Examination of the Factors Associated with Osteoporosis Among an Elderly Population in Genesee County, Michigan

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Abstract

Examination of factors associated with osteoporosis illuminates the importance of adequate health literacy skills by providing greater insight toward understanding health status among those with decreased health literacy. However, a significant portion of Genesee County, Michigan residents with osteoporosis have shed light on the importance of further exploration of the disease and its potential risk factors. Therefore, this study investigated the extent to which various factors are associated with osteoporosis among older adults residing in Genesee County. When using a convenience sampling design, older adults were recruited through local senior and assisted living centers (n = 54). A five-minute survey and assessment were conducted through voluntary interviews. The variables include gender, age, ethnicity, education, chronic health conditions, and health literacy using the Rapid Estimate of Adult Literacy in Medicine-Short Form. T-Test, Pearson Chi-Square, and ANOVA were conducted using SPSS. Findings indicated no significant differences exist between age and osteoporosis [$\chi^2(1, N = 54) = 1.27$, $p = 0.26$], education and osteoporosis [$\chi^2(3, N = 54) = 3.97$, $p = 0.27$], osteoporosis and health literacy [$\chi^2(3, N = 54) = 0.83$, $p = 0.84$], and education and health literacy ($r = 0.09$, $n = 54$, $p = 0.52$). Further research needs to be conducted in low-income areas to assess osteoporosis and its risk factors. Furthermore, health education interventions need to be targeted toward individuals at increased risk of chronic health conditions and low health literacy to ensure accurate understanding of health-related information and decisions.

Introduction

Osteoporosis is a common health condition in which an imbalance in bone cell turnover results in bone mass deterioration (Caple, 2011). As age increases, the risk of osteoporosis increases (Davidson, 2003). According to the Michigan Department of Community Health [MDCH] (2012), 1.5 million Michigan residents are affected by osteoporosis. Osteoporosis is an important health condition in Michigan to assess because: 1) it affects a large portion of Michigan residents, and 2) incidence of injuries related to falls are high in Genesee County, Michigan. Additionally, in 2007 falls accounted for the highest

proportion of hospital discharges for unintentional injuries in Genesee County (Genesee County Health Department [GCHD]). Because osteoporosis is a preventable health condition, and those with osteoporosis are at increased risk of falling (Smulders, 2010), it is critical to determine points of health intervention to reduce, not only the prevalence of osteoporosis, but also the amount of falls related to the condition.

Health literacy has been found to play a major role in its development and maintenance (Caple, 2011). For example, individuals with higher levels of educational attainment are often more knowledgeable about osteoporosis than those with lower levels of educational attainment (Drozdzowska, 2004). Misunderstandings due to low health literacy can lead to adverse health outcomes (Cornett, 2009). Therefore, it is critical to investigate the risk factors associated with low health literacy and its relationship to osteoporosis outcomes.

The purpose of this study is to explore the factors affecting the incidence of osteoporosis. The hypotheses of the current study are: (1) as age increases, the prevalence of osteoporosis will increase among residents in Genesee County, Michigan; (2) lower educational attainment will be associated with higher levels of osteoporosis among individuals age 65 and older that reside in Genesee County, Michigan; (3) decreased health literacy will be associated with higher levels of osteoporosis in individuals age 65 and older that reside in Genesee County, Michigan; and (4) lower educational attainment will be associated with decreased health literacy levels in individuals age 65 and older that reside in Genesee County, Michigan. By confirming that the hypotheses are true, Genesee County has the potential to reduce its medical expenditures by decreasing the number of osteoporosis-related falls, reducing the number of emergency room visits due to lack of education, and lowering the amount of medical misunderstandings by targeting interventions at patients with decreased health literacy.

Methods

Population of Interest

Participants were recruited from: Abbey Park Senior Independent Living Center, Grand Blanc Senior Center, and Flushing Senior Center. Those eligible to participate were males and females of any race, age 65 and older that reside in Genesee County, Michigan. The survey took five minutes to

complete. Individuals who refused to participate or did not respond were excluded from the research study.

Recruitment

Once informed consent was obtained, data was collected using a flyer during the summer and fall of 2012 at the Abbey Park Senior Independent Living Center, Grand Blanc Senior Center, and Flushing Senior Center. In the lobby of each location participants voluntarily stopped to take the survey. Once the participant agreed to participate in the study, all interviews were performed at a semi-private seating area either within the lobby or in the library. After survey completion, participants were directed to a refreshment table where donuts and homemade desserts were served.

Measures

The survey used in this study was composed of 17 items. Survey question topics included: (1) osteoporosis, (2) age, (3) education, (4) chronic health conditions, (5) gender, (6) race/ethnicity, and (7) ZIP code.

