Knowledge and Beliefs on Osteoporosis among African Postmenopausal Women in a Kenyan Semi-Rural County of Kiambu

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Background: Assessing people's knowledge and beliefs about osteoporosis is fundamental to the formulation of preventive strategies for this condition. To our knowledge, no randomized community survey has been conducted using Facts on Osteoporosis Quiz (FOOQ) and Osteoporosis Health Belief Scale (OHBS) exclusively in the postmenopausal women in Kenya. This study aimed to assess postmenopausal women's knowledge and beliefs concerning osteoporosis in semirural Kiambu County, Kenya. **Methods:** A cross-sectional study involving face-to-face interviews with 254 African postmenopausal women was conducted between October 2017 and February 2018. The questionnaire explored the socio-demographic characteristics; FOOQ was used to evaluate the knowledge these women had about osteoporosis, while OHBS was used to assess their beliefs. **Results:** The mean age of the participants was 64.6 ± 10.7 years. About 26.4% (67/254) of the participants had no formal education, while 3.1% (8/254) were in formal employment. About 54.3% (138/254) of the women were married, and 51.2% (130/254) were in the lowest and lower wealth quintile. FOOQ had a mean score of 8.6 (standard deviation ± 1.8; range, 0-17). OHBS revealed a low level of perceived susceptibility to osteoporosis. Perceived benefits of exercising and calcium intake as well as perceived seriousness of osteoporosis as a disease were at moderate levels. The level of health motivation was also moderate. **Conclusions:** The women in this study demonstrated limited knowledge about osteoporosis. The low susceptibility score makes the prevention and treatment of osteoporosis in this population challenging. We recommend public health education for all postmenopausal women in this setting.

Key Words: Culture · Kenya · Knowledge · Osteoporosis · Postmenopause

INTRODUCTION

Osteoporosis is a bone disease characterized by reduced bone mass and structural weakening of the bone tissue. Osteoporotic bones are prone to fractures even with the application of marginal force.[1] Although the disease affects both sexes, postmenopausal women are especially at increased risk.[2] This is due to a reduction in the level of estradiol, increased osteoclastic resorption activity, and reduced osteoblastic activity.[3-6]

Osteoporosis is a relatively new concept in Kenya and the broader African re-

gion. It is not recognized as a health priority in Kenya due to the 'more' essential diseases like malaria and human immunodeficiency virus/acquired immune deficiency syndrome. There is consensus that a clear understanding of the knowledge and beliefs of osteoporosis by the general population is vital in developing and implementing effective prevention strategies.[7-9]

Over time, osteoporosis and osteoporosis-related fractures have consumed significant health resources and are now considered a public health concern.[10] The primary step in the prevention and management of any health condition leverages adequate knowledge and right beliefs about the condition.[11,12] Proper knowledge provides an excellent platform for sharing ideas between the healthcare provider and the patient, which is the cornerstone of the successful outcome of any consultation. On the other hand, insufficient knowledge about a health condition places patients at risk of complications and poor prognosis in a condition that would otherwise be easily preventable or treated.

This information is vital in the formulation of osteoporosis preventive strategies.[13] Hence, this study was designed to test the knowledge and beliefs about osteoporosis amongst African postmenopausal women residing in Kiambu County of Kenya.

METHODS

1. Study design and setting

This was a cross-sectional study with a face to face interview amongst 254 African postmenopausal women conducted between October 2017 and February 2018 in Kiambu County. Kiambu County is a semi-rural county in the central region of Kenya. The county has a population of over 1.6 million and has 12 sub-counties, and most parts are predominantly rural. All African postmenopausal women within the sampling frame who consented to the study were interviewed.

2. Sampling and sample size

The sampling frame comprising of households in all enumeration areas within Kiambu County was obtained from the Kenya National Bureau of Statistics. The study adopted a 3-stage random sampling (Fig. 1).

