

Nutritional Preventive Behavior of Osteoporosis in Female Students: Applying Health Belief Model (HBM)

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Abstract

Background

Osteoporosis is one of the most important health problems and it is of great importance to prevent this disease. This study aimed to evaluate the nutritional preventive behavior of osteoporosis using health belief model in female students in Qom city, Iran.

Materials and Methods

This cross-sectional descriptive analytical study was conducted on 265 tenth to twelfth grade female students in Qom city. The subjects were selected via multistage sampling method. To collect data, we used a standard questionnaire based on health belief model. Data were analyzed by SPSS version 20.0 using independent t-test, Pearson correlation coefficient, and ANOVA.

Results

Knowledge and perceived self-efficacy had a positive and significant relationship with nutritional preventive behavior of osteoporosis ($P=0.04$, $r=0.12$ and $P=0.004$, $r=0.18$, respectively). However, perceived susceptibility and perceived barriers had a negative and significant relationship with nutritional preventive behavior of osteoporosis ($P=0.02$, $r=-0.14$ and $P<0.001$, $r=-0.27$, respectively). Perceived severity and perceived benefits had no significant relationship with nutritional preventive behavior of osteoporosis ($P=0.08$, $r=0.11$ and $P=0.22$, $r=0.07$, respectively).

Conclusion

Health Belief Model is a helpful and efficient model for preventive behaviors. This method can be also utilized to design intervention programs to change osteoporosis preventive nutritional behaviors.

Key Words: Health Belief Model, Iran, Nutrition, Osteoporosis, Students.

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1- INTRODUCTION

The osteoporosis is becoming serious problem for the preventive healthcare. The loss of bone mass in women may be even five times higher than in men (1). The definition of osteoporosis was originally formulated at a conference of the World Health Organization (WHO) in 1993 as a systemic skeletal disease characterized by decreased bone mass and altered micro-architecture of bone tissue, leading to enhanced bone fragility and risk of fractures'. Osteoporosis is characterized by low bone mineral density (BMD) and loss of the structural and bio-mechanical properties that are required to maintain bone homeostasis (2). According to a report by the World Health Organization published in 1991, ranked after heart attack, stroke, and cancer, osteoporosis is the fourth main enemy of human (3-7) and is the most important cause of fractures all over the world (8). Clinical consequences of fracture include short and long-term morbidity characterized by pain, limitation of function, decreased health-related quality of life, and increased mortality (9).

Osteoporosis is considered as a major problem because this disease is associated with many disabilities, it is a cause of mortality, it has adverse effects on quality of life, and it imposes heavy costs on the individuals and community (10). Although one in four women aged over 50 years suffers from osteoporosis-related bone fracture, it should be noted that 80% of people affected by this disease are females (11). Based on the results of studies by Endocrine and Metabolism Research Center, Tehran University of Medical Sciences, two out of every three Iranian women aged over 50 years and one out of every three Iranian men aged over 50 years is diagnosed with osteoporosis or has low bone mineral density (12). Osteoporosis risk constructs include the two groups of modifiable constructs (lack of calcium and vitamin D intake, insufficient physical

activity, smoking, alcohol consumption, and taking medications such as glucocorticoids), and un modifiable constructs (gender, age, size (height or weight), Body mass index (BMI), and family history of disease) (11). Osteoporosis is one of the most important health problems which must be prevented seriously. Developing healthy eating habits, exposure to direct sunlight, adequate physical activity, avoiding alcohol consumption, avoiding tobacco use, and the use of medications are among the methods to prevent the disease (13).

Knowledge of osteoporosis risk factors is a key to preventing osteoporosis (14). In the new era, health education professionals have utilized different theories from the fields of psychology and social sciences to propose new models for changing behaviors; the new theories have been proved to be very effective and useful. Among the newly established models we may note health belief model that was designed by Rosenstok. This model is mainly used for the prevention of diseases (15). Health belief model (HBM) tries to explain why some people adopt disease preventive behaviors while others do not (16). The structures of the HBM include perceived severity, perceived susceptibility, perceived benefits, perceived barriers, modifying variables, cues to action, and self-efficacy (17).

