

## Related Factors of Physical Activity Preventive Behavior of Osteoporosis Based on Health Belief Model among Teen Girls in Qom City, Iran

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### Abstract

#### Background

Although osteoporosis is a disease of adulthood, it can start from childhood and adolescence. Lifestyle, especially physical activity, mobility, and proper nutrition during adolescence are among the important osteoporosis preventive factors. Therefore, this study aimed to determine related factors of physical activity preventive behavior of osteoporosis based on the Health Belief Model (HBM) among teen girls in Qom city, Iran.

#### Materials and Methods

This cross-sectional descriptive analytical study was conducted on 265 tenth to twelfth grade girl students in Qom city. The participants were selected via multistage sampling method. A researcher-made questionnaire based on Health Belief Model used for data collection. Data were analyzed using SPSS-20.

#### Results

The current study, knowledge and perceived self-efficacy had a significant and positive relationship with physical activity behavior ( $r=0.13$ ,  $P<0.05$  and  $r=0.25$ ,  $P<0.05$ , respectively); while, perceived susceptibility and perceived barriers had a negative and significant relationship with physical activity behavior ( $r = -0.20$ ,  $P<0.05$  and  $r= -0.26$ ,  $P<0.05$ , respectively). Perceived severity and perceived benefits had no significant relationship with physical activity behavior ( $P>0.05$ ).

#### Conclusion

The results of the study showed that educational interventions and programs must focus on increasing knowledge and perceived self-efficacy to enhance physical activity behavior and reduce the perceived barriers associated with osteoporosis preventive physical activity.

**Key Words:** Adolescents, Health Belief Model, Physical activity, Osteoporosis.

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## 1- INTRODUCTION

Osteoporosis is a chronic, asymptomatic, and metabolic bone disease characterized by decreased bone mass and microarchitectural alterations of bone tissue (1). It is considered a complex health problem because it is associated with poor bone quality and increased fracture risk (2). Today, osteoporosis is a major health problem in communities and is known as the silent disease of the century (3). According to the World Health Organization (WHO), osteoporosis is defined as a bone density of 2.5 standard deviations (SD) below that of a normal young adult (4).

Osteoporosis begins in early adolescence. From childhood to the time a person becomes twenty year old, bone formation is higher than bone destruction. After thirty years of age, for reasons that are not yet known, the process is reversed and bone destruction become more common than bone formation. By the age of thirty, most people achieve the peak of their bone mass. Since this age, bone loss starts slowly. In other words, the peak bone mass is formed at the early stages of life and it continues to the late teens or early thirties (5). So that, ten percent decreasing in bone mass among adolescence leads to doubling of the risk of osteoporosis in adults. Thus, childhood and adolescence is the best time and opportunity to increase bone mass through modification of lifestyle and environmental factors (6).

The risk factors for the onset of osteoporosis are many and different from each other. Some of them cannot be modified, such as age, hereditary diseases and endocrine diseases. Others are modifiable, so that prevention is an advisable tool to reduce the incidence of osteoporosis. Among preventive factors, physical activity (PA) is certainly a valid instrument of prevention in fact physical activity contributes to a healthy energy balance and increases muscle mass and

bone mass (7). Nevertheless, 25 minutes of daily regular physical activity can strengthen femoral neck bone in children (8) and can be used as a method of preventing osteoporosis in people in coming years of their life. Many methods have been proposed and many studies have been conducted so far to review risk factors associated with osteoporosis and the parameters influencing physical activity behavior in different communities and groups (9-11).

Experts believe that the efficacy of health education and behavior change programs depends largely on the use of models and theories of health education. Therefore, in order to investigate factors affecting the adoption of osteoporosis preventive behaviors among women, it is essential to use models that identify factors affecting behavior. Based on Health Belief Model (HBM), people change their behavior when they understand that the disease is serious. Otherwise, they might not turn to healthy behaviors (12). The structures of the HBM include perceived severity, perceived susceptibility, perceived benefits, perceived barriers, modifying variables, cues to action, and self-efficacy (13). Therefore, perceived susceptibility was used to evaluate individual's perception about the extent to which they are at risk of osteoporosis.

