The Role of Health Professionals in Promoting Osteoporosis Awareness in an Appalachian Community

Autumn May, Stephanie Jones, Heather Sumner

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Abstract

This study investigated knowledge of osteoporosis risk and prevention strategies, physical activity levels, information exchange with health professionals, and behavioral intentions related to osteoporosis among a convenience sample of 61 women seeking healthcare at a community health center in rural Appalachia. The authors hypothesized that higher levels of education and older age would be associated with overall osteoporosis awareness and preventive behaviors among these subjects. Subjects provided information about age, years living in Eastern Kentucky, education and whether they had menstruated within the past 12 months. Ten survey items were summed to obtain an "osteoporosis knowledge" score, 6 items were summed to obtain a "behavioral intention related to osteoporosis" score, four items measured current physical activity level and 2 items measured discussions with health professionals about osteoporosis. Descriptive statistics were calculated for all variables and correlation coefficients were calculated for education, knowledge, years in Kentucky, activity levels, behavioral intentions related to osteoporosis and intention to discuss osteoporosis with friends and family. A multiple regression equation was calculated with intention to discuss osteoporosis with friends and family as the dependent variables and 3 knowledge-related variables (education, osteoporosis knowledge and reported discussions of osteoporosis with a health professional) as the independent variables. No relationships were found among age, pre-post menopausal status, education, and osteoporosis knowledge. However, reported discussion of osteoporosis with a health professional was found to be the key variable that predicted whether subjects intended to discuss osteoporosis with others during the coming week. Thus, we see it as vital that healthcare professionals initiate conversations regarding osteoporosis to improve knowledge and action among women.

Introduction

More than 25 million Americans experience the adverse outcomes of osteoporosis.[1] Of this population, 80% of the individuals affected are females.[2] A research study by Saw et al, conducted in China, concluded that women who were younger (31.2%), educated, and who exercised on a regular basis were more likely to have heard of osteoporosis compared to the 68.8% of postmenopausal women in their study.[3] Another study focusing on rural women of Washington and Oregon concluded that of the 42% of the subjects that rated their knowledge of osteoporosis as excellent or good, only 18% of the participants answered nutritional questions correctly, including questions concerning vitamin D and calcium.[2] Gueldner conducted a study in which 323 randomly selected, rural women were ultrasonomotrically profiled showing that 25% of the subjects had a total t-score of < -1.0. implying they were at a 1.5-2 fold increased risk of hip or spinal fractures. This indicates that as many as 25% of this population of women might have been at risk of developing osteoporosis. [4]

Due to the large percentage of the population at risk for osteoporosis, prevention is the focal point of many research studies. Much prior research showed that the most effective preventive measures include high calcium diet and exercise. Papazian concluded that if dietary calcium is insufficient, calcium is absorbed from the bones to increase the levels in the bloodstream.[5] He also found that calcium intake during bone growth is an essential part of increasing peak bone mass and thus preventing osteoporosis. However, this paper also stated that pre menopausal women will not benefit from exceeding the daily recommended value of calcium.[5] The Papazian study concluded that elderly women who increase calcium intake above daily recommended value may benefit because the ability to absorb calcium decreases with age.[5] Birge and Dalsky discussed the implications of exercise on peak bone mass. Exercise can increase the mineral content of bone and is considered effective both to treat and prevent osteoporosis. Peak bone mass is not achieved until the third decade and a low peak bone mass is an indicator of osteoporosis risk.[6] There has been evidence showing that weight bearing activities prevent bone mineral loss.[6] Weight bearing exercises include brisk walking, stair climbing, jogging, line dancing and tennis. According to Birge and Dalsky in order to achieve the highest benefit from exercise there has to be adequate calcium intake.[6]

Kutsal et al found that age was negatively correlated with awareness of osteoporosis and positively correlated with physical activity, education, and calcium intake.[7] Through a telephone survey of middle aged and elderly women, Kung found that there was considerable ignorance and confusion on the role of sunlight in vitamin D production and prevention of osteoporosis.[8] Gerend recommended prevention campaigns to increase awareness of osteoporosis with a focus on widespread misconceptions about effective preventive measures.[9] Ford et al found that males and females have different

levels of knowledge about osteoporosis, especially concerning calcium intake.[10]

Our literature search found no articles comparing the osteoporosis knowledge of pre and post menopausal women in the United States. Therefore, we proposed to carry out a study that focused on the understanding of risk for and prevention of osteoporosis among pre and post menopausal women in a rural Appalachian community. By gathering information on age as well as menopause status, we were able to determine if either was related to knowledge of osteoporosis.