Based on Health Belief Model, people change their behavior when they understand that the disease is serious, otherwise they might not turn to healthy behaviors (18). The development of health behaviors in adolescence plays a major role in the prevention of osteoporosis in old ages. In addition, because of the women's low bone density and stop of estrogen production after menopause which in turn decreases bone mass, women are much more at risk of osteoporosis than men. Given that, girls living now will turn into mothers in the future and as girls'

health is a determinant of the next generations' health (19). This study aimed to determine nutritional preventive behavior of osteoporosis in female students in Qom city, with Applying Health Belief (HBM) Model.

2- MATERIALS AND METHODS

2-1. Study Design and Population

This cross sectional descriptive analytical study was conducted on students in Qom city, Iran. The study population including tenth to twelfth grade girl students.

2-2. Methods

In the current study used multi-stage sampling method. Accordingly, a related study (20), with $d=1$, $\sigma^2=64$ and confidence interval (CI) 95% by using the formula, sample size was calculated as 256 students (including probability 5% sample loss). Since, the Qom city was divided into four regions, and then two public schools were selected randomly from each region. Then, the participants were randomly selected from eight public schools using the attendance lists and each were given a code. Sample size estimation was based on the following formula:

$$n = \frac{z^2 \cdot \frac{\sigma}{d}}{d^2} = (1.96)^2 \times 64 / (1)^2 = 256$$

2-3. Measuring tools

The standard questionnaire was used to collect data that including three parts; the first part following items: demographic variables such as age, father's educational level, mother's educational level, father's job, mother's job, family income level, etc. (with 10 questions); the second part following: knowledge about nutritional preventive behaviors of osteoporosis with 15 multiple-choice questions; and, the third part following: health belief model constructs with six sub-items including; perceived susceptibility with 6 questions,

perceived severity with 5 questions, perceived benefits with 6 questions, perceived barriers with 6 questions, perceived self-efficacy (with 10 questions); and nutritional preventive behaviors of osteoporosis (with 11 questions). The questionnaire was given to the target group and the required data was collected via visiting the selected schools.

The answers to the questions about each of the abovementioned constructs were recorded on a Likert scale rating from 1 to 5 i.e. from totally agree to totally disagree, respectively. Accordingly, each of the options was scored as follows: "totally agree" was scored 5 points, "agree" was scored 4 points, "no idea" was scored 3 points, "disagree" was scored 2 points, and "totally disagree" was scored 1 point. To check the efficacy of osteoporosis preventive nutritional behavior, correct preventive behavior was scored 1 point and wrong behaviors was scored 0 point. In addition, all the scores were finally calculated and reported on the basis of a 100 point system. In Khorsandi et al.'s study the validity of the questionnaire was proved by an expert panel (21). In addition the reliability was proved through calculating Cronbach's alpha coefficient for knowledge questions ($\alpha=0.81$), health belief model constructs ($\alpha=0.86$), the checklist for students performance in terms of nutritional preventive behavior of osteoporosis ($\alpha=0.84$).

2-4. Inclusion criteria

The inclusion criteria were consisted of being tenth to twelfth grade girl students and being satisfied to participate in the study.

2-5. Exclusion criteria

The exclusion criteria including; having osteoporosis, just partial completing of the questionnaire and unwillingness for participation in current study.

2-6. Ethical considerations

Before completing the questionnaire, the aim of the study was presented for the participants and the informed consent was obtained from them.

2-7. Data analyses

Data were analyzed by SPSS statistical software version 20.0 using Pearson correlation coefficient for correlation between health belief model structures (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived self-efficacy), with nutritional preventive behaviors of osteoporosis, and ANOVA for relationship between parents' educational level, parent's job and family income level with nutritional preventive behavior of osteoporosis at the significant level 0.05.

3- RESULTS

Overall, 256 students participated in the current study. Based on the results of the study, the mean age of the subjects was 16.03 ± 0.72 years. Based on the findings of our study, the majority of students' parents were educated up to junior high school (28.5%), and primary school (33.8%). The majority of students' fathers were self-employed (38.8%), and the majority of students' mothers were housewife (68.8%). Of all, 68.8% of households had a moderate income level.