Osteoporosis was measured using the Behavioral Risk Factor Surveillance System Questionnaire (2011), by asking the respondent *has a doctor, nurse, or other health professional EVER told you that you had osteoporosis?* The response choices included: “Yes” (coded as “1”) and “No” (coded as “0”),

Age was self-reported and measured in number of years (CDC, 2011b). Education was assessed by grade 12 or GED (high school graduate) (1), college 1 year to 3 years (some college or technical school) (2), and college 4 years or more (college graduate) (3).

Additional chronic health conditions were measured using the Behavioral Risk Factor Surveillance System Questionnaire (2011), all of which were based upon self-report, by asking the respondent *has a doctor, nurse, or other health professional EVER told you that you had any of the following?:* heart attack also called a myocardial infarction, angina or coronary heart disease, stroke, asthma, skin cancer, any other types of cancer, chronic obstructive pulmonary disease (COPD), emphysema, or chronic bronchitis, some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia, depressive disorder (including depression, major depression, dysthymia, or minor depression), kidney disease, and diabetes. The response choices for each question included: “Yes” (coded as “1”) and “No” (coded as “0”).

Demographic measures include: gender, race/ethnicity, and ZIP code. Gender was assessed by "male" (coded as "0") and "female" (coded as "1") (CDC, 2011c). Race/ethnicity was either "White" (coded as "1"), "Black or African American" (coded as "2"), "Asian" (coded as "3"), "Native Hawaiian or Other Pacific Islander" (coded as "4"), "American Indian or Alaska Native" (coded as "5"), and "Other (specify)" (coded as "6") (CDC, 2011b).

ZIP code was coded as a five-digit number.

Health literacy was measured using the Rapid Estimate of Adult Literacy in Medicine – Short Form (REALM-SF), which has been found to be a valid measure for assessing health literacy (U.S. Department of Health and Human Services: Agency for Healthcare Research and Quality [AHRQ], 2009). The participant was given a laminated copy of the REALM-SF sheet, which included seven health-related words. The participant was asked to read the words aloud. If the participant took more than 5 seconds to read a word, the researcher said 'blank' and pointed to the next word, if necessary, to move the participant along. If the participant began to miss every word, the researcher asked him or her to pronounce only known words. Participants were scored based on how many of the seven words they recognized (AHRQ, 2009). Participants who recognized zero words were categorized as having a literacy level of third grade or below (coded as "0"). Participants who recognized one to three words were categorized as having a literacy level of fourth to sixth grade (coded as "1"). Participants who recognized four to six words were categorized as having a literacy level of seventh to eighth grade (coded as "2"). Participants who recognized all seven words were categorized as having a literacy level of 9th grade or higher (coded as "3") (AHRQ, 2009).

Analyses

Descriptive statistics were used to develop a demographic profile of the study sample. Descriptive statistics in the form of means and standard deviations are reported for continuous variables, whereas frequency statistics were used to determine the number and percentages of categorical variables. Additionally, T-Test, Pearson Chi-Square, and Analysis of Variance (ANOVA) were used to test for significant differences between the variables using the computer software SPSS 20.

Results

A total of 62 individuals were willing to participate in the study. Due to ineligibility, eight of the individuals were eliminated from the final study sample. Of the eight participants excluded from the study, seven declined to participate in the health literacy assessment and one refused to provide their age, making them ineligible, thus, eliminating them from the analysis. Therefore, 54 participants were available for this analysis.

As indicated in Table 1, the study was composed of 34 females (63%) and 20 males (37%). Despite some locales within Genesee County being ethnically diverse, in this sample, all study participants self-identified as 'white' (100%).

Table 1.
Demographic Information for Adults Living in Genesee County

	n = 54 n(%)	Range
Gender		
Male	20(37)	
Female	34(63)	
Mean age [M(SD)]	83.51(8.49)	65 - 97
Race/ethnicity		
White	54(100)	
Black of African American	0	
Asian	0	
Native Hawaiian or Other Pacific Islander	0	
American Indian or Alaska Native	0	
Other	0	
Education		
Less than high school diploma	3(6)	
High school/GED	25(46)	
College 1-3 years	18(33)	
College 4 or more years	8(15)	

Mean (M); Standard deviation (SD)

The mean age of participants was 83.51 years (SD = 8.49), 28% (N = 15) had osteoporosis, and 6% (N = 3) did not complete high school. In addition, the average health literacy score was 6.76 (SD = 1.05) out of 7 points, which indicates a health literacy level of seventh to eighth grade.

Of chronic disease, the largest number of respondents (67%) reported being diagnosed with arthritis, followed by skin cancer (32%). Almost half of the sample (43%) indicated being diagnosed with three or more chronic health conditions. Of the sample, seven participants (13%) reported never being diagnosed with a chronic health condition.