Our research hypotheses were:

1. Education level is correlated with osteoporosis knowledge.

2. Post-menopausal women have an increased knowledge of osteoporosis.

3. Behavioral intention to be physically active and physical activity levels are correlated with osteoporosis knowledge.

4. Behavioral intention to follow health practices that prevent osteoporosis is correlated with osteoporosis knowledge.

5. Women who have conversations with health professionals about osteoporosis have an increased knowledge of osteoporosis.

Subjects

English-speaking, female patients at a community health center in eastern Kentucky were invited to participate in this study. Participants were limited to ages 18-100. Males were excluded because we were looking at the relationship of the knowledge of women who are pre and post-menopausal. Data was collected over a four month period. The administrator of the health center approved the study. A cover letter was included with the Osteoporosis survey that included all elements of consent. Consent was assumed if the survey was completed and returned. General demographic information was gathered, but no identifying information was obtained.

The survey was available in the waiting room between May and August of 2009. When female patients registered for health care, clinic staff informed them of the opportunity to take the survey. (See appendix for Osteoporosis Awareness Survey). The clinic administrator estimated that 350 patients in our target population were seen during this time frame. Sixty-one completed surveys were returned to a sealed box that was placed on a table inside the clinic waiting room. This represents an approximate response rate of 17%.

Methods

The authors identified factors related to knowledge of the causes of osteoporosis and steps that individuals can take to prevent it when they carried out a review of the

literature. They used that information to design survey items that tapped these factors.

The survey asked subjects to provide information about age, years living in Eastern Kentucky, education and whether they had menstruated within the past 12 months. Ten survey items tapped general osteoporosis knowledge, 6 items tapped behavioral intentions related to osteoporosis risk factors, 4 items measured current physical activity level and 2 items measured discussions with health professionals about osteoporosis.

Data Analysis

The data was entered into a password-protected database. To determine if subjects were answering all questions in the same way (response set), some items were reversed. Before analysis, those items were re-coded. The 10 items that tapped "General Osteoporosis Knowledge" were summed for each subject. The 6 items that tapped "Behavioral Intention Related to Osteoporosis" were also summed for each subject. The 4 items that tapped "Physical Activity Level" were summed for each subject.

We used SPSS version 17.0 for all analyses. We obtained descriptive statistics for all variables, including means and frequencies as appropriate (See Table 1). We included data from all 61 completed surveys in the analysis. Some surveys had missing data, so the number of subjects in each analysis varies. We also calculated correlation coefficients for selected variables and use multiple regressions to predict the likelihood of the participant discussing osteoporosis with family, friends and health care providers (dependant variable). Independent variables included osteoporosis knowledge, health professionals addressing osteoporosis and education. Each of the independent variables can be seen as a source of knowledge about osteoporosis that might be associated with passing such information along to others.

Results

The mean level of education reported for this sample was 4 on a 7-point scale (some college). We found no correlation between age and knowledge of osteoporosis or education level and osteoporosis knowledge (Table 1). However, we found that knowledge about osteoporosis was significantly related to a subject's intention to practice behaviors related to osteoporosis prevention (correlation of .303, $p<.05$). Behavior was compiled from 18-23 on the questionnaire while knowledge was compiled from questions 7-16. Physical activity intent was calculated using the answers from question 18-20. The original intent was to classify subjects by categories of physical activity (pre-contemplation, contemplation, initiation, action and maintenance) based on their answers to the 4 items on physical activity from the survey. However, the pattern of responses appeared to indicate that subjects were able to answer the first question accurately, but that their answers to the remaining 3 questions were

missing or inconsistent with their answers to the first question. For that reason, only the first question was used in subsequent analyses.

We wanted to understand what type of knowledge had the greatest impact on a subject's intention to discuss osteoporosis with their social network of family, friends and neighbors. Because of the tight knit nature of eastern Kentucky it is extremely important to find what impacts intention to discuss osteoporosis with social networks. The importance of word of mouth in the eastern Kentucky area is extremely significant. Some people in this area rely on the information they gain from their social network and use that information to make decisions concerning many areas of their lives including healthcare. Education level, participants score on knowledge of osteoporosis and whether they reported that a health professional had discussed osteoporosis with them were used as predictors in a multiple regression equation. The only variable of the three that was significantly associated with the predictive power of the equation was the subject's report that a health professional had discussed osteoporosis with them (Table 2).