A total sample size of 254 was used in this study, with 80% power and 95% confidence level. The data was collected using a questionnaire administered by trained research assistants. The first part of the questionnaire included information on the socio-demographic characteristics of the recruited postmenopausal women; the second part assessed the level of knowledge using a previously validated questionnaire-based tool, the Facts on Osteoporosis
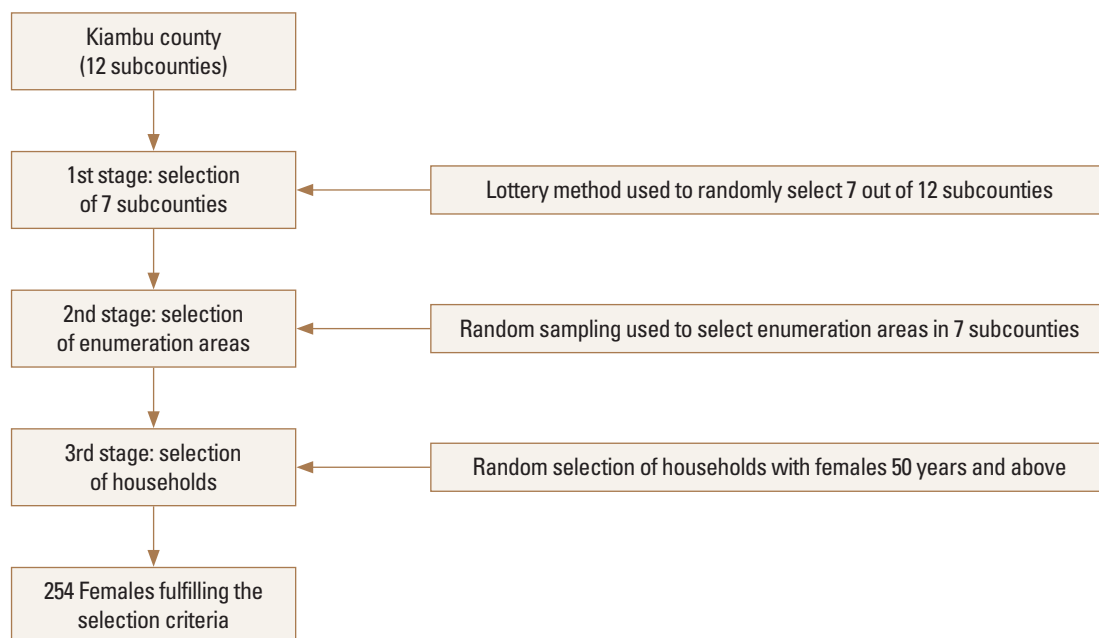

Fig. 1. Flow chart showing the sampling method.

Quiz (FOOQ), and the third part involved use of Osteoporosis Health Belief Scale (OHBS) to assess their beliefs. FOOQ was developed based on the osteoporosis consensus conference of the National Institutes of Health in 2000 and contained 20 questions with options for "True," "False," or "Don't Know" responses on facts about osteoporosis.[8] The respondent is supposed to opine to each statement and 1 mark is then awarded for each correct response to "true" or "false" statement and 0 for "don't know" response or a wrong response. The total marks are then computed out of possible 20 marks.

The belief on osteoporosis was scored using the OHBS, which is a 42-item instrument, based on the Health Belief Model. OHBS assess the beliefs related to osteoporosis using 7 subscales, which include susceptibility, seriousness, benefits of exercise, benefits of calcium intake, barriers to exercise, barriers to calcium intake, and health motivation. [14] The susceptibility subscale determines the perceived risk of an individual that they will develop osteoporosis. Questions on susceptibility are concerned with assessing the individual's perceptions of 2 risk factors: body build and family history; and the possibility that they will develop osteoporosis. Seriousness measures the person's perceived threat that osteoporosis presents to the individual's ability to complete daily tasks, physical health, and social status. Questions on exercise address the ability of exercise to prevent osteoporosis, the impact of regular exercise on bone health, and the individual's feelings about exercise in the prevention of osteoporosis. Questions on calcium intake determine the perception that sufficient intake of calcium reduces the risk of osteoporosis and broken bones. Each subscale uses a 5-point Likert scale range for each of the 6 items, from strongly disagree awarded 1, to strongly agree, awarded 5. Thus, each subscale will have a possible minimum of 6 and a possible maximum of 30. The total minimum score will be 42, while the maximum will be 210 for the whole OHBS.