As the results of statistical analyses showed, demographic variables (age, parents' education, parents' occupation, and family income level) had no significant relationship with nutritional preventive behavior of osteoporosis ($P > 0.05$). The study findings showed that the knowledge had a positive and significant relationship with the perceived benefits, perceived barriers, and perceived self-efficacy ($P < 0.001$, $r = 0.35$; $P = 0.007$, $r = 0.16$ and $P < 0.001$, $r = 0.31$, respectively). So that with increasing score of the knowledge about osteoporosis, the score of the perceived benefits, perceived barriers,

and perceived self-efficacy significantly increased. In addition, the perceived susceptibility had a positive and significant relationship with perceived severity, perceived barriers, and perceived self-efficacy ($P < 0.001$, $r = 0.31$; $P < 0.001$, $r = 0.34$ and $P < 0.001$, $r = 0.24$, respectively).

So that with increasing score of the perceived susceptibility about osteoporosis, the score of the perceived severity, perceived barriers, and perceived self-efficacy significantly increased. Also, the perceived benefits had a positive and significant relationship with the perceived self-efficacy ($P < 0.001$, $r = 0.28$); so that with increasing score of the perceived benefits about nutritional preventive behavior of osteoporosis, the score of the self-efficacy significantly increased. While, the perceived barriers had a negative and significant relationship with the perceived benefits and perceived self-efficacy ($P = 0.003$, $r = -0.18$; $P < 0.001$, $r = -0.44$ respectively) (**Table-1**). So that with increasing score of the perceived barriers about nutritional preventive behavior of osteoporosis, the score of the perceived benefits and perceived self-efficacy significantly decreased.

As presented in **Table.2**, the knowledge and perceived self-efficacy had a positive and significant relationship with nutritional preventive behavior of osteoporosis ($P = 0.04$, $r = 0.12$; $P = 0.004$, $r = 0.18$ respectively). However, perceived susceptibility and perceived barriers had a negative and significant relationship with nutritional preventive behavior of osteoporosis ($P = 0.02$, $r = -0.14$; $P < 0.001$, $r = -0.27$, respectively); while, perceived severity and perceived benefits had no significant relationship with nutritional preventive behavior of osteoporosis ($P = 0.08$, $r = 0.11$; $P = 0.22$, $r = 0.07$, respectively).

Table-1: Relationship between constructs of health belief model toward osteoporosis prevention

Variables	Knowledge	Perceived Susceptibility	Perceived Severity	Perceived Benefits	Perceived Barriers	Perceived Self-Efficacy
Knowledge	1					
Perceived Susceptibility	r = 0.038 p = 0.545	1				
Perceived Severity	r = 0.071 p = 0.251	r = 0.310 p < 0.001	1			
Perceived Benefits	r = 0.355 p < 0.001	r = 0.013 p = 0.829	r = 0.108 p = 0.081	1		
Perceived Barriers	r = 0.168 p = 0.007	r = 0.348 p < 0.001	r = 0.173 p = 0.005	r = -0.182 p = 0.003	1	
Perceived Self-Efficacy	r = 0.319 p < 0.001	r = 0.241 p < 0.001	r = 0.092 p = 0.137	r = 0.280 p < 0.001	r = -0.441 p < 0.001	1

Table-2: Relationship between nutritional preventive behavior of osteoporosis and constructs of health belief model

Variables	Knowledge	Perceived Susceptibility	Perceived Severity	Perceived Benefits	Perceived Barriers	Perceived Self-Efficacy
Nutritional Behavior	p = 0.04 r = 0.12	p = 0.02 r = - 0.14	p = 0.08 r = 0.11	p = 0.22 r = 0.07	p < 0.001 r = - 0.27	p = 0.004 r = 0.18