Also, their perceived severity of osteoporosis complications was measured. The sum of these two factors is the individual's perceived threat of the disease. The perceived benefits and barriers that refer to the individual's analysis about the benefits of adopting preventive behaviors of osteoporosis, and about the potential barriers to carry out preventive behaviors of osteoporosis were investigated. These, alongside individual's perceived ability to carry out preventive behaviors, as a result of seeking preventive behaviors are the factors affecting individual's decision to comply with the preventive behaviors of

osteoporosis (14). Therefore, in order to improve individual's health, health care providers need to affect a person's beliefs (15). The development of health behaviors in adolescence plays a major role in the prevention of osteoporosis in old ages. In addition, women and girls are the major group at risk of osteoporosis and are more affected by this disease at the later stages of their life. Thus, this study aimed to determine related factors of physical activity preventive behavior of osteoporosis based on the health belief model among teen girls in Qom city, Iran.

## **2- MATERIALS AND METHODS**

### **2-1. Study Design and Population**

This cross-sectional descriptive analytical study was conducted on tenth to twelfth grade girl students in Qom city, Iran. The study populations, including 10-12<sup>th</sup> grade girl students.

### **2-2. Methods**

In the current study used multi-stage sampling method. Accordingly, the city was divided into four regions, and then two public schools were selected randomly from each region. A total of 256 girl students were randomly selected from eight public schools using the attendance lists and each were given a code.

### **2-3. Measuring tools**

In this study, a researcher-made questionnaire used that including two 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, and family income level with 10 questions, and knowledge about preventive behaviors of osteoporosis with 15 multiple-choice questions from 0-15 scores.

The second part about the Health Belief Model constructs including perceived susceptibility with 6 questions from 6-30 scores, perceived severity with 5 questions

from 5-25 scores, perceived benefits with 3 questions from 3-15 scores, perceived barriers with 3 questions from 3-15 scores, perceived self-efficacy with 6 questions from 6-30 scores. Each of the above mentioned constructs were recorded on a Likert scale from 1 to 5 from strongly agree to strongly disagree, respectively. It is worth mentioning that, to ensure the accuracy of the answers, some of the questions were designed inversely to ask the opposites as well.

Physical activity preventive behavior of osteoporosis was designed as a behavior checklist. Physical activity means walking at least 30 min of mild- to vigorous-intensity. To measure the reliability of the questionnaire about the Health Belief Model, a pilot study was conducted on 30 girl students.

So that, the Cronbach's alpha coefficient calculated for different constructs was as follows: knowledge questions ( $\alpha=0.76$ ), perceived susceptibility ( $\alpha=0.71$ ), perceived severity ( $\alpha=0.89$ ), perceived benefits ( $\alpha=0.90$ ), perceived barriers ( $\alpha=0.75$ ), perceived self-efficacy ( $\alpha=0.86$ ), and preventive behaviors ( $\alpha=0.81$ ). To measure the validity of the questionnaire, we collected the views and comments of six experts in the fields of health education and epidemiology.

### **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**

It should be noted that before the start of the study, the aim of the project was

explained to the target group and they were ensured about the confidentiality of their data. Only after obtaining a fully informed consent, the students were enrolled into the study and the required data was collected from the selected schools.

### 2-7. Data analyses

Data were analyzed by using SPSS statistical software version, 20 with using ANOVA for relationship between parent's educational level, parent's job and family income level with physical activity preventive behavior of osteoporosis, and Pearson correlation coefficient for correlation between health belief model's structures with physical activity preventive behavior of osteoporosis at the significant level 0.05.

### 3- RESULTS

Based on the results of the study, the mean age of the participants was  $16.03 \pm 0.72$  years old. In addition, the majority of parents' educational level was primary school (28.27%). The majority of students'

fathers were self-employed (38.8%) and the majority of students' mothers were housewife (90.7%). Of all, 68.8% of participants reported that they had a moderate family income level. The statistical analysis of data showed no significant relationship between demographic variables and physical activity preventive behavior of osteoporosis ( $P > 0.05$ ) (**Table.1**).

As shown in **Table.2**, knowledge and perceived self-efficacy had a significant and positive relationship with physical activity behavior ( $r=0.13$ ,  $P=0.03$  and  $r=0.25$ ,  $P<0.001$ , respectively), while, perceived susceptibility and perceived barriers had a negative and significant relationship with physical activity behavior ( $r= -0.20$ ,  $P=0.001$  and  $r= -0.26$ ,  $P<0.001$ , respectively).