Discussion

According to our data analysis there was no significant correlation between education level, age, and osteoporosis knowledge. This finding did not support our first research hypothesis that education level is correlated with osteoporosis knowledge. The hypothesis that post menopausal women have an increased knowledge of osteoporosis was also not supported in our findings. However, the hypothesis that behavioral intention to follow health practices that prevent osteoporosis is correlated with osteoporosis knowledge was supported in our findings. If people are aware of the risks of osteoporosis and the benefits that can come from behavioral changes they are more likely to make the necessary changes. Another hypothesis was that women who have conversations with health professionals about osteoporosis have an increased knowledge of it, which was also supported in our findings. We found that women who report that a health professional has addressed osteoporosis with them are more likely to share this knowledge with friends and family. It appears that when a health professional raises this issue with women, it may help spread discussion of osteoporosis in the community. Gentry et al stated that 97% of physicians believe that it is their responsibility to give advice in order to modify patient behavior to reduce risk factors. They also stated that "despite this belief, the provision of preventative services by physicians is relatively rare."[11] Though beyond the scope of this study, it is conceivable that increasing knowledge sharing could decrease the number of women affected by osteoporosis in rural Eastern Kentucky over time. This means it is very important for all health professionals, including physical therapists, to address this issue with all patients, but especially female patients. Educating the female population on the risk factors associated with osteoporosis at an early age may aid in

prevention of osteoporosis if preventive steps are taken when the outcome can still be affected.

Limitations

The results of this study cannot be generalized to all populations because the number of participants was small and not representative of any known population. The sample was a small proportion of the eligible patients seen during the months of data collection. The authors don't know whether receptionists didn't always present the opportunity to take the survey because of other responsibilities or if participants chose not to complete survey. The survey was only 2 pages, but subjects may have found it too long or were not willing to complete it due to physical or mental fatigue. We have no data for reliability or validity of the survey developed because this was the only population exposed to it. Education level and osteoporosis knowledge weren't correlated using this instrument. We do not know if the instrument items failed to measure osteoporosis knowledge or if education and osteoporosis knowledge are not correlated in this sample.

Conclusion

Osteoporosis awareness is limited in this sample of patients in rural Eastern Kentucky. However, it was not associated with the education level or age of participants in the study. One important factor in determining osteoporosis knowledge in this study was whether subjects reported that healthcare professionals addressed the issue with them. Another important finding was that osteoporosis knowledge was significantly correlated with prevention behavior (.303) but not with other variables. In other words, if patients are properly educated osteoporosis prevention is likely to increase. The results of this study support the importance of informing patients about osteoporosis, what they can do to prevent it and associated illnesses. By initiating such conversations, health professionals may be able to affect not just their own patients, but also can spread information to other members of the community through informing their patients.

Table 1: Descriptive Statistics for Questions Asked

	N	Minimum	Maximum	Mean	Std. Deviation
VitDsunlight?	60	1	7	4.75	2.136
FxQ16rec	61	1	7	4.52	1.699
osteoknowl	52	35	63	46.33	5.614
Age	61	1	2	1.54	.502
MD address				1.75	.895
Valid N (listwise)	50				

Table 2: Correlation Coefficients of Selected Study Variables

		Education	osteoknowl	yrs in KY	active	MD address	Behavior	PhysActIntnt
Education	Pearson Correlation	1	.190	-.089	.141	.054	.127	.204
	Sig. (2-tailed)		.176	.509	.286	.681	.336	.122
	N	61	52	57	59	60	59	59
osteoknowl	Pearson Correlation	.190	1	-.193	.132	-.060	.303*	.105
	Sig. (2-tailed)	.176		.188	.361	.674	.031	.467
	N	52	52	48	50	51	51	50
# yrs in KY	Pearson Correlation	-.089	-.193	1	-.036	.096	.040	-.168
	Sig. (2-tailed)	.509	.188		.792	.482	.771	.221
	N	57	48	57	55	56	55	55
Active	Pearson Correlation	.141	.132	-.036	1	.148	-.246	.804**
	Sig. (2-tailed)	.286	.361	.792		.263	.062	.000
	N	59	50	55	59	59	58	59
Health professionals address	Pearson Correlation	.054	-.060	.096	.148	1	-.037	.019
	Sig. (2-tailed)	.681	.674	.482	.263		.781	.884
	N	60	51	56	59	60	59	59
Behavior	Pearson Correlation	.127	.303*	.040	-.246	-.037	1	-.142
	Sig. (2-tailed)	.336	.031	.771	.062	.781		.287
	N	59	51	55	58	59	59	58

