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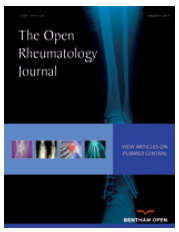

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RESEARCH ARTICLE

Cross-Cultural Adaptation and Psychometric Properties of Osteoporosis Knowledge Tool-Arabic Version Among Iraqi Population

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Abstract:

Background:

Osteoporosis is a major public health problem as the majority of people are not aware of the disease until the complications occur.

Objective:

The aims of this study were to validate Osteoporosis Knowledge Tool (OKT-A) Arabic version and to assess the osteoporosis knowledge among Iraqi general population.

Methods:

A descriptive, cross-sectional study was carried out in the city of Baghdad with a random cluster sampling method from the community. Forward–backward-forward translation method was used to translate the OKT questionnaire from English into Arabic language. The psychometric assessment process includes: face validity, reliability (Cronbach's alpha and test-retest), item difficulty index, point biserial correlation and discriminatory power.

Results:

The results showed good face validity. The Cronbach's alpha and Pearson correlation coefficient of the test re-test reliability were 0.775 and 0.412, respectively. Item difficulty index, point biserial correlation ranges and discriminatory power were 0.105 to 0.852, 0.105 to 0.445 and 0.933, respectively. These results demonstrated that OKT-A was a reliable and stable tool. The results showed low OKT-A scores 11.50±3.958. Furthermore, the OKT-A scores and its subscales were less than 50%. In addition, there were significant differences between the following independent variables in relation to total OKT-A scores: educational level, do you have osteoporosis or ever heard about osteoporosis. Moreover, there was a significant association between ever heard about osteoporosis groups and the OKT-A knowledge levels.

Conclusion:

This study showed good validity and reliability of OKT-A tool among Arabic general population. In addition, the results showed an urgent need for implementing an educational programme and should be a public health practice to increase the knowledge toward osteoporosis and its related risk factor.

Keywords: Arabic, Knowledge, Osteoporosis, Validation, Psychometric properties, BMD.

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1. INTRODUCTION

Osteoporosis (OP) is a silent painless metabolic process that leads to the increase in bone fragility, susceptibility to fractures and premature death rate [1 - 4]. OP is characterised by decrease in Bone Mineral Density (BMD), which is due to the microarchitectural deterioration of bone tissue [5]. As it affects both sex, it's a major public health problem as more people are not aware about it until complications occur [6 - 8]. In addition, OP leads to a decrease in the quality of life as a result of severe back pain, loss of independence, costly rehabilitation and excessive health care [2, 9].

As with other chronic disease, prevention of OP is critically important. Lifestyle modification is the key component in this prevention process to increase bone mass density. Managing modifiable risk factors like regular weight-

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bearing exercise, increase calcium and vitamin D intake, stop smoking and alcohol intake are the cornerstone in preventing OP development [10, 11].

Strategies focused on gaining information toward osteoporosis are important for promoting osteoporosis preventing behaviour for high-risk populations and preserving lifelong bone health [12 - 17]. A review article by Werner P. discusses the utility of several tools that used to assess knowledge toward osteoporosis [18]. Though, the Osteoporosis Knowledge Test (OKT, 24 items) is the most reliable and widely used tool that had been successfully translated and validated in different communities, there is paucity in literatures regarding its use for Arabic cultures. Moreover, the only Arabic tool that was found in the literatures was Osteoporosis Knowledge Assessment Tool (OKAT) which is 32 items [19 - 21]. This makes OKT questionnaire an easy and short to answer and valuable to be assessed. Moreover, it is surprising that approximately 1% of the global research output regarding OP were published from Arab countries [22]. Accordingly, this topic is vital to be evaluated for improving OP prevention strategies and behaviour. Therefore, the aims of this study were to assess cross-cultural adaptation and psychometric properties of OKT Arabic version and to evaluate the osteoporosis knowledge among Iraqi general population.

2. MATERIALS AND METHODS

2.1. Participants and Study Design

A descriptive, cross-sectional study from the community was conducted from November 2016 to February 2017 in Baghdad capital, Iraq. Random cluster sampling method was used to select three areas from two large district areas named Al-Rusafa (six districts; east of the Tigris) and Al-Kharkh (four districts; west of the Tigris) of Baghdad. Equal number of participants from each area was recruited through systemic random sampling method. Community pharmacies where the undergraduate students undertake their training were used as a place to invite the participants in each area. The inclusion criteria for participants were: more than 18 years, no cognitive impairment, able to write and read in Arabic. Though structured interview included the administration of socio-demographic data and the translated OKT-Arabic version (OKT-A), each participant was interviewed individually by the researchers or trained 5th year undergraduate student after written informed consent.