1) Data collection and analysis

A questionnaire was administered to all study participants in their households through a face to face interview. A cross-sectional study by Noreh et al. [15] in Kenya revealed a median age at menopause of 48.2 years. In this study, a postmenopausal woman is defined as a female who is 50 years of age or older and has not had her menstrual periods for at least 1 year. The study excluded women on hormone replacement therapy or those with physical or mental limitations that may affect their ability to provide informed consent or answer questions. The principal researcher and the other 2 researchers coordinated seven research assistants whom each covered a sub-county. The SPSS statistical software version 21.0 (SPSS Inc., Chicago, IL, USA) was used to perform all the statistical analyses. Data analysis was conducted where categorical variables were summarized using frequencies and percentages, while continuous variables were presented using mean and standard deviations (SDs).

2) Ethical considerations

The study was approved by Kiambu County government and Kenyatta National Hospital, Ethics and Research Committee before commencing. Written informed consent was obtained from all participants in this study, and the information collected was kept confidential.

Table 1. Socio-demographic characteristics of the participants

Variable	N (%) (N=254)
Age	
50-59	90 (35.4)
60-69	85 (33.5)
70-79	55 (21.7)
80-89	19 (7.5)
≥90	5 (2.0)
Education level	
No school	67 (26.4)
Primary	138 (54.3)
Secondary	43 (16.9)
College/University	6 (2.4)
Occupation	
Employed	8 (3.1)
Others	246 (96.9)
Marital status	
Unmarried	116 (45.7)
Married	138 (54.3)
Household wealth status	
Lowest	51 (20.1)
Lower quintile	79 (31.1)
Middle quintile	36 (14.2)
Higher quintile	40 (15.7)
Highest quintile	48 (18.9)

RESULTS

A total of 254 African postmenopausal women aged 50 years and above were included in the study. The minimum age was 50 years, a maximum of 95 years, the median age of 63, and a mean of 64.6±10.7 years. The 26.4% (67/254) had not attained any formal schooling, 54.3% (138/254) had attained primary education, 16.9% (43/254) had secondary education and 2.4% (6/254) had tertiary education. Only 3.1% (8/254) were involved in formal employment. The 54.3% (138/254) were either married or living with a partner, and 35.8% (91/24) were widowed while others 5.1% (13/254) were either single or 4.7% (12/254) divorced/separated. On household wealth status, 51.2% (130/254) were in the lowest and lower wealth quintile, 14.2% (36/254) were in the middle quintile while the rest were in higher/highest wealth quintile (Table 1).

1. Facts on Osteoporosis Quiz

The mean score on the FOOQ was 8.6 (SD±3.6; range, 0-17). Less than half of the women, 115 (45.2%) scored over half of the questions correctly. Only 3.1% had a score of 75% and above. The specific responses to the FOOQ are shown in Table 2. The false statement that "most people gain bone mass after 30 years of age" was correctly identified by only 96 (37.8%) of participants. The majority of the women, 168 (66.1%) and 135 (53.1%) were aware that osteoporosis is a preventable and treatable disease. Approximately half of the participants (52.8%) understood that fractures could occur if osteoporosis is not prevented. Concerning the effect of exercise on bone health, physical activity, 128 (50.4%), and weight training 141 (55.5%) were correctly identified as being beneficial in osteoporosis prevention by the participants. The 121 (47.6%) and 81 (31.9%) respectively acknowledged that caffeine and smoking increase the risk of developing osteoporosis. Early meno-

