



## How Well do Women Understand their Osteoporosis Risk?

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### Abstract

**Purpose:** This study sought to determine postmenopausal women's knowledge of osteoporosis risk factors and compare those findings to their actual risk. The goal was to determine the deficits in knowledge regarding osteoporosis risk factors that may impact care to postmenopausal women.

**Methods:** Thirty participants were selected from a local Internal Medicine office in the southern United States using a nonrandom convenience sampling method. The Osteoporosis Knowledge Assessment Tool (OKAT) was used to determine knowledge regarding osteoporosis. The lead investigator administered the OKAT tool for the participants to complete independently. After completion of the questionnaire, an osteoporosis educational pamphlet was given to the participants.

**Results:** The findings demonstrated a weak positive correlation between the participant's OKAT total score and T-score data. Twenty-six participants had lower than normal T-scores. The OKAT score ranges for the three T-score groups were: normal or higher T-score group 8-15 points, low T-score group 4-14 points, osteoporosis group 6-10 points. The normal or higher T-score group had a median score of 8.5, the median score for the low T-score group and the osteoporosis group was 8.

**Conclusion:** The null hypothesis that perceived risk (questionnaire score) will not correlate with the participant's actual risk (T-score) could not be rejected but a positive association was demonstrated.

**Keywords:** Osteoporosis knowledge assessment tool; Osteoporosis risk perception

### Introduction

Osteoporosis is a bone disorder characterized by increased bone loss and deterioration of the bone microarchitecture. Bone remodeling is a process that begins with the onset of puberty that replaces old bone with new bone [1]. An imbalance in the remodeling process begins with advancing age and menopause for women. The fracture risk is increased as the resorption of bone outweighs the formation of bone [1]. Osteoporosis can be divided into two main groups that are classified as either primary or secondary by considering factors that affect bone metabolism. Primary osteoporosis has no direct cause and generally occurs with aging and menopause [1]. However, secondary osteoporosis is associated with direct causes that are related to factors such as endocrine deficiencies, renal impairment, or drug-induced origins

[2]. Although osteoporosis affects men and women of all races and ethnic backgrounds, it is most common in postmenopausal Caucasian women. It is also known as a silent disease which often leads to increased morbidity and risk for future fractures and early mortality [3].

According to The National Osteoporosis Foundation (NOF), approximately 10.2 million adults in the United States have osteoporosis, with an additional 43.4 million having osteopenia, defined as low bone mass [4]. The NOF also released a new report that sheds light on the financial and health impact of osteoporosis in the United States [5]. The report indicates that in 2015, two million Americans who receive Medicare benefits experienced over two million fractures secondary to osteoporosis and over 200,000 of those experienced additional fractures within the next year [5]. The initial fracture resulted in a price tag just under \$22,000 for direct patient costs alone. The report indicates that osteoporosis care (including skilled nursing care) costs Medicare over 6 million

dollars annually [5].

The NOF recommends a bone density test of the spine and hip to confirm a diagnosis of osteoporosis [6]. Bone density is measured by using a central Dual-Energy X-ray Absorptiometry (DEXA) machine. The NOF clinical practice guidelines recommend a bone density test for postmenopausal women age 65 or older with risk factors and those with fractures after age 50 [6]. The NOF also recommends a repeat bone density test by central DEXA every 1-2 years [6]. While there are clinical guidelines for the screening and treatment of osteoporosis, less than one-quarter of individuals who experience a fracture secondary to osteoporosis receive a bone mineral density test or pharmacological therapy for osteoporosis in the six months following the fracture [7]. Also, despite an increase in the variety of agents available to treat osteoporosis, there has been a decrease in compliance with treatment options [7]. Because of treatment gaps, the financial and health implications of osteoporosis that further insight into patient knowledge of risk factors needs to be investigated.

The purpose of this research was to assess postmenopausal women's knowledge of osteoporosis risk factors and compare those findings to their actual risk. The goal was to find the gaps in women's knowledge of osteoporosis risk factors to improve provider education on primary and secondary prevention of osteoporosis.

## Methods

The investigators conducted a quantitative, correlational pilot study at one local Internal Medicine office in the southern United States. Potential participants were selected using a nonrandom convenience sampling method by a chart review prior to their regularly scheduled appointment. Participants were postmenopausal women aged 65 and older who had a previously recorded T-score. The inclusion criteria for this study were being at least 65 years of age, experiencing physiological menopause, and having a previously performed DEXA with documented T-score. On the day of their regularly scheduled clinic appointment, participants received an explanation of the study from the principle investigator. Once they agreed to participate, informed consent was obtained. The goal for the sample size was 30 postmenopausal women.

The investigators obtained approval from the Institutional Review Board (IRB) of the College of Nursing at Northwestern State University. Consent was also granted from the facility.

