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Evaluation of Osteoporosis Educational Program on Elders who Sustained an Osteoporotic Fracture

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Abstract

Background. Studies indicate that there is a low adherence to drug therapy for osteoporosis. Educational programs have been shown to have a positive effect on osteoporosis health beliefs and osteoporosis preventive health behaviors. Little is known about the effect of educational programs on adherence to drug therapy for osteoporosis in people diagnosed with the disease.

Aim. An evaluation of osteoporosis educational program on knowledge, health beliefs and intention of elders who sustained an osteoporotic fracture to adhere to drug therapy for osteoporosis.

Methodology. A convenience sample of 102 elders hospitalized with osteoporotic fracture in a rehabilitation ward of a large geriatric facility in central Israel in 2012-2013 completed a questionnaire based on the Health Belief Model (HBM), pre and post educational program.

Results. The findings show that the program improved elders' knowledge, health beliefs, and intention to adhere to drug therapy. A strong positive correlation was found between post-educational program knowledge of osteoporosis and intention to adhere to drug therapy.

Conclusions. Evaluation the impact of educational programs on health beliefs and intention to adhere drug therapy for osteoporosis among elderly may help tailor osteoporosis educational interventions for this unique population.

Key words: Drug Therapy; Elders; Evaluation; Health Belief Model; Osteoporosis; Patient Education.

Introduction

Osteoporosis is defined by decreased bone mineral density and degenerative micro-architectural changes of bone tissue, and consequently an increased fracture risk (Uitterlinden, Van Leeuwen and Pols, 2001). It is the result of gradual bone loss as one gets older (Ross, 1996). Osteoporosis has frequently been called a "silent disease", due to the fact that it is asymptomatic until a fracture occurs (Hamdy, 2002).

Osteoporosis is a health problem common in older people regardless of gender, however, it is traditionally considered a female problem because the incidence of osteoporosis in women is much higher than in men (Lee and Lai, 2006). It is a major public health threat for an estimated 55 percent of those 50 years and older in the United States (Kuczynski and Ostrowska, 2006). Given the aging population and feminization of aging trends worldwide, the prevalence of osteoporosis is expected to

increase to an epidemic proportion (Johnson et al, 2008).

Hip fractures are the most serious consequence of osteoporosis due to the associated morbidity, mortality, and financial costs. The lifetime risk of hip fractures for Caucasian women aged 50 or older is estimated at 17%. Hip fractures are associated with functional impairment, poor health-related quality of life, institutionalization, and mortality (Haaland et al, 2009). Individuals who have sustained an osteoporotic fracture are at high risk of future fractures (Haaland et al, 2009). Treatment of osteoporosis with calcium, vitamin D, and bisphosphonates can prevent future fractures in high-risk patients, and such treatment may also lower the risk of mortality after fractures (Bogoch et al, 2006).

There is a range of drug treatments available for osteoporosis. Different studies have consistently shown that, depending on the drug and the patient population, treatment reduces the risk of vertebral fracture by 30-70%, nonvertebral fractures by 15-20%, and hip fractures up to 40% (Black et al, 2007; Kanis et al, 2008). Treatment of established osteoporosis is cost-effective irrespective of age (Kanis et al, 2005), and therapies with proven rapid efficacy may offer important value to healthcare payers, providers, and patients (Lindsay, Burge and Strauss, 2005). However, studies indicate that there is a low adherence to drug therapy for osteoporosis (Rabenda et al, 2008; Nielsen et al, 2010; Rabenda and Reginster, 2010). A lack of knowledge and understanding by patients, side effects of medications, reluctance of elderly patients to add more medications to already long lists, were identified as some of the barriers to initiating treatment of patients who have, or are at risk for osteoporosis (Bogoch et al, 2006).

Better understanding of determinants related to patients' adherence to drug therapy for osteoporosis will provide guidance for the development of effective interventions with a reasonable chance of producing changes in health behavior.

Background

Various theories can be used to explain the psychological determinants of behavior and

to guide the development and refinement of health promotion and education (Painter et al, 2008). Originally created to explain and predict preventative health behaviors (Rosenstock, 1974), The Health Belief Model (HBM) has been widely used to examine initiation and maintenance of health behavior (Janz, Champion and Strecher, 2002). There is substantial empirical evidence supporting the use of HBM constructs as important contributors to the explanation and prediction of individuals' osteoporosis preventative health behaviors (McLeod and Johnson, 2011).

According to the model, a number of variables are associated with the likelihood of taking action to detect or prevent the occurrence of disease. The HBM has five main constructs: susceptibility, seriousness, benefits, barriers, and health motivation. Thus, an individual motivated to engage in health behaviors who perceives his/her susceptibility to become afflicted by a condition as high, and the condition as serious enough (including harmful consequences to personal physical health, role and social status, and so on), and the benefits of taking a particular action as exceeding the barriers – will likely take that particular action. Unlike the other constructs which relate to beliefs about behaviors, health motivation (representing the general tendency of an individual to engage in health behavior) is concerned directly with behaviors (Rosenstock, 1990). Knowledge has been identified as an additional important factor associated with improved patient health behaviors (Werner, 2005).

