium intake can be achieved by two glasses of milk a day.                                                         | True<br>64.5%      | False<br>21.5%       | 14%          |
| 14. Sardines and broccoli are good sources of calcium for people who cannot take dairy products.                                     | True<br>66.9%      | False<br>14.6%       | 18.5%        |
| 15. Calcium supplements alone can prevent bone loss.                                                                                 | False<br>72.2%     | True<br>22.4%        | 5.4%         |
| 16. Alcohol in moderation has little effect on osteoporosis.                                                                         | True<br>32.2%      | False<br>43.3%       | 24.5%        |
| 17. A high salt intake is a risk factor for osteoporosis.                                                                            | True<br>23.3%      | False<br>34.6%       | 42.1%        |
| 18. There is a small amount of bone loss in the ten years following the onset of menopause.                                          | False<br>36.4%     | True<br>56.7%        | 6.9%         |
| 19. Hormone therapy prevents further bone loss at any age after menopause.                                                           | True<br>76.7%      | False<br>16.1%       | 7.2%         |
| 20. There are no effective treatments for osteoporosis.                                                                              | False<br>71.3%     | True<br>15.2%        | 13.5%        |

At the same time, the participants belonging to the rheumatology and endocrinology speciality were found to have the highest score of  $14.86 \pm 1.95$  as compared to all other speciality domains ( $p=0.006$ ). The mean knowledge score was similar for both males and females with no significant difference ( $p=0.914$ ). Similarly, for working status and years of experience, no significant differences were observed in the mean knowledge score. Although the scores were slightly higher for those with more than 15 years of experience and those working as

consultants this difference was statistically significant. Table 3 summarizes the associations between mean scores and various demographic characteristics. The comparison of knowledge categories including poor, satisfactory and good scores, with qualification (graduates, post-graduates) and speciality (surgery, medicine, paediatrics, gynaecology, rheumatology/endocrinology and others) is given in Table 4.

**Table 3: Association of mean knowledge score with demographic characteristics**

| Characteristics                 |                            | mean±SD    | p            |
|---------------------------------|----------------------------|------------|--------------|
| <b>Gender</b>                   | Male                       | 11.77±2.54 | <b>0.914</b> |
|                                 | Female                     | 11.74±2.42 |              |
| <b>Qualification</b>            | Graduate                   | 11.33±2.72 | <b>0.028</b> |
|                                 | Post-graduate              | 11.96±2.30 |              |
| <b>Working status</b>           | House officers             | 11.32±2.71 | <b>0.272</b> |
|                                 | Trainees                   | 11.95±2.39 |              |
|                                 | Medical officers           | 11.64±2.27 |              |
|                                 | Consultants                | 12.36±1.90 |              |
| <b>Years of work experience</b> | Specialty registrar        | 11.89±2.15 | <b>0.239</b> |
|                                 | <5 years                   | 11.68±2.51 |              |
|                                 | 6-10 years                 | 11.98±2.20 |              |
|                                 | 11-15 years                | 11.67±2.06 |              |
| <b>Specialty</b>                | >15 years                  | 13.67±1.36 | <b>0.006</b> |
|                                 | Surgery and allied         | 11.88±2.27 |              |
|                                 | Medicine and allied        | 11.84±2.48 |              |
|                                 | Paediatrics                | 11.30±2.39 |              |
|                                 | Gynaecology                | 11.12±2.79 |              |
|                                 | Rheumatology/Endocrinology | 14.86±1.95 |              |
|                                 | Others                     | 11.93±2.05 |              |

**Table 4: Association of knowledge categories with qualification and speciality**

|                            | Knowledge                   |                                        |                             |
|----------------------------|-----------------------------|----------------------------------------|-----------------------------|
|                            | Poor<br>(Score <10)<br>n=29 | Satisfactory<br>(Score 10-15)<br>n=255 | Good<br>(Score >15)<br>n=17 |
| <b>Qualification</b>       |                             |                                        |                             |
| Graduate                   | 29 (46.0%)                  | 74 (29.0%)                             | 7 (41.2%)                   |
| Postgraduate               | 34 (54.0%)                  | 181 (71.0%)                            | 10 (58.8%)                  |
| <b>Specialty</b>           |                             |                                        |                             |
| Surgery and allied         | 13 (20.6%)                  | 63 (24.7%)                             | 2 (11.8%)                   |
| Medicine and allied        | 24 (38.1%)                  | 95 (37.3%)                             | 8 (47.1%)                   |
| Paediatrics                | 12 (19.0%)                  | 37 (14.5%)                             | 1 (5.9%)                    |
| Gynaecology                | 11 (17.5%)                  | 31 (12.2%)                             | 1 (5.9%)                    |
| Rheumatology/Endocrinology | 0 (0.0%)                    | 4 (1.6%)                               | 3 (17.6%)                   |
| Others                     | 3 (4.8%)                    | 25 (9.8%)                              | 2 (11.8%)                   |