On the other hand, the constructs of perceived severity and perceived benefits had no significant relationship with physical activity preventive behavior of osteoporosis ( $P > 0.05$ ).

**Table-1:** Relationship between demographic variables and physical activity preventive behavior of osteoporosis

Variables	Level	Frequency (percent)	P-value
Parents' educational level	Illiterate	55 (10.58%)	0.68
	Primary school	147 (28.27%)	
	High school	137 (26.35%)	
	Diploma	103 (19.8%)	
	Collegiate	78 (15%)	
Father's job	Unemployed	15 (5.8%)	0.55
	Self-employed	101 (38.8%)	
	Laborer	41 (25.8%)	
	Employee	26 (15%)	
	Other	77 (29.6%)	
Mother's job	Housewife	236 (90.7%)	0.69
	Employee	8 (3.07%)	
	Self-employed	7 (2.7%)	
	Other	9 (3.46%)	
Family income level, (Rials)	High ( $\geq 30.000.000$ )	51 (19.6%)	0.66
	Moderate ( $15.000.000-30.000.000$ )	179 (68.8%)	
	Low ( $\leq 15.000.000$ )	30 (11.5%)	

**Table-2:** Relationship between the constructs of health belief model and physical activity preventive behavior of osteoporosis

Constructs	Knowledge	Perceived Susceptibility	Perceived Severity	Perceived Benefits	Perceived Barriers	Perceived Self-efficacy	Physical Activity Behavior
Knowledge	1						
Perceived Susceptibility	r = 0.03 P = 0.54	1					
Perceived Severity	r = - 0.07 P = 0.02	r = 0.31 P < 0.001	1				
Perceived Benefits	r = 0.35 P < 0.001	r = 0.01 P = 0.82	r = 0.10 p = 0.08	1			
Perceived Barriers	r = 0.16 P = 0.007	r = 0.34 P < 0.001	r = 0.17 P = 0.005	r = 0.18 P = 0.003	1		
Perceived Self-efficacy	r = 0.31 P < 0.001	r = 0.24 P < 0.001	r = 0.92 P = 0.13	r = 0.28 P < 0.001	r = - 0.44 P < 0.001	1	
Physical Activity Behavior	r = 0.13 P = 0.03	r = -0.20 P = 0.001	r = -0.06 P = 0.28	r = 0.05 P = 0.40	r = -0.26 P < 0.001	r = 0.25 P < 0.001	1

#### 4- DISCUSSION

The findings of this study showed that physical activity preventive behavior of osteoporosis had significant relationship with knowledge, perceived susceptibility, perceived barriers, and perceived self-efficacy; this finding is consistent with the results of Kamjoo et al. which aimed to predict osteoporosis preventive behaviors through the use of Health Belief Model (16). Thus, 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. Among the constructs of the model, perceived susceptibility showed a significant negative relationship with osteoporosis preventive behavior; however, according to some other studies, higher levels of perceived susceptibility could promote the behavior (17).

This inverse relationship which was observed in our study could be due to 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 (18). 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 (19, 20).

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 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 (11). Based on the results of this study, among the constructs of health belief model, self-efficacy construct showed a significant and direct relationship with 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, Janiszewska et al. 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. People with high levels of self-efficacy have more challenging and valuable goals.

As a result, they show higher levels of commitment and perseverance to meet their goals (21). According to the results of Khorsandi et al. study, because of the strong relationship between self-efficacy and health related behaviors, the studied mothers had poor performance in terms of walking and appropriate diet (22).

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' educational level, parents' job, and family income level) with osteoporosis preventive physical activity behavior. This finding is not consistent with the results of Rahnavard study which evaluated the effects of girls' lifestyle on the prevention of osteoporosis; and the result of Lesan et al. that was conducted to determine the relationship between food habits and osteoporosis preventive behaviors in female teachers (5, 23).

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 findings of this study cannot be generalized for other groups and populations. In addition, the use of self-report instruments in this study was due to the lack of observation for physical activity behaviors, descriptive form of the study, and lack of follow up the effect of the study in future that all of these items are the limitation of this study.

### **5- CONCLUSION**

The results of the study showed that educational interventions and programs must focus on increasing knowledge and perceived self-efficacy to enhance physical activity behavior and reduce the perceived barriers associated with osteoporosis preventive physical activity.

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 physical activity behaviors.

**6- CONFLICT OF INTEREST:** None.

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