Knowledge of osteoporosis and its related risk factors among nursing professionals

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ABSTRACT

Introduction: Knowledge about osteoporosis and its related risk factors may be lacking among nurses in Singapore. The objective of this study was to assess the various aspects related to nurses' knowledge and attitudes regarding osteoporosis.

Methods: The Facts on Osteoporosis Quiz was used to survey 100 nurses who attended an osteoporosis nursing symposium at the largest hospital in Singapore.

Results: No respondent scored 100 percent on the quiz. One-way ANOVA showed that tertiary hospital respondents had a lower mean score at 14.26 +/− 2.571 compared to the scores of staff from polyclinics and rehabilitation hospitals at 15.71 +/− 1.704 and 16.67 +/− 1.211, (p-value is 0.029), respectively. Respondents had good knowledge regarding certain aspects of osteoporosis. The majority (94.6 percent) knew that without preventive measures, 20 percent of women older than 50 years would have a fracture due to osteoporosis in their lifetime, that bone loss speeds up after menopause (92.9 percent) and that smoking increases the risk of osteoporosis (91.1 percent). However, only one (1.8 percent) respondent knew that the statement "walking has a great impact on bone health" is false. Knowledge about the required calcium intake in growing children was also poor, with 39.3 percent believing that a glass of milk provided enough calcium to prevent osteoporosis in this age group.

Conclusion: Although this was a small pilot study, it does highlight the fact that knowledge of osteoporosis among nurses in Singapore may be insufficient. More osteoporosis outreach programmes for nursing professionals are warranted.

Keywords: Facts on Osteoporosis Quiz, knowledge of osteoporosis, nurses, Singapore

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INTRODUCTION

Osteoporosis is rapidly assuming epidemic proportions in Singapore, as it is in the rest of the developed world. It is likely to increase in Singapore as we have one of the fastest-growing aging populations in Asia. Osteoporotic fracture rates in Singapore are among the highest in Asia.[1] In the late 1990s, the age-adjusted rates of osteoporotic hip fractures for men and women (per 100,000 population) were 180 and 459 in Hong Kong, 164 and 442 in Singapore, 88 and 218 in Malaysia, and 114 and 289 in Thailand, respectively, compared with the rates of 187 in men and 535 in women in the United States.[1] Urgent action to deal with this devastating chronic illness is necessary to prevent the dreaded complications of fractures. Nursing professionals are the key link in the chain of multidisciplinary approach to the management of this potentially preventable disease, and in educating patients about the various aspects of its evaluation and management.

There are emerging studies from several countries on the knowledge of osteoporosis among healthcare workers using various assessment tools, and many studies have reported a deficit in knowledge among this group.[2-6] All these studies had adopted the Osteoporosis Knowledge Test (OKT), a 24-item, multiple-choice instrument developed by Kim et al in 1991 to assess the knowledge level of osteoporosis and its related risk factors among allied healthcare professionals.[7] However, this instrument was designed in a multiple-choice format and was originally meant for an American population. Hence, the content needs to be modified to suit local contexts. Several inconsistencies in the OKT content have been demonstrated in various studies. Also, the questionnaire addresses knowledge about specific facts and statistics about osteoporosis. Both the above reasons may render the OKT questionnaire unsuitable for administration and interpretation in its original form in Singapore.

The Facts on Osteoporosis Quiz (FOOQ) is another instrument that has been developed to assess knowledge of osteoporosis. This instrument consists of 20 true and false questions, and its content was generated based on the osteoporosis consensus conference of the National Institutes of Health in 2000.[8] It has a content validity of 0.87 and an internal consistency reliability of

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0.76, but unlike the OKT, it does not require in-depth knowledge about statistical figures on osteoporosis.[8] A randomised study was conducted by Hannon using the FOOQ to investigate nurses' and midwives' knowledge of osteoporosis, as well as to assess their education and training needs.[9] The study has raised concern over the competency of nurses and midwives in playing a vital role in health education and promotion, as it found that the mean score of nurses' knowledge of osteoporosis was only 13.75, which was less than the mean score of 16.8 found among a general population in Ailinger et al's study.[8] However, the scoring system used by Hannon is also conceptually more difficult to interpret, for example, the participants who scored poorly were assigned individual categorical scores of 6–19.

