THE EFFECT OF OSTEOPOROSIS HEALTH EDUCATION PROGRAM BASED ON HEALTH BELIEF MODEL ON KNOWLEDGE AND HEALTH BELIEFS TOWARDS OSTEOPOROSIS AMONG JORDANIAN FEMALE TEACHERS

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Abstract

This study was conducted to assess the effect of osteoporosis health education program based on Health Belief Model on knowledge and health beliefs towards osteoporosis among Jordanian female teachers. This experimental study was performed on 200 female teachers (100 teachers in the intervention group and 100 in the control group) aged 25 - 49 years old in four governmental secondary schools affiliated to public educational directorate in Amman governorate. The females participated in a four-week educational program based on the Health Belief Model. The data collection instrument was a validated and reliable questionnaire in three sections: demographics, knowledge and health beliefs. The questionnaires on osteoporosis knowledge and health beliefs were given to the participants before the program (pre-intervention) and repeated three months later after the intervention on the same participants (post-intervention). The health education program prepared according to pre-intervention results. The results revealed that the mean scores of teachers' knowledge and health beliefs subscales among the intervention group were significantly changed before and after the educational intervention program ($P \leq 0.05$). The use of an osteoporosis educational program seems to improve knowledge and health beliefs. In addition, it could support the need to raising the awareness and knowledge of osteoporosis.

Keywords: Osteoporosis, health education program, knowledge, health beliefs, female teachers

Introduction

Osteoporosis is a global health issue along with heart disease, stroke, diabetes and cancer and takes up many financial resources for prevention and treatment (Wallace, Callachand, Elliott & Gardiner, 2011; Curtis JR, McClure, Delzell, Howards, Orwell, Saag, Safford & Howard, 2009).

It is a systemic skeletal disorder characterized by decreased bone mass density, micro architectural deterioration of bone tissue, and fragility fractures, particularly of the hip, spine, wrist and shoulder (Fleming & Patrick, 2002; Davidson, 2003; Vaytrisalova, Kubena, Vleek, Palicka, Hala & Pavelka, 2007). It affects more than 75 million people worldwide and, according to the US Department of Health and Human Services, will affect more than 10 million women by 2020 if efforts to prevent it are ineffective (Schuiling, Robinia & Nye, 2011).

There is a significant difference in the prevalence of osteoporosis among countries. Among the countries of the WHO Eastern Mediterranean Region, osteoporosis is a health priority. In previous studies, the levels of osteoporosis and osteopenia in the Islamic Republic of Iran were 22.2% and 59.9%, respectively and the level of osteoporosis in Pakistan was 55% (Lowe, Ellahi, Bano, Bangash, Mitra & Zaman, 2011). On the contrary, in Turkey was 27%–33.3% (Tüzün, Eskiyurt, Akarirmak, Saridogan, Senocak & Johansson, 2012), Morocco was 31%, Egypt was 28.4%, Bahrain was 27.1%, Saudi Arabia was 23%–24% and also United Arab Emirates was 2.5% (El-Hajj Fuleihan, Gemma Adib & Nauroy, 2011).

In Jordan, there are no specific statistics about the prevalence of osteopenia, osteoporosis and related fractures. The reported prevalence of osteoporosis ranges from 13% -44% (Al-Qutob, Mawajdeh, Khalil, Schmidt, Hannak & Masri, 2001; Shilbayeh, 2003). In addition, in the recent study, the prevalence of osteoporosis among women aged 40-60 years was 13% and 40% of women have low bone density (Jordan University, Jordan University of Science and Technology & Jordanian Osteoporosis Prevention Society, 2010). However, Jordan is in social transformations represented by increasing elderly population in which the majority of whom are women, in addition to, lack of health care services for postmenopausal women (Chowdhury, 2000) that may add susceptibility for osteoporosis.

Osteoporosis is a crippling condition that often results in premature mortality and significant morbidity that is manifested in the form of fractures, bone deformity, and pain (Krall & Dawson-Hughes, 1999). Worldwide, osteoporosis causes more than 8.9 million fractures annually, resulting in an osteoporotic fracture every 3 seconds (Johnell & Kanis, 2006). Evidence suggested that many women who sustain a fragility fracture are not appropriately diagnosed and treated for probable osteoporosis (Freedman, Kaplan, Bilker, et al., 2000; Siris, Miller, Barrett-Connor, et al., 2001).

Since bone density decreases with age, acquisition of peak bone mass during the first three decades and the subsequent retention of bone through middle age are important determinants for reducing the risk of osteoporosis (Martin, Coviak, Gendler, Kim, Cooper & Rodrigues-Fisher, 2004). Primary prevention programs of osteoporosis, which include health education and promotion programs should be emphasized, with the goal of optimizing bone mass growth, to prevent bone loss later in life. Maximizing bone mass along with lifestyle factors such as calcium intake and physical activity are considered as modifiable factors in the prevention of osteoporosis ((Babatunde, Forsyth & Gidlow, 2012). These programs are effective and cheap ways of increasing knowledge and skills needed to establish behavioral changes in the prevention of osteoporosis such as increasing calcium intake and physical activity (Shin et al., 2005; Babatunde et al., 2012). The challenge for osteoporosis prevention programs is to promote early identification of risk factors and to encourage the adoption of risk-reducing behaviors in women from adolescence to premenopause to develop a healthy lifestyle (von Hurst & Wham, 2007).

