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Research Article

Theory-based Osteoporosis Prevention Education and Counseling Program for Women: A Randomized Controlled Trial

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SUMMARY

Purpose: The purpose of this research was to investigate the effect of an osteoporosis prevention program based on the Health Belief Model for women between the ages of 30 years and 45 years at risk of osteoporosis.

Methods: This study was conducted with randomized control group pretest, post-test and follow-up trial. Intervention group ($n = 37$) and control group ($n = 36$) participated in the research. Data were collected using a sociodemographic data questionnaire, the Osteoporosis Knowledge Test, the Osteoporosis Health Belief Scale, the Osteoporosis Self-efficacy Scale, a monitoring form for estimated dairy calcium intake, and a monitoring form for estimated weekly exercise. Intervention program was composed of a 4-week education program and a 24-week counseling program. Data were collected pretest, post-test 15 days after the end of the education program, follow-up 1 after 3 months, and follow-up 2 after 6 months. Mann Whitney *U* test, chi-square test, Friedman test, Bonferroni test, two means test and Wilcoxon signed-rank test were used for statistical analysis.

Results: After the education and counseling program, a significant increase was seen in comparison with the control group in the mean scores of the intervention group on the Osteoporosis Knowledge Test and its subscales ($p < .001$), on the Osteoporosis Health Belief Scale and its subscales ($p < .001$), on the Osteoporosis Self-efficacy Scale and its subscales ($p < .001$), and in their daily calcium intake ($p < .001$) and duration of weekly exercise ($p < .001$).

Conclusion: The results of this study were evidence that showed the effects of Health Belief Model–based osteoporosis prevention education and counseling program conducted by nurses.

Introduction

Osteoporosis which changes bone density and quality is a devastating disease affecting public health. As bones become more porous and fragile, the risk of fracture is greatly increased [1]. It is estimated that more than 200 million people worldwide have osteoporosis, and that one in three women and one in five men are at risk of osteoporotic fractures [1].

In Turkey, there have been few studies on the prevalence of osteoporosis. The International Osteoporosis Foundation (IOF) [2], using data from a study in Turkey by Tüzün et al [3], came to the important conclusion in its Hip Fracture Map that the incidence of hip fracture was more than 300 per 100,000. The study by Tüzün et al [3], conducted in 12 regions of Turkey with 1,965 individuals aged 50 years and above, found that approximately 24,000 hip fractures, caused by osteoporosis occurred in 2009 and that 73.0% of these were in women. They also estimated that by 2035 the number would rise to approximately 64,000 [3]. Also, although the rate of hip fracture was lower in Turkey than in other European countries, the incidence had been rising significantly in the last 20 years [3].

One of the most frequently encountered results of osteoporosis is bone fractures. These are most often fractures of the hip, vertebrae or wrist. Hip and vertebral fractures in particular increase with age in both men and women [1]. The number of women affected annually by osteoporosis-related fractures is greater than the total of those affected by heart attacks, stroke and breast cancer combined [4].

The main target of osteoporosis treatment is to prevent fractures. For this, calcium and vitamin D supplements, treatment with alendronate, risedronate and ibandronate, treatment with raloxifene (a selective estrogen receptor modulator) and treatment with parathyroid hormone are recommended [4]. Treatment of the

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complications of osteoporosis and replacement of lost bone are difficult and expensive, and take a long time. At the same time, the economic losses caused by osteoporosis-related fractures are disturbing. In the United States, 40 million dollars a day is spent on the treatment of osteoporosis-related fractures. If the costs of hospital and home care, nursing services and loss of manpower are included, the total approaches 14 billion dollars a year [4].

The risk factors for osteoporosis are various nonmodifiable factors such as gender (female), ethnic origin (Caucasian, Asian, Spanish), advanced age, and osteoporosis in the family or a history of fractures, as well as modifiable lifestyle-related factors such as insufficient calcium intake, a sedentary lifestyle, smoking, drinking alcohol, vitamin D deficiency, and caffeine intake [1,5].

The early diagnosis and treatment of people with osteoporosis can reduce the influence of the disease, and correction of aspects of lifestyle that may be risk factors can reduce the risk of the disease and secure a fall in its occurrence in society. For this reason, determining the risk factors which lead to osteoporosis and placing an early diagnosis are evaluated as a more effective, easier and more cost-effective approach than treating advanced osteoporosis [6].