Knowledge about osteoporosis, its complications and management may be lacking among both lay people as well as nursing professionals in Singapore. A population-based survey conducted by Saw et al to determine the awareness, knowledge of risk factors and attitudes toward osteoporosis in middle-aged and elderly Chinese women showed that awareness of osteoporosis as a serious disease was still lacking.[10] Another study that looked at the knowledge of risk factors and current health practices in the prevention of osteoporosis among nursing professionals also suggested the need for healthcare professionals to increase their awareness of this disease.[5] The latter study, however, used the OKT questionnaire, which was also restricted to orthopaedic unit nurses.

To mark World Osteoporosis Day, the Osteoporosis and Bone Metabolism Unit at the Singapore General Hospital organised a symposium on osteoporosis for healthcare professionals. The objective of the symposium was to update nursing professionals on osteoporosis and its holistic management. Since it was felt that the symposium would be a good opportunity to test our hypothesis that knowledge about osteoporosis, its risk factors, prevention and treatment may be lacking among nursing professionals in Singapore, a survey to voluntarily test the participants, who represented different institutions across Singapore, on their knowledge of the above was conducted prior to the start of the symposium. The purpose of the survey was to assess nurses' knowledge of osteoporosis risks and its associated lifestyle factors. We also hoped that it would provide nursing educators with data that could help them to plan and prepare for more outreach programmes targeted at nursing professionals from different disciplines, as well as equip them with better knowledge so that they could become more proficient in the diagnosis and management of osteoporosis. The FOOQ was used as the questionnaire instrument, as it has been well validated and regarded to be a questionnaire that would be easy to administer in the Singapore context. Permission to use the research instrument was granted by Professor Ailinger.

Table I. Characteristics of the study population (n = 56).

Working location	No. of respondents (%)
Tertiary hospital	35 (62.50)
Polyclinics	7 (12.50)
Rehabilitation hospital	6 (10.71)
Teaching institution	1 (1.78)
Unknown	7 (12.50)

METHODS

This was a descriptive cross-sectional survey of nurses who participated in an osteoporosis nursing symposium that was held at the Singapore General Hospital, the largest hospital in Singapore, in conjunction with World Osteoporosis Day. The FOOQ was handed out to all 100 registrants at the symposium, and they were encouraged to answer all the questions voluntarily. Participants had to return the completed questionnaire before the commencement of the first talk. The questionnaires that were returned during or after the symposium were not included in the data analysis. Approval to conduct the survey was obtained from the Centralised Institutional Review Board of our institution. All potential participants in the survey were provided with complete information regarding the questionnaire and informed that participation in the study was entirely voluntary. They were assured of confidentiality and anonymity. To ensure this, the participants were not asked to provide any identifying information except the type of institution they worked in. The data collected was handled only by the principal investigator and her supervisor, and it was analysed using PASW Statistics 18.0 (SPSS Inc, Chicago, IL, USA). Demographic characteristics and scores on the FOOQ were summarised using descriptive summary measures, and expressed as mean ± standard deviation for continuous variables and number (percentage) for categorical variables. One-way ANOVA was used to compare the means. A p-value of 0.05 was considered statistically significant.

RESULTS

A total of 56 out of 100 nurses returned the questionnaires. This translated into a response rate of 56%. Of the 56 respondents, 35 were from tertiary hospitals, seven were from polyclinics and six were from rehabilitation hospitals. Only one respondent was from a polytechnic

Table II. Participants' responses to the questionnaire (n = 56).