2.2. Sample Size

A recommendation suggested that at least 5 subjects per item are needed to evaluate the validity and reliability of a questionnaire [23]. The original OKT consist of 24 questions; therefore 120 participants were needed for the purpose of validation. Doubling the sample size, with an additional 30% as drop out was considered necessary for the study to overcome erroneous results. Only 400 participants were accepted to be involved in this study, however, 75 of them were ineligible due to incomplete responses. Therefore, only 325 participants were selected for this study (25 participants for pilot study and 300 for the final study analysis). Twenty five participants from the sample population were randomly selected for test- retest within 1-2 weeks according to the participant's convenience.

2.3. Instruments and Measurements

All participants completed the structured questionnaires including OKT-A. The original OKT is in English language and designed to measure osteoporosis knowledge with 24 multiple-choice items regarding risk factors and its prevention. It is divided into two parts: OKT-exercise subscale and OKT-calcium subscale. From 0 to 24 is the possible score range and the highest value indicate the highest level of knowledge score [24]. A cut-off point [14] was used to categorize the osteoporosis knowledge scores into two levels: low and high OKT-A [25].

2.4. Instrument Translation

Permission to use the OKT was obtained from the author of the original instrument. Forward–backward-forward translation method was used to translate the questionnaire from English into Arabic according to translation international guidelines including forward translation, reconciliation, reverse translation, debriefing [26 - 29]. The translation process was undertaken by two independent expert translators in Iraq . Thereafter, the researchers and an expert panel (eight clinical pharmacists) reviewed the Arabic version for reconciliation. Then, the reconciled version was again translated by two different translators. Then, repeated discussions between the researchers, the expert panel and the translators were undertaken to resolve any inconsistencies and harmonise the final version. Finally, twenty five participants from the same study demographic areas were recruited for a pilot study and the questionnaire was modified according to their feedback to be a face valid tool (Face validation process). The pilot study results were excluded from the results of the final study analysis and sample size.

2.5. Reliability and Validation

2.5.1. Reliability

Reliability with a minimum acceptable criterion above 0.5 was applied to measure the consistency of a measurement item [30]. The internal consistency was evaluated using Cronbach's alpha and corrected item total correlations between the scales and their corresponding items (correlation of < 0.20 is considered poor). Pearson's correlation coefficient was used to evaluate test-retest reliability [23].

2.5.2. Item Difficulty Index

The item difficulty index (P) is a measure of difficulty to answer the question. It is the ratio between the numbers of respondents answering the item correctly to the total number of responses. The (P) value is a range between 0 (meaning no one can answer the question correctly) to 1 (meaning everyone can answer this question correctly). The most acceptable values are between 0.3 and 0.7. An items with values more than 0.75 is considered poor, *i.e*., these items are answered correctly more frequently [31].

2.5.3. Point Biserial Correlation and Discriminatory Power

The point biserial correlation is the reliability index for each item and refers to an item-total correlation. A correlation of <0.20 is considered poor [23]. On the other hand, discriminatory power indicates how broadly the total scores of a sample are distributed over the possible range. It can be measured using Ferguson's sigma and the item is consider discriminant if the value is above 0.9 [32].

3. STATISTICAL ANALYSIS

Predictive Analytics Software (PASW) version 19.0 was used to analyse data in this study. Descriptive statistics, percentages and frequencies were used as needed. The significance level was set at a *P* value less than 0.05. The chi square ($\chi 2$) test was employed for categorical variables while for continuous data, Mann-Whitney U and Kruskal-Wallis tests were used to evaluate the differences between the groups when required. The statistical analysis of the validation and reliability processes included (Cronbach's alpha and test-retest) and item analysis.

4. RESULTS

4.1. Socio-Demographic

The average age of the participants was 41.82±12.452 years with a range from 18 to 87 years. The majority of respondents were female (54%). Nearly 79% of the patients had educational level beyond secondary school (more than 12 years). More than half of the participants were married (77%) and had monthly income more than 500,000 thousand Iraq dinner (IQD) (62%; IQD; 1 US dollar is equivalent to 1,200 IQD). The majority of respondents had heard about osteoporosis (93%). The most common sources of information about OP as follows: internet (34%), doctor (31.7%), family and friends (17.3%). A smaller proportion of respondents had heard about osteoporosis from the pharmacist (6.7%), television (10.7%), social media (11.7%), magazine (5.3%) and medical advertisement (5%).