Table 2. The facts on osteoporosis quiz score

Questions	Correct answer	N of answer		
		True (%)	False (%)	Don't know (%)
Physical activity increases the risk of osteoporosis	False	86 (33.9)	128 (50.4)	40 (15.7)
High impact exercise (weight training) improves bone health	True	141 (55.5)	78 (30.7)	35 (13.8)
Most people gain bone mass after 30 years of age	False	117 (46.1)	96 (37.8)	41 (16.1)
Being under 125 pounds (or 57 kg) is a risk for osteoporosis	True	96 (37.8)	52 (20.5)	106 (41.7)
Alcoholism is linked to the occurrence of osteoporosis	True	74 (29.1)	63 (24.8)	117 (46.1)
The most important time to build bone mass is between 9 and 18 years of age	True	159 (62.6)	42 (16.5)	53 (20.9)
A diet with a lot of caffeinated drinks and little calcium intake increases the risk of osteoporosis	True	121 (47.6)	56 (22.0)	77 (30.3)
There are ways to prevent osteoporosis	True	168 (66.1)	45 (17.7)	41 (16.1)
Without prevention 1 in 3 women and 1 in 5 men older than 50 years will have a fracture due to osteoporosis in their lifetime	True	134 (52.8)	42 (16.5)	78 (30.7)
There are treatments for osteoporosis after it develops	True	135 (53.1)	40 (15.7)	79 (31.1)
A lifetime of low intake of calcium and vitamin D increases the risk of developing osteoporosis	True	164 (64.6)	41 (16.1)	49 (19.3)
Smoking does not increase the risk of osteoporosis	False	58 (22.8)	81 (31.9)	115 (45.3)
Walking has a great effect on bone health	True	162 (63.8)	45 (17.7)	47 (18.5)
Hormones, such as oestrogen and testosterone, are important for strong healthy bones	True	60 (23.6)	69 (27.2)	125 (49.2)
Osteoporosis affects men and women	True	143 (56.3)	36 (14.2)	75 (29.5)
Vitamin D and calcium are necessary to help build and maintain strong, healthy bones	True	182 (71.7)	45 (17.7)	27 (10.6)
Children 9 to 17 years of age get enough calcium from one glass of milk each day to prevent osteoporosis	False	163 (64.2)	45 (17.7)	46 (18.1)
If there is history of osteoporosis in your mother or father, you would be at risk for developing osteoporosis	True	66 (26.0)	64 (25.2)	124 (48.8)
Normally, bone loss speeds up after menopause	True	101 (39.8)	58 (22.8)	95 (37.4)
Menopause before the age of 45 is a risk for osteoporosis	True	90 (35.4)	54 (21.3)	110 (43.3)

Table 3. Mean ± standard deviation, and the interpretation for each osteoporosis health belief subscale

Subscale	Possible score (6-30)	Interpretation in relation to osteoporosis
Perceived susceptibility	14.7±0.3	Low perceived susceptibility
Perceived seriousness	19±0.4	Moderate perceived seriousness
Perceived benefits of exercises	20±0.4	Moderate perceived benefits
Perceived benefits of calcium intake	20.4±0.5	Moderate perceived benefits
Perceived barriers to exercises	13.4±0.3	Low perceived barriers
Perceived barriers to calcium intake	13.4±0.3	Low perceived barriers
Perceived health motivation	19.4±0.4	Moderate perceived health motivation

pause and a positive family history of osteoporosis were identified as risk factors of osteoporosis by only 90 (35.4%) and 66 (26%), respectively. On the FOOQ, the Cronbach α was 87.1%.

2. Osteoporosis Health Beliefs among postmenopausal women in Kiambu County

The Cronbach α for each latent variable of the OHBS was above the recommended 70%, which is an indication of a good measure of scale reliability of the items for each subject. Although during data collection and analysis of the OHBS, the 5-point Likert scale was used, during our reporting, for practical purposes, 'strongly agree' and 'agree' responses were reported together as "agree" while 'strongly disagree' and 'disagree' were reported as 'disagree'.

More than half (60.9%) of the respondents did not perceive themselves as susceptible to osteoporosis. Only 49 (19.3%) agreed they were likely to get osteoporosis. With regard to the seriousness of osteoporosis, 149 (59.2%) were scared about having osteoporosis, while 157 (62.3%) thought it would be costly if they got osteoporosis. A majority of respondents believed regular exercise 154 (60.8%) and a calcium-rich diet 163 (64.9%) are protective against osteoporosis. Regarding the perceived barriers to exercise, only a quarter of respondents reported barriers to exercise such as spouse or family discouraged them from exercising 35 (14%) and no place to exercise 56 (22.4%). About 2 thirds (65.7%) of the respondents did not consider calcium-rich foods too costly, and in fact, 196 (78.9%) liked calcium-rich foods. The majority of women had a moderate level of health motivation, with majority 120 (47.9%) eating well-balanced diet, 133 (53.2%) looking for new information related to health, and 164 (65.6%) following recommendations to keep healthy. The table below (Table 3) presents the mean, SD, and the interpretation for each health belief subscale.