Age	Pearson Correlation	-.108	.118	-.090	.94	.365	.094	-.087
	Sig. (2-tailed)		.204	.179	.258	.005	.257	.275
	N	51	51	50	50	50	51	51

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3: What knowledge matters

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.886	2.052		.432	.668
	osteoknol	.031	.043	.098	.725	.472
	education	.097	.157	.083	.618	.539
	Health Professionals talk	.811	.256	.417	3.163	.003

F value: 3.617

Adjusted R square: 0.136

Sig:0.020

a. Dependent Variable: family/friend talk

Appendix A

Osteoporosis Questionnaire

1. Age: ____18-38 ____39-58 ____59-78 ____79-100
2. I am ☐ Male ☐ Female
3. Number of years lived in Eastern Kentucky: _____
4. Your age(s) when you lived in Eastern Kentucky _____
5. Education: Check the highest level you have completed

   ☐ Grade school ☐ Some High School ☐ High School Diploma
   ☐ Some College ☐ 2 year College Degree ☐ 4 year College Degree
   ☐ Graduate School ☐ Graduate Degree
6. Have you had a menstrual cycle within the last 12 months? _____

Definition Osteoporosis: Weak bones that are more likely to break.

Circle the number that best describes how certain you are that the statement is true.

7. Bicycling is a good way to build strong bones.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

8. Dancing until you sweat helps prevent osteoporosis.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

9. Daily activities such as making your bed do not prevent bone loss.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

10. Vitamin D is necessary for osteoporosis prevention.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

11. Vitamin D does not come from sunlight.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

12. Collard greens or spinach can help you get enough calcium every day.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

13. You can get some vitamin D from fatty fish such as mackerel, tuna, or salmon.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

14. Small, thin women are at higher risk for osteoporosis.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

15. Young women with irregular menstrual cycles should consult a doctor about osteoporosis.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

16. Adults who break a bone are not at greater risk of osteoporosis.

1	2	3	4	5	6	7
Certainly Untrue	Probably Untrue	Might be Untrue	Don't Know	Might Be True	Probably True	Certainly True

The next four questions are about physical activities, such as walking, exercises and sports, that you do on a regular basis and that increase your breathing or heart rate.

17 a. **Are you physically active now (3 days a week for at least 20 minutes each time)?**	☐ No ☐ Yes
17 b. **If you are physically active now, have you been active regularly for the past 6 months or more?**	☐ No ☐ Yes ☐ Does not apply (I am not physically active now)
17 c. **If you are not active now, do you plan to begin regular physical activity in the next 6 months?**	☐ No ☐ Yes ☐ Does not apply (I am physically active now)
17 d. **If you plan to begin regular physical activity in the next 6 months, will you begin within 30 days?**	☐ No ☐ Yes ☐ Does not apply (active now or don't plan to be)

In the coming week, how likely are you to:

18. Ride a bicycle for a few miles on several days?

1	2	3	4	5	6	7
Certainly Won't	Probably Won't	Maybe Not	Don't Know	Maybe Will	Probably Will	Certainly Will

19. Walk for a mile or two on several days?

1	2	3	4	5	6	7
Certainly Won't	Probably Won't	Maybe Not	Don't Know	Maybe Will	Probably Will	Certainly Will

20. Do housework most days (for example, make beds or cook meals)

1	2	3	4	5	6	7
Certainly Won't	Probably Won't	Maybe Not	Don't Know	Maybe Will	Probably Will	Certainly Will

21. Eat a serving of greens on several days?

1	2	3	4	5	6	7
Certainly Won't	Probably Won't	Maybe Not	Don't Know	Maybe Will	Probably Will	Certainly Will

22. Eat 1 or more servings of mackerel, tuna or salmon?

1	2	3	4	5	6	7
Certainly Won't	Probably Won't	Maybe Not	Don't Know	Maybe Will	Probably Will	Certainly Will

23. Spend 10 minutes a day in the sun on at least 3 different days?

1	2	3	4	5	6	7
Certainly Won't	Probably Won't	Maybe Not	Don't Know	Maybe Will	Probably Will	Certainly Will

24. Talk with my family, friends or neighbors about osteoporosis?

1	2	3	4	5	6	7
Certainly Won't	Probably Won't	Maybe Not	Don't Know	Maybe Will	Probably Will	Certainly Will

25. Has a health professional (for example, a doctor or a nurse) talked with you about osteoporosis?

☐ Never ☐ A few times ☐ Often ☐ Every time I see them.

26. Have you asked a health professional (for example, a doctor or a nurse) about osteoporosis?

☐ Never ☐ Once or twice ☐ Often ☐ Every time I see them.

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