By employing the recommended scoring method, the mean score (M±SD) of the OKT-A was 11.50±3.958, which was considered a low score. Table **1** shows the demographic data results and the distribution of the two levels of osteoporosis knowledge. Only 31.70% of the study population was found to have high OKT-A level. The results showed significant difference between the following independent variables in relation to total OKT-A scores: educational level (P<0.005), Do you have osteoporosis (P<0.005) and ever heard about osteoporosis (P<0.001). In addition, there was a significant association between ever heard about osteoporosis groups and the OKT-A knowledge levels (P<0.01) (Table **1**).

Table **2** shows the correct answer percentage of OKT-A and its two subscales and Table **3** shows the percentage of correct response and incorrect response of each question of OKT-A among sample population. The results showed that the OKT-A scores and its subscales were less than 50%. The lowest value was within the OP knowledge toward risk factors. Less than 30% correct answers were found within the questions 3 (Having big bones), 4 (Eating a diet high in dark green leafy vegetables) and 7 (Having ovaries surgically removed). In addition, the lowest values in OKT-A exercise subscale were questions: 14 (30.30%, Exercise makes bones strong, but it must be hard enough to make breathing) and 16 (27.30%, Which of the following exercise is the best way to reduce a person's chance of getting osteoporosis). Moreover, the lowest values in OKT-A calcium subscale were questions: 21 (32.30%, Which of these is a good source of calcium) and 22 (9.70%, Which of the following is the recommended amount of calcium intake for an adult).

4.2. Validation and Reliability

The face validity of the OKT-A questionnaire was guaranteed and showed good readability as per feedback from of the eight professionals, the pilot study and the extensive translation method. Then, the tool was ready for testing the main objectives. Regarding item analysis for OKT-A, the item difficulty index for most items were between 0.105 and 0.852, which is satisfactory (Table **4**). Only three items (Item 15, 17 and 20) scored above 0.75 which indicated that most of the subjects answered these questions correctly, and only one item (Item 22) had a low difficulty index below 0.2. However, these four items were retained as they reflected basic knowledge regarding osteoporosis. The corrected item-total correlation (Point Biserial Correlation) values ranged from 0.105 to 0.445 (Table **4**).

Although only one item (item 22) showed corrected item-total correlation value of less than 0.20, all items appeared to be suitable for retention depending on the meaningfulness of the items. Ferguson's sigma for the questionnaire was 0.933, which is considered prefect.

For the reliability, the Cronbach's alpha test of internal consistency was 0.775 for the twenty four items in OKT-A, and it's within the recommended acceptable result for reliability [30]. The test-retest reliability of 24 items OKT-A indicated an excellent reliability and stability of the instrument with Pearson correlation coefficient of 0.412 (P < 0.05). An initial Cronbach's alpha result for the OKT-A test-retest group was 0.474, and after 1 to 2 weeks, it was 0.727. These results demonstrated that OKT-A was reliable and stable.

5. DISCUSSION

To reduce the risk of future bone fractures, osteoporosis prevention by the mean of educational programme is the most effective way. Nonetheless, before any educational programme to be implemented, the knowledge must be assessed so that the programme could be tailored according to the required need for the population. Hence, this is the first study that translates and

validated comprehensively the OKT to Arabic language. The reliability of the OKT-A, which is the consistency of a measurement item, was good with an acceptable overall Cronbach's alpha [30]. This result was comparable to the original OKT tool and the translated Malaysian and Persian OKT [25, 33, 34]. The test–retest reliability Cronbach's alpha value after 1-2 weeks was higher than the initial value indicating that the respondents may be more aware about OP and this could be used in longitudinal or cohort studies to measure the change in knowledge level. In addition, the difficulty indexes which assess the difficulty of the items to be answered correctly were within the acceptable level [31]. Moreover, point biserial correlation and Ferguson's sigma values which are an item-total correlation and discriminatory power, respectively, were within the acceptable range and indicated that the tool is reliable and discriminating [23, 32].

Table 1. Participants demographic characteristics.