#### 4. Discussion

Osteoporosis can lead to devastating physical, psychosocial and economic consequences. Despite this fact, the condition is often overlooked and undertreated; partly because it is clinically silent, and partly because this chronic disease is less prioritized by physicians as compared to diabetes mellitus and hypertension<sup>19</sup>. The role of healthcare professionals in screening and management of osteoporosis cannot be underestimated; and the burden of osteoporosis may be limited only if all healthcare professionals are well-versed in the risk

factors, prevention modalities and management of this disease.

Our study included participants with an average age of 28.8±4.6 years. This cohort is younger than that of a study done in KSA, where the mean age was 41.5 years<sup>20</sup>. The majority of doctors included in our study are working as house officers or medical officers with 84.2% having a work experience of <5 years.

Around 50% of our study participants had average knowledge (41-60%) regarding risk factors, symptoms and prevention of osteoporosis. This is higher than that reported by Chai Li Tay et al. in a study conducted in Malaysia where 31.4% of participants attained a satisfactory overall knowledge score<sup>15</sup>. A study conducted among nurses in Iran regarding the assessment of osteoporosis knowledge, practice and beliefs reported that their mean total knowledge and attitude score was at a moderate level<sup>21</sup>.

This study highlighted a weak positive association between the age of the participant and their level of knowledge (r=0.130, p=0.018); this is contrary to what is reported by Yacov Fogelman et al. who found that physicians aged <40 years exhibited better knowledge than physicians aged 40–59 or aged 50 and above.<sup>16</sup> However, our results were seconded in another study conducted in Pakistan which also reported a direct relation between the age of the participant and their osteoporosis knowledge (p<0.05)<sup>22</sup>.

As far as the association of gender and level of knowledge is concerned, our study was neutral in this regard, with no statistically significant difference (p=0.914). Another study reported similar results regarding the association of gender and level of knowledge<sup>16</sup>, however, one study conducted in Malaysia and involving Allied Health Sciences Students found females to have slightly higher levels of knowledge than males, but with no statistical significance<sup>23</sup>.

OKAT assesses knowledge regarding symptomatology, risk factors, prevention and treatment options available for osteoporosis. Evaluating the results on individual components of this questionnaire, it was found that the participants had weak knowledge in some areas. The fact that osteoporosis is a silent disease was known only by 17.6% of participants. This is lower than that reported by Naif R. Almalki et al. in a study involving medical interns from Saudi Arabia (32.4% correct responses)<sup>24</sup>. The same study reported poor knowledge about osteoporosis exercise (25.4% correct responses); similar results are reflected in our study (23% correct

responses). Also, 76% of our study participants were unaware that high salt intake is a risk factor for osteoporosis; an even higher percentage of participants (83.5%) were also unaware of this fact as quoted by a study done in Malaysia<sup>25</sup>.

A few limitations were encountered in the present study. The tool used in this study (OKAT), does not assess the knowledge regarding practices and approaches to the management of osteoporosis including prescription preferences, timing of initiation of treatment and safety profile of various drugs used in its management. Indeed, awareness and basic knowledge of osteoporosis will correlate with management practices, and this study opens up avenues for further research and surveys in this regard.

## 5. Conclusion

We conclude that the majority of the doctors possessed average knowledge regarding symptoms, risk factors and prevention of osteoporosis, scoring 41-60% on the OKAT questionnaire. The level of knowledge is affected by age, qualification and speciality of the health care provider and is independent of gender. This study also highlights key areas where doctors hold inadequate knowledge and hence provides directions for policymakers to intensify efforts to improve the knowledge of all healthcare providers to reduce the burden of this debilitating disease.

## INSTITUTIONAL REVIEW BOARD

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## CONFLICTS OF INTEREST- None

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## Contributions:

B.A, T.K, - Conception of study

B.A, H.Z.Z - Experimentation/Study Conduction

B.A, S.A.S, - Analysis/Interpretation/Discussion

B.A, S.A.S, - Manuscript Writing

T.K, S.A.S, - Critical Review

H.Z.Z - Facilitation and Material analysis

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.

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