Results of the study show no statistically significant relationship between age and the percentage of participants that were diagnosed with osteoporosis, $\chi^2(1, N = 54) = 1.27$, $p = 0.26$. Similarly, a Pearson's correlation was computed to assess the relationship between osteoporosis and age, in which there was no significant correlation found between the two variables ($r = 0.15$, $n = 54$, $p = 0.27$). Finally, although no statistically significant association was found between age and co-morbidities, results approaching significance suggest that increased ages may be associated with increased prevalence of co-morbidities ($r = 0.32$, $n = 54$, $p = 0.07$).

The percentage of participants that were diagnosed with osteoporosis did not differ by level of education, $\chi^2(3, N = 54) = 3.97$, $p = 0.27$. As indicated in Table 1, the greatest proportion of respondents reported being a high school graduate (46%). Next, Pearson's correlation was computed to assess the relationship between osteoporosis and education, in which no statistically significant relationship was found between the two variables ($r = -0.16$, $n = 54$, $p = 0.24$). Lastly, there was no statistically significant relationship found between level of education and co-morbidities ($r = -0.10$, $n = 54$, $p = 0.48$).

Individuals who had osteoporosis and individuals who did not have osteoporosis did not significantly differ in their health literacy skills, $\chi^2(3, N = 54) = 0.83$, $p = 0.84$. Using Pearson's correlation, no statistically significant relationship was found between osteoporosis and health literacy ($r = 0.10$, $n = 54$, $p = 0.45$). In addition, the means were assessed using Independent Samples T-Tests, in which there was no significant difference found in health literacy level for those that had osteoporosis ($M = 6.93$, $SD = 0.26$) and those that did not have osteoporosis ($M = 6.69$, $SD = 1.22$); $t(52) = -0.76$, $p = 0.45$. Finally, no statistically significant relationship was found between health literacy and co-morbidities ($r = 0.07$, $n = 54$, $p = 0.64$).

There was no statistically significant relationship found between education and health literacy ($r = 0.09$, $n = 54$, $p = 0.52$). Similarly, there was not a statistically significant difference in means of health literacy level for those that achieved a high school diploma or less ($M = 6.61$, $SD = 1.42$) and those that had achieved higher than a high school diploma ($M = 6.92$, $SD = 0.27$); $t(29.11) = -1.15$, $p = 0.26$.

Additional statistical methods used to investigate potential relationships with health literacy are indicated in Table 3. No statistically significant difference was found in health literacy between males (M

= 6.75, SD = 0.72) and females (M = 6.76, SD = 1.21); t(52) = -0.05, p = 0.96. In addition, no statistically significant difference was found between gender and co-morbidities.

Table 3.
Results of Health Literacy

	Health Literacy	P-Value	Test
Osteoporosis	-0.76	0.45	T-Test
Co-morbidities	0.35	0.71	ANOVA
Age	2.66	0.45	Chi-Square
Education	0.58	0.63	ANOVA
Gender	-0.05	0.96	T-Test

Discussion

This study found no association between: age and osteoporosis, education and osteoporosis, health literacy and osteoporosis, and education and health literacy. However, as age increased, the likelihood of being diagnosed with more than one chronic health condition increased. Additional analysis found no relationship between: gender and health literacy, and co-morbidities and health literacy.

The conflicting findings indicate that lifestyle, and access to health care due to social conditions and socioeconomic status may affect the prevalence of osteoporosis because, for example: 1) Majority of the respondents in the current study have not been diagnosed with osteoporosis, which may suggest that many of them engage in regular physical activity, 2) Since the current study population lives in higher income areas, they may be more likely to have a means of transportation, leading to increased access to health care, 3) Majority of the individuals in the current study reside in locations that are in close proximity to hospitals, resulting in increased access to health care, 4) Because majority of the sample population in the current study lacked osteoporosis, this may indicate that they have diets rich in vitamin D and calcium, and 5) Because the survey locations were among the more affluent areas in the county, individuals who reside in these cities may be exposed to more health information, despite their level of education increasing their health literacy level.

Like all research, this cross-sectional study has its own limitations. First, due to the small sample size of only 54 participants, generalization to Genesee County or Michigan as a whole is not possible. Second, because all of the participants (100%) self-identified as ‘white’ the study lacked ethnic diversity. Third, with such a low proportion of participants possessing low health literacy skills, the study lacked health literacy diversity. Fourth, to protect the confidentiality of all respondents, the surveys were not marked from which survey location they were collected making it impossible to compare information

among respondents from the different locations in which participants were recruited. Finally, although the REALM-SF assessment for health literacy is a valid and proven method for measuring health literacy, it does not examine knowledge of medical conditions, including osteoporosis.

Further research needs to be conducted in Genesee County regarding osteoporosis, health literacy and the associated risk factors including age and education. Although this study did not coincide with previous research, it is important that health educators be aware of the potential risk factors linked to managing chronic health conditions, such as health literacy. These populations are at high risk of medical complications due to inadequate knowledge and understanding of health-related information. It is up to health educators to recognize this need and do all that is possible to provide these individuals with the attention and resources they need to make sound decisions regarding their health.

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