Characteristics	Low Knowledge (N=205)	High Knowledge (N=95)	Total Samples (N=300)
24 item OKT-A score	9.40±2.720	16.03±1.859	11.50± 3.958
OKT-A exercise	5.66±2.190	10.85±1.902	7.30±3.204
OKT-A calcium	6.63±2.196	11.13±1.715	8.05±2.934
Age			
≤44	56.6	66.3	59.7
≥45	43.4	33.7	40.3
Gender			
Male	47.3	43.2	46
Female	52.7	56.8	54
Educational levels [a]			
< 12 years	23.4	15.8	21
≥ 12 years	76.6	84.2	79
Marital status			
Single	22	25.3	23
Married	78	74.7	77
Employment status			
Working	82.9	86.3	84
Unemployed	17.1	13.7	16
Monthly income (IQD)			
≤ 500,000	38	37.9	38
> 500,000	62	62.1	62
Living place			
Rural	22.9	20	22
Urban	77.1	80	78
Family history of osteoporosis			
No	73.2	71.6	72.7
Yes	26.8	28.4	27.3
Family history of fracture			
No	57.6	62.1	59
Yes	42.4	37.9	41
Do you have osteoporosis [a]			
No	87.8	92.6	89.3
Yes	12.2	7.4	10.7
Ever heard about osteoporosis [b, c]			
No	9.8	1.1	7
Yes	90.2	98.9	93
Osteoporosis diagnosis or screening			
No diagnosis before	81.5	83.2	82
Yes diagnosis	18.5	16.8	18
Smoking habit			
Not smoking	80	77.9	79.3
Smoking	20	22.1	20.7
Alcohol habit			

(Table 1) contd.....

Characteristics	Low Knowledge (N=205)	High Knowledge (N=95)	Total Samples (N=300)
Non alcoholic	99	100	99.3
Alcoholic	1	0	0.7

Data expressed as mean ±standard deviation (M±SD) or frequency (percentage, %); IQD: Iraq dinner (1 US dollar is equivalent to 1200 IQD; [a] significant difference $P<0.05$; [b] significant difference $P<0.001$. [c] significant association between groups $P<0.01$.

Table 2. Description of osteoporosis knowledge test-Arabic version (N=300).

Variable	Mean ± Standard Deviation (Median)	Potential Range	Correct %
Osteoporosis Knowledge Test Arabic version (OKT-A)	11.50±3.958 (11)	0-24	47.93%
Osteoporosis knowledge to risk factors	3.85±2.10 (4)	1-9	42.81%
Osteoporosis Knowledge Test Exercise subscale (OKT-A exercise)	7.30±3.204 (7)	0-16*	45.64%
Osteoporosis Knowledge Test-Calcium subscale (OKT-A calcium)	8.05±2.934 (8)	0-17*	47.36%

*Sum of the potential range for the Exercise subscale and Calcium intake subscale was larger than total potential range because the two subscales shared nine common questions (1-9).

Table 3. Percentage of correct and incorrect responses among sample population (N=300).

Question Number	Correct Response (%)	Incorrect Response (%)
Question 1	45.7	54.3
Question 2	40	60
Question 3	23.3	76.7
Question 4	25	75
Question 5	48.3	51.7
Question 6	58.7	41.3
Question 7	27.3	72.7
Question 8	48	52
Question 9	69	31
Question 10	60.7	39.3
Question 11	53.3	46.7
Question 12	45.7	54.3
Question 13	53.7	46.3
Question 14	30.3	69.7
Question 15	74	26
Question 16	27.3	72.7
Question 17	86.3	13.7
Question 18	65.7	34.3
Question 19	58.3	41.7
Question 20	81.3	18.7
Question 21	32.3	67.7
Question 22	9.7	90.3
Question 23	36	64
Question 24	50.3	49.7

The results showed low correct answer frequencies for all dimension with low overall knowledge score. Similar results using OKT tool showed low level of knowledge regarding OP [12, 15, 35, 36]. In addition, other studies in Arabic population using Osteoporosis Knowledge Assessment Tool (OKAT) showed similar results [20, 37]. Preventive measurements are effective in controlling OP, unless the persons are familiar with them. Previous report showed that low calcium rich food intake and lack of exercise was associated with low OP knowledge level [13]. The results showed that the respondents were unable to identify that having big bones and having ovaries surgically removed as risk factors to get OP. Similar results showed that low identification level to the risk factors of OP were also reported [13, 35]. Moreover, the respondents were unable to identify the recommended daily dose of calcium and the alternate food rich in calcium beside cheese and yogurt. Beside this, the respondents knew that exercising on a regular base, briskwalking and jogging or running can prevent OP. However,

Table 4. Psychometric properties of the osteoporosis knowledge test-Arabic version (OKT-A) by item analysis (N=300).