Osteoporosis health beliefs are considered modifiable (McLeod & Johnson, 2011). Several studies explored, using the HBM, the effect of educational programs on modifying osteoporosis health beliefs and health behaviors (Hazavehei, Taghdisi and Saidi, 2007; Sedlak et al, 2007; Shojaeizadeh et al, 2012). Generally, educational programs have been found to have a positive effect on osteoporosis health beliefs and osteoporosis preventive health behaviors (Tussing and Chapman-Novakofski, 2005; Hazavehei, Taghdisi and Saidi, 2007; Sedlak et al, 2007; Shojaeizadeh et al, 2012). The overall goal of health education is to ensure that individuals or groups have an understanding

of their current health status in order to make informed decisions and health behavior changes. Understanding osteoporosis health belief outcomes after an education intervention may help tailor interventions to a specific population (McLeod and Johnson, 2011).

To date, most of the studies exploring the effect of educational programs on osteoporosis health beliefs and behaviors have focused on the prevention of osteoporosis among healthy populations (Nielsen et al, 2010; McLeod and Johnson, 2011). Only a few explored the effect of educational programs on adherence to drug therapy for osteoporosis in people diagnosed with the disease (Nielsen et al, 2010), and to the researchers' knowledge, none explored the effect of educational programs on health beliefs and adherence to drug therapy among elders who sustained osteoporotic fracture.

Aim

Thus, the aim of this study was to examine the effect of an educational program on the knowledge of osteoporosis, health beliefs, and intention of elders who sustained an osteoporotic fracture to adhere to drug therapy for osteoporosis, using the Health Belief Model.

Research question and hypothesis

What effect does an educational program on osteoporosis have on the knowledge of osteoporosis, health beliefs, and intention of elders who sustained an osteoporotic fracture to adhere to drug therapy for osteoporosis?

Educational program on osteoporosis improves elders' osteoporosis health beliefs, knowledge of osteoporosis, and intention to adhere to drug therapy for osteoporosis.

Methodology

Study design

The study used a one group quasi-experimental design.

Participants

A convenience sample of 102 elders was recruited from a rehabilitation ward at a large geriatric facility in central Israel. Inclusion criteria were age 65 or older, having been diagnosed with an osteoporotic fracture,

being without medication treatment for osteoporosis, and Hebrew speaking. The exclusion criterion was Mini Mental State Examination (MMSE) less than 24.

Instrument

The study instrument is a questionnaire consisting of 51 items, 14 items were sociodemographic data, 6 items examined knowledge of osteoporosis and its prevention and treatment, while the remaining 31 items were Osteoporosis Health Belief Scale (OHBS), developed by Kim et al (1991), based on Rosenstock's (1990) Health Belief Model as a theoretical framework, and translated into Hebrew by Becker (2008). The OHBS investigates health beliefs related to osteoporosis and its prevention, and the likelihood of behavioral change. The questionnaire was divided into 5 subscales, representing beliefs for each of the five HBM concepts, namely perceived susceptibility to osteoporotic fractures, perceived seriousness of this condition, perceived benefits and barriers to drug therapy for osteoporosis, and health motivation. Items were rated on a five-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". For the majority of the subscales, higher scores indicated more positive health beliefs, while for barriers, higher scores indicated more negative health beliefs. Items on knowledge about osteoporosis were rated on a dichotomous true-false scale. Each correct answer provided 1 point, for a maximum of 6 points. The questionnaire demonstrated satisfactory face validity and internal consistency. Cronbach's alpha for the whole scale was 0.85 and that for the subscales ranged from 0.70-0.90.

Data collection

The data were collected over one year in 2012-2013. The researchers approached all eligible 110 elders admitted during this period to the rehabilitation ward with fractures and diagnosed with osteoporosis. The participants completed the questionnaire upon their admission to the ward. Approximately one week post hospitalization the nurse research provided a one-on-one structured educational program on osteoporosis. The HBM was used to develop the content of the educational program. The

program included explanations in a readily understandable language about osteoporosis and the high risk of future osteoporotic fractures and their consequences for physical, psychological, and social aspects of well-being. It included explanations about the pharmacological treatment of osteoporosis, its benefits, and the consequences of non-treatment. The content also focused on barriers to adherence to drug therapy, and their solutions. The actual content of the educational program was identical for all participants. The participants were allowed to stop the educational session at any stage and ask questions. Each session lasted 30-40 minutes. Printed material, in the form of a brochure developed by researchers, was supplied to the participants to help enhance information provided during the educational session. Approximately two weeks after the educational program, the participants were asked to complete the questionnaire again. All participants were still hospitalized at the time of administration of the second questionnaire. All 110 elders approached agreed to participate, and 102 questionnaires were returned properly completed both pre and post educational program, for a response rate of 92%.