Permission to use the Osteoporosis Knowledge Assessment Tool (OKAT) was given by Professor Tania Wizenberg. Each participant signed an informed consent before proceeding with the study.

The OKAT is a twenty-item questionnaire that evaluated osteoporosis knowledge in Australian women. It was designed to rate knowledge of osteoporosis by responding "true," "false," or "don't know" to questions drafted from the Osteoporosis Australia Osteoporosis Prevention and Self-Management Course (OPSMC) and the information leaflet "Understanding Osteoporosis" [8].

A chart review was completed on potential participants each morning. The chart review determined a) if the participants were 65 years old or greater, b) ensured documentation of T-score, and c) excluded those with a diagnosis of dementia or Alzheimer's disease. The investigators invited women to participate in the study when they arrived for their appointment. After obtaining consent, the investigators distributed the OKAT questionnaire to all willing participants.

The participants completed the questionnaire in private. The completed questionnaires were returned to the lead investigator before the participants left the clinic. Analysis of the data was measured by scoring one point for a correct response and zero points for an incorrect or "don't know" response. The total score could range from 0-20. The questionnaire included a variety of assessment data such as smoking status, history of fractures, and family history of osteoporosis. The psychometric properties of the questionnaire were measured by examining eight different analytics for statistical review to determine the complexity, ease, and satisfaction of each question.

## Results

The median, mean, minimum, maximum, and Standard Deviation (SD) were the descriptive statistics used for the OKAT and T-score results (Tables 1 and 4). The Pearson product-moment correlation coefficient was used to determine the relationship between the OKAT total score and the T-score (Table 2), and the results are represented on a scatter plot (Table 2.1). The frequency and the percentages for T-score classifications, including the frequency and percentage, were examined and the results are presented in Table 3. The null hypothesis was tested using the One-Way ANOVA, which compared the OKAT total score with the T-score classifications and the data is presented in Table 5. Cronbach's coefficient alpha was used to determine the homogeneity and reliability of the OKAT questionnaire, and the results are presented in Table 6.

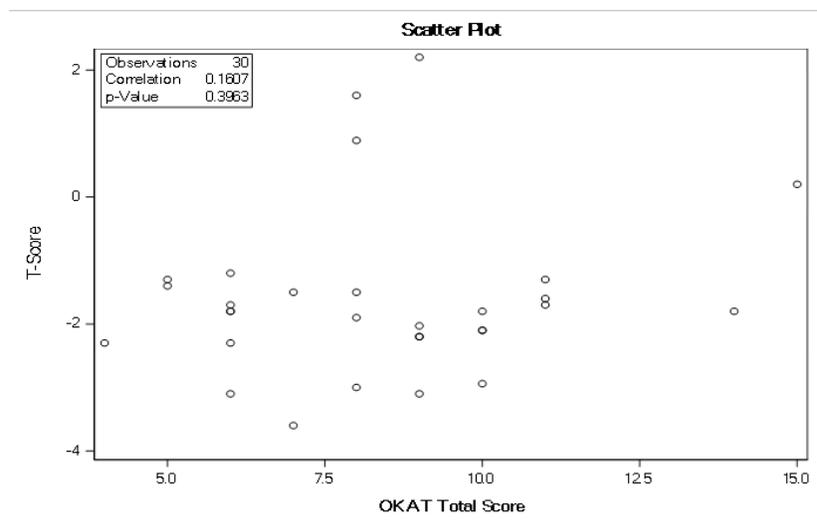
| Variable Label   | Sample Size | Mean  | 50 <sup>th</sup> Percentile (Median) | Standard Deviation | Minimum | Maximum |
|------------------|-------------|-------|--------------------------------------|--------------------|---------|---------|
| OKAT Total score | 30          | 8.37  | 8.00                                 | 2.55               | 4.0     | 15.0    |
| T-score          | 30          | -1.61 | -1.80                                | 1.31               | -3.6    | 2.2     |

**Table 1:** Descriptive Statistics. OKAT Total Score and T- Score.

| Simple Statistics |    |          |         |           |          |          |                  |
|-------------------|----|----------|---------|-----------|----------|----------|------------------|
| Variable          | N  | Mean     | Std Dev | Sum       | Minimum  | Maximum  | Label            |
| TOTSCORE          | 30 | 8.36667  | 2.55266 | 251.00000 | 4.00000  | 15.00000 | OKAT Total Score |
| T-SCORE           | 30 | -1.61267 | 1.30550 | -48.38000 | -3.60000 | 2.20000  | T Score          |

**Table 2:** Correlation between OKAT Total Score T- Score.

| Pearson Correlation Coefficients, N = 30 |                   |                   |
|--|-------------------|-------------------|
| Prob >  r  under H0: Rho=0               |                   |                   |
|  | TOTSCORE          | T-SCORE           |
| TOTSCORE<br>OKAT Total Score             | 1.00000           | 0.16069<br>0.3963 |
| T-SCORE<br>T- Score                      | 0.16069<br>0.3963 | 1.00000           |