DISCUSSION

To our knowledge, no research has been done using FOOQ and the OHBS exclusively in African postmenopausal women in a community setting. In this study, the mean score for the FOOQ revealed poor knowledge among respondents, in keeping with findings from other regions [12,16-19] but in contrast to other studies done in Turkey, Peru, and New Zealand which yielded better scores amongst respondents.[18,20,21] The contrasting results may be explained by differences in the participant age, education as well as cultural background. The low level of knowledge among respondents observed in this study which may be explained by low literacy levels and low socio-economic status that puts them at risk of osteoporosis and its complications. It is important to note that knowledge of disease alone does not necessarily influence change in behavior.

This study demonstrated a low perceived susceptibility, similar to reports from Taiwan [22] and Canada.[23] The low perceived susceptibility may put these women at risk of osteoporosis as they are unlikely to practice preventive behavior in addition to making the women at risk not to seek attention early. It is, therefore, vital for medical workers to provide essential health tips and information for women to recognize their susceptibility and inculcate a positive attitude about osteoporosis prevention and cure.

Although the majority of the women were aware that osteoporosis is preventable and treatable, the majority did not participate in preventive behavior.[24,25]

In this study, the participants moderately perceived osteoporosis as being a serious disease. These findings are similar to previous studies done in Korea and Turkey.[26,27] This was contrary to a study done in Egypt that showed low perceived severity, possibly because most of the re-

spondents were premenopausal housewives who may not be interested in acquiring knowledge about osteoporosis.[28] The participants in this study had moderate perceived benefits to calcium intake and exercises, which is in keeping with a study done in Turkey and Peru.[27,29] However, Akinpetide in the US found higher scores, possibly due to the majority of the participants having a tertiary level of education.[30] Perceived barriers to exercise and calcium intake were found to be low in this study, as seen in previous research.[29,30] This is contrary to a study done in Egypt that found high perceived barriers to both exercise and calcium intake attributed mainly to their spouse discouraging them from exercising.[28]

We noted that less than half the patients could correlate caffeine use, smoking, and alcohol consumption to the risk of osteoporosis. Smoking, caffeine use, and alcohol consumption have significantly been associated with lowered bone mineral density.[31,32] These results show that raising awareness about risk factors that contribute to osteoporosis such a low dietary calcium intake, high alcohol and caffeine consumption, small skeleton size, early menopause, sedentary lifestyle may help persons at risk to take steps to prevent disease occurrence. In order to develop effective preventive methods for a particular disease, individual and community awareness of all the risk factors to the problem is critical.

A large number of respondents were scared about having osteoporosis, while 62.3% thought it would be costly if they got osteoporosis. In addition, only a minority of respondents believed in regular exercise and a calcium-rich diet as protective against osteoporosis. These findings are similar to observations in other studies.[30,33] These reports indicate that a lack of information is a barrier to the right practice. It is vital to put up programs to encourage people to have the right beliefs to overcome barriers in preventive activities. Right, and nonconflicting information is useful in promoting a proper attitude towards exercise, calcium intake, and reduce susceptibility to osteoporosis. This information is best when it comes to the attending clinician than when the women seek it on their own.

To our knowledge, this is the first community-based randomized survey to be done in sub-Saharan Africa to assess the knowledge and beliefs of osteoporosis among African postmenopausal women. It has also used validated tools to collect the data using a randomized household survey.

Some of the limitations of our study included the inability to carry out the study in different parts of the country due to financial and logistical reasons. Secondly, it may be difficult to rule out the participants reporting socially acceptable behavior entirely.

CONCLUSIONS

The women in this study demonstrated limited knowledge about the risk and management of osteoporosis in addition to their poor health belief scores. The low perceived susceptibility score makes the prevention and treatment of osteoporosis in this population challenging. The poor understanding of the role of smoking and alcohol use on their bone health was especially perturbing. We recommend public health education to all women at risk of osteoporosis in this setting.

DECLARATIONS

Ethics approval and consent to participate

Kiambu County government and the Kenyatta National Hospital, Ethics, and Research Committee.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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