Ethical considerations

The study was approved by the Helsinki committee of the geriatric facility at which the research was conducted. Participants were given an explanation of the purpose of the study and told that participation in the study was voluntary. Informed consent was obtained from each participant.

Statistical analysis

The Statistical Package for Social Sciences (SPSS-PC, version 14, SPSS Inc., Chicago, IL, USA) was used to analyze the data. Paired samples t-tests were used to examine the differences in research variables pre- and post- educational program. To test theoretical relationships between the research variables and intention to adhere to drug therapy, Pearson's correlations were used. Statistical significance was set at $P < 0.05$.

Results

The sample consisted of 102 elders, 22 men and 80 women, with a mean age of 77.5 (SD=10.1, range 68-97). Fifty-two percent were married and 39% were

widows/widowers, with 3.5 children on average (SD=2.4). Most (83%) were Jews, while 48% defined themselves as secular, and 30% as traditional. The participants had 10 years of education on average (SD=4.4); 38% had elementary, 23% had secondary, 18% had tertiary education, and 18% had an academic degree. Fifty-five percent defined their income as average.

Twenty-seven percent of participants declared that before hospitalization they had been fully independent, 33% had needed mild help from significant others in managing their daily life, 26% had needed moderate help, and 14% had needed a constant caregiver. Most (72%) had a hip fracture. Only 28% of participants had a family member who was diagnosed with osteoporosis.

Paired samples t-tests were used to examine the differences in research variables pre- and post-educational program. The results are presented in Table 1 and show that scores of health beliefs, knowledge of osteoporosis, and intention to adhere to drug therapy were significantly higher post-educational program ($P < 0.01$). These were scored as medium or medium-low pre-educational program, and medium-high following the program. The most moderate change was in perceived benefits, while the most dramatic was in knowledge level. However, perceived barriers to drug therapy and health motivation remained unchanged ($P > 0.05$), and were scored as medium-low.

Pearson's correlations were used to examine pre-and post-educational program correlations between research variables and intention to adhere to drug therapy for osteoporosis. The results are presented in Table 2 and show moderate positive correlations between most health beliefs and intention to adhere to drug therapy, which were similar pre-and post-educational program, with the exception of perceived barriers and health motivation, which were found to have weak and statistically insignificant correlations with intention to adhere to drug therapy ($P < 0.05$). A strong positive correlation was found between post-educational program knowledge of pre-educational program, and medium-high following the program. The most moderate

change was in perceived benefits, while the most dramatic was in knowledge level. However, perceived barriers to drug therapy and health motivation remained unchanged ($P > 0.05$), and were scored as medium-low.

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A strong positive correlation was found between post-educational program knowledge of osteoporosis and intention to adhere to drug therapy ($P < 0.01$). osteoporosis and intention to adhere to drug therapy ($P < 0.01$).

Table 1. Paired samples t-tests for examination of research variables, pre- and post-educational program (n = 102)

P value	Post-educational program		Pre-educational program		
	SD	Mean	SD***	Mean	
0.01	1.03	3.8	1.27	2.8	Intention*
0.01	0.68	3.5	0.85	3.0	Susceptibility
0.01	0.77	3.6	0.87	3.1	Seriousness
0.01	0.51	3.4	0.68	3.2	Benefits
0.1	0.61	3.0	0.91	2.8	Barriers
0.9	0.47	3.4	0.49	3.3	Health motivation
0.01	1.64	4.9	1.56	1.8	Knowledge**

* Range for intention and all health beliefs 1-5

** Range for knowledge 0-6

***SD Standard deviation

Table 2. Pearson's correlations between research variables and intention to adhere to drug therapy for osteoporosis, pre- and post-educational program (n = 102)

	Susceptibility	Seriousness	Benefits	Barriers	Health motivation	Knowledge
Pre	*0.20	*0.18	**0.29	0.15	0.15	0.08
Post	*0.23	*0.21	**0.29	0.15	0.11	**0.40

* $P < 0.05$, ** $P < 0.01$

Discussion

We report here a study evaluating the effectiveness of an educational program for elders who sustained an osteoporotic fracture by measuring changes in knowledge of osteoporosis, health beliefs (perceived susceptibility to and seriousness of osteoporosis, perceived benefits of and barriers to adherence to drug therapy), and intention to adhere to drug therapy. The findings show that the program improved elders' knowledge, health beliefs, and intention to adhere to drug therapy, which is consistent with previous research on osteoporosis health behaviors (Nielsen et al, 2010; McLeod and Johnson, 2011).