4- DISCUSSION

The findings of this study showed that knowledge, perceived susceptibility, perceived barriers, and perceived self-efficacy had a significant relationship with nutritional preventive behavior of osteoporosis. So that, with increasing the knowledge about osteoporosis and the perceived self-efficacy, nutritional preventive behavior of osteoporosis significantly increased; while, with increasing the perceived susceptibility and the perceived barriers, nutritional preventive behavior of osteoporosis significantly decreased. This finding is consistent with the results of a study by Vahedian Shahroudi et al. which used health belief model to predict nutritional preventive behavior of osteoporosis (20). Based on the results of a study by Kamjo et al. educational intervention had a significant impact on high school girls' knowledge of osteoporosis prevention methods (22). As a consequence, it can be

stated that it is helpful to design educational interventions to take advantage of the significant effects of the mentioned constructs on adopting osteoporosis preventive behaviors (23, 24). Among the constructs of the model, perceived susceptibility showed a significant negative relationship with osteoporosis preventive nutritional behavior; however, according to some other studies, with increasing the perceived susceptibility the behavior is augmented (23, 24).

This inverse relationship in our study can be caused by an Optimism bias. Sometimes people's false beliefs and misconceptions about health problems make them feel they are less at risk of having a health problem, as compared to their peers. In other words, people usually underestimate the risk of their exposure to threats, as compared with the risk estimated for their peers (25). So, if people

have a lower perception of the threats or health problems, they deny health warnings and thus take no action to prevent health problems or health threats and make no change in their attitudes and behaviors (26, 27). Hence, it is needed to carry out further researches and particularly interventional studies in this field. In our study, perceived severity and perceived benefits did not show a significant relationship with osteoporosis preventive nutritional behavior. This finding is consistent with the results of Shojaeizadeh et al.'s study which evaluated the relationship between the application of health belief model and the prevention of osteoporosis in female health volunteers in health care centers in Khoramabad (5).

Based on the results of this study, among the constructs of health belief model, the perceived self-efficacy showed a significant relationship with the knowledge, perceived susceptibility, perceived benefits, and perceived barriers. It seems that with increasing people's self-efficacy, they can be empowered to obtain knowledge about osteoporosis preventive behavior, increase their perceived susceptibility, overcome the perceived barriers, and adopt osteoporosis preventive behaviors. In other words, enhancing people's self-efficacy can promote preventive behavior adopted by them. Self-efficacy plays a major role in adopting and maintaining behavior. In general, Bandura believes that perceived self-efficacy could determine the level of efforts made by an individual and time it takes to persevere in the face of problems and obstacles. Thus, it could affect the level of motivation of a person (28). According to the results of Khorsandi et al.'s study, because of the strong correlation between self-efficacy and health related behaviors, the studied mothers had poor performance in terms of walking and appropriate diet (21).

Similarly, in our study, self-efficacy had a significant effect on other constructs

especially behavior; however, further studies are needed to prove such a relationship. Based on the findings of this study, there was no significant relationship between demographic variables (age, parents' education, parents' occupation, and family income level) and osteoporosis preventive nutritional behavior. It seems lack significant relationship, because the low sample size and low power study (80%) is in the current study. This finding is not consistent with the results of Rahnavard's study (which evaluated the effects of girls' lifestyle on the prevention of osteoporosis), and Lessan et al.'s study (which was conducted to determine the relationship between food habits and osteoporosis preventive behaviors in female teachers) (29, 30).

In the mentioned studies, father's education level, family size, as well as work experience had a significant relationship with osteoporosis preventive behaviors. The difference between the results of our study and other studies might be due to geographical, regional, or cultural differences between the studied groups; it might be also attributed to the differences in demographic variables.

4-1. Limitations of the study

The limitations of this study contain its use of self-report questionnaires; present study surveyed only tenth to twelfth grade girl students in government schools might boundary the generalizability of the outcomes external these contributors.

5- CONCLUSION

Osteoporosis is a latent and asymptomatic disease. If it would not be prevented in adolescence, it will lead to the loss of bone density and fractures in the old ages. Moreover, health belief model is recognized as a useful and efficient predictor of preventive behaviors. As a result, this model can be also utilized to design intervention programs to change

behaviors, especially osteoporosis preventive nutritional behaviors.

6- CONFLICT OF INTEREST: None.

7- ACKNOWLEDGMENT

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