**Table 2.1:** Scatter Plot Representing Relationship between the OKAT total score and T-score.

| Bone Density Classification |           |         |
|-----------------------------|-----------|---------|
| T-Score Category            | Frequency | Percent |
| Normal or Higher            | 4         | 13.33   |
| Low Bone Mass               | 21        | 70.00   |
| Osteoporosis                | 5         | 16.67   |

**Table 3:** Frequencies and Percentages for T-Score Classification. The FREQ Procedure.

| Bone Density Classification | Variable Label   | Number of Non-missing Observations | Mean    | Standard Deviation | Minimum | 50th Percentile (Median) | Maximum |
|-----------------------------|------------------|------------------------------------|---------|--------------------|---------|--------------------------|---------|
| Normal or Higher            | OKAT Total Score | 4                                  | 10.0000 | 3.36650            | 8       | 8.5                      | 15      |
| Low Bone Mass               | OKAT Total Score | 21                                 | 8.1429  | 2.57460            | 4       | 8.0                      | 14      |
| Osteoporosis                | OKAT Total Score | 5                                  | 8.0000  | 1.58114            | 6       | 8.0                      | 10      |

**Table 4:** Descriptive Statistics for OKAT Total Score by T-Score Classification.

| _SOURCE_ | F       | Degrees of Freedom | Degrees of Freedom (Error) | P-Value from ANOVA |
|----------|---------|--------------------|----------------------------|--------------------|
| T-Score  | 0.94769 | 2                  | 27                         | 0.4002             |

**Table 5:** Results from One-Way ANOVA Comparing OKAT Total Scores among T-Score Classifications.

| OKAT Scale | Number of Items | Cronbach's Coefficient Alpha | Average Correlation Between Items |
|------------|-----------------|------------------------------|-----------------------------------|
| RAWALPHA   | 20              | 0.4895                       | 0.0457                            |

**Table 6:** Cronbach's Coefficient Alpha for the OKAT Scale.

The descriptive statistics in the OKAT total score were the following: the mean score was 8.37 (SD=2.55), the median score was 8.00, the minimum score was 4.0, and the maximum score was 15.0. The score range for the OKAT was 0-20. The descriptive statistics for the T-score were the following: the mean score was -1.61 (SD=1.31), the median score was -1.80, the minimum score was -3.6, and the maximum was 2.2. The relationship between the OKAT total score and the T-score was established by using the Pearson product-moment correlation coefficient.

The percentages of women with normal or higher, low bone mass, or osteoporosis were summarized in Table 3 using the FREQ procedure. The percentage of participants with normal or higher (-1 and above) T-score classification was 13.33, with a frequency of four. The percentage of participants with low bone mass T-score classification (-2.5 to -1.0) was 70, with a frequency of 21. The percentage of participants with a T-score classification of osteoporosis (less than -2.5) was 16.67, with a frequency of five. For the four participants in the normal or higher T-score classification, the mean OKAT score was 10 (SD=3.37), the minimum score was 8, the median score was 8.5, and the maximum score was 15. For the 21 participants in the low bone mass classification, the mean

OKAT score 8.1429 (SD=2.57), the minimum score was 4, the median score was 8, and the maximum was 14. For the five participants with osteoporosis, the mean and medium OKAT score were 8 (SD=1.58), the minimum score was 6, and the maximum score was 10.

The results from the One-Way ANOVA that compared the mean OKAT total scores for the three T-score classifications showed no statistically significant difference. The F score was 0.95 and the *p* value was 0.4002 (*P* < 0.05 is significant). Although the mean OKAT scores decreased as the participant's condition worsened, the difference was not statistically significant.

## Discussion

The findings demonstrated a weak positive correlation between the participants' OKAT total score and T-score data. Consequently, the results supported the belief that there was no statistically significant difference in the OKAT total scores in comparison to the T-scores.

Although the null hypothesis could not be rejected, there were some interesting result findings. The greatest number of points received in the osteoporosis group was 10 out of 20,

compared to the osteopenia group that received 14 out of 20 total points. The greatest number of points earned by the osteoporosis and osteopenia groups were lower than the highest points received by the normal-high T-score group. The osteopenia group had the lowest score (4 out of 20 points) of the three groups. The normal-high T-score group's median score of 8.5 was higher than the median score of the osteopenia and osteoporosis groups.

## Conclusion

Understanding patients' perception of postmenopausal osteoporosis is essential for providers to effectively provide education on the treatment options and to improve their overall wellbeing. Providers should engage patients in a discussion detailing their specific risk factors for developing postmenopausal osteoporosis, specific treatment options, required lifestyle changes, and complications. This study reflects the need for provider implemented strategies to improve postmenopausal women's knowledge regarding managing their osteoporosis risks to reduce the burden on the economy and their quality of life.

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