Chan et al (2007) found that all educational programs applied in their study – regardless of design – increased participants' knowledge about osteoporosis prevention. They claimed that knowledge is the easiest factor to change through such educational programs, and suggested that this is because adult learners showed readiness to learn through self-direction and voluntary participation in the educational programs. Similarly, Werner (2005) found that most of the intervention studies she reviewed showed an increase in the level of knowledge about osteoporosis following the educational program.

It should be noted that participants' knowledge of osteoporosis prior to the educational program, as well as their scores on various health beliefs, were medium or medium-low. This finding was also demonstrated in previous studies concerning osteoporosis health behavior among older populations (Lee and Lai, 2006; Doheny et al, 2007), reflecting the public's general unawareness of osteoporosis (McLeod and Johnson, 2011). This may indicate that the public health education on osteoporosis provided by television programs, broadcasts, and bulletins in Israel is insufficient.

Additionally, regardless of educational interventions, elders who undergo rehabilitation after sustaining osteoporotic fracture were expected to perceive their susceptibility to future fractures and the seriousness of this condition as high. Surprisingly, the participants' perceived susceptibility and seriousness were scored as medium pre-educational program,

emphasizing the need for health education on osteoporosis among this population in particular.

A more moderate increase in health belief scores, as well as in intention to adhere to drug therapy, may be attributed to the educational method, mostly didactic, that was applied in the present study. Previous studies on osteoporosis prevention showed that passive and lecture-based teaching styles were frequently applied as a means of information transfer, with great impact shown on knowledge, but little change was noted in personal beliefs and intended outcome behaviors (Tussing and Chapman-Novakofski, 2005). Programs that use nontraditional pedagogic methods for teaching (Hazavehei, Taghdisi and Saidi, 2007), e.g., interactive methods (Werner, 2005) that empower the participants (Nielsen et al, 2010) in addition to knowledge transfer, are more conducive to behavior modification (Tussing and Chapman-Novakofski, 2005).

Additionally, this study applied an educational program of short duration. More intense educational programs have been shown to be more successful in promoting change in personal beliefs and intended outcome behaviors (Tussing and Chapman-Novakofski, 2005).

In the present study, participants' health motivation remained unchanged following the educational program; however, it was an expected outcome, since one's general tendency to engage in osteoporosis health behaviors is unlikely to change within such a short period of time and in a hospital environment. Interestingly, perceived barriers to drug therapy (cost, side effects, etc.) remained unchanged as well, and were scored as medium pre- and post-educational program. Once again, it may be attributed to the educational method applied in the study. Participants probably did not receive enough empowerment to feel confident to overcome the barriers.

All health beliefs examined, with the exception of health motivation and perceived barriers, were found to be moderately correlated with intention to adhere to drug therapy for osteoporosis. Perceived barriers and health motivation were found to have

weak and statistically insignificant correlations with intention to adhere to drug therapy. Perceived barriers emerge across studies as the most powerful HBM dimension impacting osteoporosis-related health behaviors (McLeod and Johnson, 2011). Barriers to calcium intake and exercise were the most important constructs in explaining exercise and calcium intake behaviors in older adults (Kim et al, 1991). The lack of a statistically significant correlation between perceived barriers and intention to adhere to drug therapy in the present study may be explained by the small sample size. The lack of a statistically significant correlation between health motivation and intention to adhere to drug therapy in the present study may be attributed to homogeneity in participants' health motivation (as revealed by narrow standard deviations).

A strong positive correlation was found between post-educational program knowledge of osteoporosis and intention to adhere to drug therapy. Increased knowledge about the disease is associated with improved patient's compliance through increased identification and awareness of decision processes, mainly in the area of chronic disease management (Kennedy and Rogers, 2002).

Study limitations

The small sample size and non-probability sampling in a single geriatric facility hamper the generalizability of the findings to the entire population of elders who sustain osteoporotic fractures. Additionally, the lack of a control group, using the same instrument pre-and post-educational program, and administering the questionnaire in close proximity to the educational intervention might have had an impact on the validity of the results. One further limitation includes the fact that there was no longitudinal follow-up of adherence to drug therapy for osteoporosis. Moreover, the study did not include additional concepts of HBM such as cues to action and self-efficacy. The acknowledgement of these limitations provides directions for further research.

Conclusions

The findings show that proper educational interventions may improve elders' knowledge of osteoporosis, osteoporosis health beliefs, and adherence to drug therapy for osteoporosis. Evaluation of the impact of educational programs on health beliefs and intention to adhere drug therapy for osteoporosis among elderly may help tailor osteoporosis educational interventions for this unique population. The findings demonstrate that osteoporosis educational interventions in this population, for example, patient instruction during hospitalization, are needed in order to promote adherence to drug therapy.

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