Questions	Correct Answer	No. (%)		
		True	False	Don't Know
1. Physical activity increases the risk of osteoporosis.	False	6 (10.7)	50 (89.3)	0 (0.0)
2. High-impact exercise (weight training) improves bone health.	True	32 (57.1)	21 (37.5)	3 (5.4)
3. Most people gain bone mass after 30 years of age.	False	11 (19.6)	43 (76.9)	2 (3.6)
4. Lower weight women have osteoporosis more than heavy women.	True	26 (46.4)	25 (44.6)	5 (9.0)
5. Alcoholism is not linked to the occurrence of osteoporosis.	False	6 (10.7)	43 (76.8)	7 (12.5)
6. The most important time to build bone strength is between 9 and 17 years of age.	True	43 (76.8)	10 (17.9)	3 (5.4)
7. Normally, bone loss speeds up after menopause.	True	52 (92.9)	4 (7.1)	0 (0.0)
8. High caffeine combined with low calcium intake increases the risk of osteoporosis.	True	50 (89.3)	4 (7.1)	2 (3.6)
9. There are many ways to prevent osteoporosis.	True	53 (94.6)	1 (1.8)	2 (3.6)
10. Without preventive measures, 20% of women older than 50 years will have a fracture due to osteoporosis in their lifetime.	True	53 (94.6)	1 (1.8)	2 (3.6)
11. There are treatments for osteoporosis after it develops.	True	43 (76.8)	9 (16.1)	4 (7.1)
12. A lifetime of low intake of calcium and vitamin D does not increase the risk of osteoporosis.	False	7 (12.5)	46 (82.1)	3 (53.6)
13. Smoking does not increase the risk of osteoporosis.	False	3 (5.4)	51 (91.1)	2 (3.5)
14. Walking has a great effect on bone health.	False	52 (92.9)	1 (1.8)	3 (5.3)
15. After menopause, women not on oestrogen need about 1,500 mg of calcium (for example, 5 glasses of milk) daily.	True	41 (73.2)	7 (12.5)	8 (14.3)
16. Osteoporosis affects men and women.	True	49 (87.5)	5 (8.9)	2 (3.6)
17. Early menopause is not a risk factor for osteoporosis.	False	8 (14.3)	45 (80.4)	3 (5.3)
18. Replacing hormones after menopause cannot slow down bone loss.	False	19 (33.9)	29 (51.8)	8 (14.3)
19. Children 9 to 17 years of age get enough calcium from one glass of milk each day to prevent osteoporosis.	False	30 (53.6)	22 (39.3)	4 (7.1)
20. Family history of osteoporosis is not a risk factor for osteoporosis.	False	13 (23.2)	40 (71.4)	3 (5.4)

teaching institution. Seven respondents did not indicate their work site. Table I summarises the characteristics of the study population.

Table II shows the participants' detailed responses to the questionnaire. Almost all participants (94.6%) knew that there are many ways to prevent osteoporosis and that without preventive measures, 20% of women older than 50 years would have a fracture due to osteoporosis during their lifetime. 92.9% of respondents were aware that bone loss speeds up after menopause and 91.1% knew that smoking increases the risk of osteoporosis. The false statement that "walking has a great impact on bone health" was correctly identified by only one (1.8%) respondent, with 92.9% (n = 52) incorrectly identifying the statement as true. However, 57.1% (n = 32) of participants knew that high impact (weight training) exercise improves bone health.

No respondent scored 100% on the quiz. The scores ranged from 8 to 18 out of a total score of 20. The mean score was 14.55 ± 2.586, as shown in Table III. Tertiary hospital respondents had a lower mean score of 14.26 ± 2.571 compared to staff from polyclinics (15.71 ± 1.704) and rehabilitation hospitals (16.67 ± 1.211) ($p = 0.029$). Seven respondents did not specify their working institution, and they were found to have the lowest mean score of 12.71.

DISCUSSION

The purpose of our study was to examine the knowledge level of nurses with regard to osteoporosis. A self-administered questionnaire was selected as the tool of assessment, as has been previously employed in several studies.[2,6] Our decision to employ a questionnaire as the method of data collection was also influenced by the knowledge that questionnaires have been shown to be one of the simplest and most cost-effective means of collecting data, and they can be utilised effectively to measure attributes, beliefs, knowledge and behaviour.[11,12] Nurses have a major responsibility to initiate as well as impart primary and secondary osteoporosis prevention education to patients and the public. Thus, education of healthcare professionals has been shown to be the most important element if changes in practice related to prevention and treatment of osteoporosis are to be implemented.[13]

Table III. Mean score differences among respondents according to work locations.

Working location	Mean ± SD*
Tertiary hospital	14.26 ± 2.571
Polyclinic	15.71 ± 1.704
Rehabilitation hospital	16.67 ± 1.211
Teaching institution	17.00†
Unknown	12.71 ± 2.870
Total	14.55 ± 2.586

* p-value = 0.029

† The SD for teaching institution could not be estimated, as there was only one respondent from a teaching institution.