Question Number	Difficulty Index	Point Biserial Correlation*	Cronbach's alpha if item deleted
Question 1	0.463	0.345	0.766
Question 2	0.383	0.326	0.767
Question 3	0.228	0.261	0.770
Question 4	0.247	0.281	0.769
Question 5	0.444	0.244	0.772
Question 6	0.574	0.297	0.769
Question 7	0.272	0.362	0.765
Question 8	0.475	0.402	0.762
Question 9	0.685	0.333	0.768
Question 10	0.642	0.432	0.762
Question 11	0.537	0.445	0.758
Question 12	0.463	0.354	0.766
Question 13	0.531	0.373	0.764
Question 14	0.333	0.297	0.769
Question 15	0.772	0.413	0.761
Question 16	0.284	0.289	0.769
Question 17	0.852	0.232	0.772
Question 18	0.654	0.105	0.776
Question 19	0.685	0.230	0.772
Question 20	0.809	0.282	0.769
Question 21	0.272	0.275	0.770
Question 22	0.105	0.404	0.762
Question 23	0.309	0.241	0.771
Question 24	0.543	0.261	0.770

* Give corrected item-total correlation

they did not know how many days a week, the intensity of the exercise required and the alternate type of exercise like Aerobic dancing to prevent OP. Previous reports showed related results [38 - 41].

This study showed that 68.30% of the respondents had insufficient OP knowledge despite high awareness of the sample population regarding OP (93% heard about OP). This may be due to incorrect or inadequate information regarding OP had been gained. This result is consistent with the previous reports. Ribeiro *et al.* found that women possess limited knowledge and do not take adequate measures to prevent osteoporosis when they are receiving inadequate information about the disease [42]. In addition, Turkish study showed that although 60% of the respondents had heard about OP, only 44.9% of them could correctly define it [39]. Moreover, Taylor *et al.* showed that education and practicing to prevent OP by general practitioners in London was consider inadequate, however, their awareness of the importance of preventing OP was adequate [43]. Furthermore, Werner P. showed a serious deficit in OP knowledge for both general population and healthcare professionals [18]. Additionally, the results showed that only 6.7% of the sample population had heard about OP form pharmacists which indicated that the counselling and prevention strategies of the pharmacists were questionable. However, this was not measured in this study, but three recent studies showed that this result may be due to the fact that the pharmacists were either reactive than proactive regarding OP counselling or had low knowledge regarding OP prevention strategies [44 - 46]. Therefore, an educational program with reliable information is an urgent necessity to increase the awareness to prevent OP. In addition, using the OKT-A would be a useful tool in general practice to identify the population with low OP knowledge level.

Furthermore, it appears that the total OKT-A score was enhanced when the educational level increases (≥ 12 years). This finding was comparable with the other report [47, 48, 41]. In general, it is obvious that osteoporotic patients are more likely to have more information about OP. However, in this study, the total OKT-A and OKT-A exercise subscale were decreased significantly, if the respondents have OP. This indicated that the respondents were still unaware about the suitable exercise to prevent osteoporosis. Similar results showed intervention directed to the patients and their physicians will increase the patients' OP knowledge [49].

As previously mentioned, the respondents did not identify the alternate source of calcium or type of exercise due to their deficient knowledge. In Iraq, the culture does not accept someone running or cycling in the street and this applies particularly for women. In addition, the long hot summer weather does not let the person do regular exercise out door. Hence, the space and time are obstacles. Furthermore, adopting a healthier lifestyle is an obstacle due to the unavailability of

alternative foods in the markets and/or they are more expensive [50, 51]. Previous reports showed that high calcium intake levels were associated with a high motivation to health and OP knowledge [35, 52 - 54]. Therefore, those respondents could change their behaviours by increasing their knowledge and a consequence increase health motivation and practice. Consequently, the results recall the previous conclusions that the knowledge as a single measure is insufficient but can be a preparation phase to start the preventive healthy behaviours [55, 56]. This means that sample population could cop the barriers in future if they had good knowledge toward OP.

As with the other cross sectional study, the results cannot be generalised for all population. However, the full and comprehensive translation and validation with a good sample size give a high impact for this study.

CONCLUSION

This study showed good psychometric properties and cultural adaptation of OKT-A tool and could be used in clinical setting or with Arabic general population. In addition, the results showed an urgent need for implementing an educational program to increase the knowledge toward OP and its related risk factor so that the preventing behaviour of the population can be improved.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was approved by the Scientific Committee of Al-Rafidain University Collage, Baghdad, Iraq.

HUMAN AND ANIMAL RIGHTS

No experiments involving human or animals were used in this research. This research was conducted in compliance with the principles laid in declaration of Helsinki in 1975 and revised in 1983.

CONSENT FOR PUBLICATION

All participants were provided with a written informed consent form prior to participation in this study. All personal information collected was considered confidential.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

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