In addition to the progressive increase in the number of people affected by osteoporosis, health improvement programs, seen as an economically effective way to prevent the development of this disease also seem to be increasing. The knowledge and skills gained in these programs will help to bring about changes in behavior to increase calcium intake and encourage weight-bearing exercises to prevent osteoporosis [7]. The literature emphasized that knowledge levels and awareness of osteoporosis must be increased in women, who are the most at-risk group, and that there is a need for research and education on developing preventive behaviors [8].

The IOF [1] states that nurses play a key role in providing information to individuals about the risks of osteoporosis and behaviors for protection, and cooperating with other professions on osteoporosis prevention. Nurses are responsible for providing information on the risks, prevention, diagnosis and treatment of osteoporosis to all individuals to whom healthcare is given [9].

The importance must be stressed of a theoretical basis for programs relating to osteoporosis and its prevention in order to improve bone health and to promote preventive behavior [10]. Indeed, many studies of educational programs in the literature on the prevention of osteoporosis are based on theory [11–14].

The Health Belief Model (HBM) was developed to explain why some people show health-protecting behavior and some do not participate enough in disease protection and scanning programs [15]. The components of the HBM include perceived susceptibility, perceived severity, perceived benefits and perceived barriers. Perceived susceptibility refers to individuals' subjective perception of the risk of developing a health condition [11]. In a study by McLeod and Johnson [16] examining 22 research papers on osteoporosis health beliefs and osteoporosis inadequacy perceptions, they reported both in the study and in practice that inquiring about individuals' health beliefs was of benefit.

It has been found that with studies in which an osteoporosis prevention education program was conducted for women, there were positive developments in women's health beliefs towards osteoporosis [9,11,13]. Self-efficiency levels rose with regard to protective behavior against osteoporosis [10,12]. There was an increase in calcium consumption, which is a protective behavior against osteoporosis [9–11], and periods of physical activity were extended [9,11,17].

Aim

This study aimed to investigate the effects of an osteoporosis prevention education and counseling program based on the HBM and developed for women between the ages of 30 and 45 at risk of osteoporosis. The goals of the program were to increase women's knowledge of osteoporosis, their health beliefs, their self-efficacy and the frequency of osteoporosis preventing behaviors (OPBs), which are their daily calcium intake and weekly exercise.

Hypotheses

We examined five hypotheses, which were as follows:

H_1: After the program, there will be a difference between the mean scores on the osteoporosis knowledge test of the intervention and control groups. H_2: There will be a difference between the intervention and control groups in terms of mean scores on the osteoporosis health belief scale. H_3: There will be a difference between the intervention and control groups in terms of mean scores on the osteoporosis self-efficiency scale. H_4: There will be a difference between the intervention and control groups in terms of the daily intake of calcium. H_5: There will be a difference between the intervention and control groups in terms of weekly exercise.

Methods

Study design

This randomized control group pretest, post-test and follow-up trial was performed between August 2014 and April 2015 at a family health center (FHC) in İzmir, in the west of Turkey.

Setting and samples

There are 25 FHCs in the area where the study was conducted. One was selected using purposive sampling as an FHC where women with varying sociodemographic characteristics came for health services and would be able to take part in and continue with the prevention program. G*Power software was used to estimate the required sample size. At the beginning of the study, the research power was taken as 80% and the effect size of the study was taken as moderate (.5). A sufficient size for each group in the study was established to be 34 people. The inclusion criteria were women (a) aged between 30 and 45 years, (b) those at risk of osteoporosis, (c) of at least primary school education, and (d) participating voluntarily in the study. Exclusion criteria were (a) having a diagnosis of osteopenia or osteoporosis, (b) being in menopause or surgical menopause, (c) being pregnant or breastfeeding, or (d) having an impediment to taking exercise.

In women, maximum bone mass occurs at 30–35 years of age, and begins to decline afterwards [4]. With greater bone mass in early adulthood, women will be less affected by the decline of bone mass in the postmenopausal period. Therefore, it is of great importance to support the development of behavioral changes aimed at increasing bone mass and preventing osteoporosis in women in the postmenopausal period. For this reason, women between the ages of 30 and 45 were chosen for this study.

Randomization

Participants were randomly assigned to either intervention or control groups by drawing lots. They ($n = 171$) were examined to determine their potential risk of osteoporosis using a computerized instrument; 102 women with a potential risk of osteoporosis were invited to take part in the study. Those at-risk women who accepted to take part in the study ($n = 80$) were assigned to the intervention group ($n = 40$) or the control ($n = 40$) group by drawing lots. We established that the two groups were homogeneous with regard to age ($\chi^2 = 0.45$, $p = .798$), education level ($\chi^2 = 0.30$, $p = .960$) (Table 2), and osteoporosis risk potential scores ($Z = 0.32$, $p = .748$).