SD: standard deviation

The mean osteoporosis knowledge score of 14.55 in our study was lower than the finding of 15 reported by Ailinger et al in the American general population,[8] but higher than Hannon's finding of 13.86 among nurses and midwives in North West Ireland.[9] Studies conducted in the US have suggested that there may not be a difference in the knowledge of osteoporosis between healthcare professionals and the lay public.[2,6] However, no comparison with regard to this can be made with the local general population in Singapore, as no such study has been carried out in the general populace using the same instrument. In our study, tertiary hospital respondents interestingly had lower mean scores than staff from polyclinics and rehabilitation centres. This may be explained by the greater involvement of primary care nurses in the current nationwide osteoporosis prevention and treatment programmes, and does provide a positive outlook for outcomes of future education campaigns, as polyclinic nurses will continue to be at the forefront of such outreach programmes. Rehabilitation hospital nurses are likely to have more experience caring for patients recovering postoperatively from surgery for osteoporotic hip fractures, which may be a likely explanation for their higher mean score on knowledge about osteoporosis. However, it has to be highlighted that these results have to be interpreted with caution, as our sample size was small.

Question 14 (Walking has a great effect on bone health) was correctly answered as 'False' by only 1.8% of respondents, which suggests that most nurses do not understand that although walking has an obvious cardiovascular benefit, there is little evidence to suggest that it has a beneficial effect on bone density. Another reason could be due to the participants' perception of walking as a high-impact exercise. This may also explain why 57.1% of participants responded correctly to question 2 (High-impact exercise [weight training] improves bone health). Only 39.3% of participants responded correctly to question 19 (Children 9–17 years of age get enough calcium from one glass of milk each day to prevent osteoporosis), suggesting that nurses are not familiar with either the recommended daily calcium intake for adolescents or the amount of calcium contained in one glass of milk. It also highlights the fact that more attention should be given to the promotion of bone health during the early years and that nurses should be made aware that preventive measures with regard to osteoporosis should begin with the paediatric population. 73.2% of participants responded 'True' to question 15 (After menopause, women not on oestrogen need about 1,500 mg of calcium [e.g. five glasses of milk] daily). This answer is considered as correct in the original FOOQ questionnaire design. The high response rate of 'True' was surprising given the fact that our local clinical practice guidelines recommends a daily intake of 1,000 mg of calcium for post-menopausal women.[14] In future surveys, the FOOQ may need to be modified to adapt to this disparity between Caucasian and local guidelines.

The majority of participants (94.6%) knew that there are many ways to prevent osteoporosis and that without these preventive measures, 20% of women > 50 years of age would have a fracture due to osteoporosis in their lifetime. Equally heartening was the large number of participants (91.1%) who knew that smoking increases the risk of osteoporosis. This indicates that nurses are aware of the importance of preventive measures, are cognizant of some of the statistics concerning osteoporosis and have reasonable knowledge of certain important risk factors. However, only 46.4% respondents identified that women with a lower body weight tend to have osteoporosis compared to heavier women (question 4) and only 51.8% correctly identified that the statement "Replacing hormones after menopause cannot slow down bone loss" (question 18) is false. This suggests that in education programmes, emphasis has to be placed on the fact that body mass index (BMI) is positively correlated with bone density and that more importance should also be given to updating nurses on the treatment modalities available for osteoporosis.[15]

Although these preliminary findings would have to be validated in larger studies, they still carry serious implications since they suggest that knowledge about osteoporosis in general among nurses may be lacking on several fronts, such as knowledge of risk factors for osteoporosis and its prevention and treatment. The public expects healthcare workers to be thoroughly knowledgeable about bone health. In order to meet this expectation and to optimise the contribution of nurses

to educating patients and the public on the prevention of osteoporosis and its complications, more osteoporosis outreach and educational programmes for this group of healthcare professionals are required. Potential areas for future research include replicating the study on a larger scale in the general nursing population across Singapore and exploring the relationship between nurses' knowledge and their current practices in the management of osteoporosis. It may also be interesting to compare the knowledge level about osteoporosis among nurses from different disciplines.

Our study has some limitations. The number of respondents in this study was small. Also, since it was a convenience sample, the population that was studied does not represent the total nursing population of Singapore. Moreover, the questionnaire did not allow for subjects to elaborate on their views and answers, and demographic data such as age, gender, years in service and disciplines was not collected. Future studies that evaluate the correlation between demographic data and nurses' knowledge of osteoporosis are required. These limitations notwithstanding, this study is the first of its kind in more than a decade conducted in Singapore and the first to employ a well-validated questionnaire to assess a wide variety of aspects related to knowledge of osteoporosis among nursing professionals in Singapore.

In conclusion, the findings from this study indicate that the knowledge of osteoporosis among nursing professionals in Singapore may be inadequate and that there are considerable gaps in the existing knowledge, especially in the preventive and treatment aspects. Our pilot study will hopefully shed light on this neglected aspect of healthcare education and encourage attempts to address these gaps in knowledge.

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