Health Belief Model (HBM), which was the theoretical framework for this study, is one of the theoretical models that explain factors influencing healthy behavior (Moodi et al., 2011). The HBM addresses four major components for compliance with recommended health action: perceived barriers and perceived benefits of recommended health action, perceived susceptibility and perceived severity of the disease. In addition, there are modifying factors that can effect behavior compliance and perception of health status and value placed on taking preventive action (Becker & Rosenstock, 1984). It is also the most widely applied theoretical framework for evaluating osteoporosis health beliefs and behaviors (McLeod & Johnson, 2011). Furthermore, several studies have already been conducted on osteoporosis preventive interventions using this model, in most of which health beliefs and knowledge improved after the intervention (Turner, Hunt, DiBrezzo, & Jones, 2004; Chan, Kwong, Zang, & Wan, 2007; Hazavehei, Taghdisi, & Saidi, 2007; Abd El Hameed, Emam, Fouad, & Abd El Mohsen,

2008; Abushaikha, Omran, & Barrouq, 2009; Sanaeinasab, Tavakoli, Karimizarchi, Haji Amini, Farokhian, &Rahmati Najarkolaei, 2013; El-Sayed, & Abdel Megeid, 2013). In this study, the modified HBM has been used to test osteoporosis (Kim, Horan, Gendler, & Patel, 1991).

Considering the limited studies focusing on prevention of osteoporosis through health education programs among women in different age groups especially young adult and mid-age women in Jordan (Abushaikha et al., 2009) and with the recent increase in women's life expectancy, the incidence of this disease will grow, and women is a key target group in preventive intervention. So that, this study was conducted with the purpose of assessing the effect of osteoporosis health education program based on Health Belief Model on knowledge and health beliefs towards osteoporosis among Jordanian female teachers. This study could be as a basis for health care providers to plan and develop effective osteoporosis prevention education programs based on the Health Belief Model.

Methods

Study design and sample

Experimental design (pretest-posttest control group) was selected. Two hypotheses were developed to be tested in this study, which were 1) the Jordanian female teachers who engage in osteoporosis education program will demonstrate higher levels of knowledge about risk factors and preventive measures of osteoporosis than those who do not engage, and 2) the Jordanian female teachers who engage in osteoporosis education program will demonstrate stronger health beliefs of osteoporosis than those who do not engage. A cluster sampling technique was used in which two zones from the available five zones in the public educational directorate in Amman were selected. Amman is the capital and the largest city of Jordan. After that, four governmental secondary schools (two from each zones) were selected by simple random sampling then, one school from each selected zone was selected randomly to be in the control group and another one to be in the intervention group. In total, 200 female teachers (100 in the intervention group and 100 in the control group), aged 25-49 years, Jordanian and willing to participate in the study participated. On the contrary, teachers who had physical immobility or had oteoporosis were excluded from participation. The study was conducted from August, 2012 through January, 2013.

Study instruments

A self-administered questionnaire was used and consists of the following instruments: Female Teacher Health Profile Structured Questionnaire, which includes personal and socio-demographic data, and Osteoporosis Knowledge Test (OKT) (Kim, Horan, Gendler & Patel, 1991), which was modified by the researcher to become 35 items tool and to include nine questions on risk factors. The OKT risk factors consist of 18 items. Each item is rated by the subject using ML = more likely, LL = less likely, NT = neutral, and DK = don't know. OKT preventive strategies related to exercise and calcium consist of 17 items questionnaire of multiple-choice questions. For the total instrument, there was only one correct answer for each question, and the maximum score for the OKT was 35 and the lowest was zero. The level of knowledge was categorized according to this rate: 0-8 indicated poor knowledge; 9-17 indicated mild or little knowledge; 18-26 indicated moderate knowledge; and 27-35 indicated strong or high knowledge. In addition, Osteoporosis Health Belief Scale (OHBS) that developed by Kim et al., 1991) and includes a 42-item instrument consisting of seven subscales addressing health beliefs. The subscales address susceptibility, severity (seriousness), benefits of exercise, benefits of calcium intake, barriers to exercise, barriers to calcium intake, and health motivation. Each item was rated by using a 5 point Likert scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

Accordingly, a maximum total score for OHBS was equal to five and a minimum total score was equal to 1.

The content validity of the Arabic version of the questionnaire was evaluated based on the feedbacks of three research experts in osteoporosis. Furthermore, the questionnaires were tested on a group of female teachers in Amman (N=20) who were not included in the study sample. Questionnaires were found to be clear, and respondents took an average of 15-20 minutes to complete. Internal consistency was used in ascertaining reliability of the instrument. The Cronbach's Alpha that obtained from the pilot data was 0.81 for (OKT) and 0.88 for (OHBS). Data was collected through two stages pre-intervention and post intervention. In pre-intervention stage, participants in each group completed questionnaires, then results were analyzed to design health education intervention program contents for the intervention group.

Furthermore, the intervention group was divided into small groups (10) teachers in each. There were 10 groups, five groups in each school. A four-week health education program based on the Health Belief Model consisted of four sessions, 40 minutes each, presented via pamphlets, slides show and face to face lectures using discussion method..

The content of educational sessions include definition of osteoporosis, prevalence and risk factors; symptoms, complications, diagnosis and treatment; and preventive measures including nutritional prevention and calcium-rich foods and exercise.

Statistical analysis

Data were analyzed with *SPSS,* version 13, and the Excel 5.0 spreadsheet was used to compute all data in this study. Descriptive statistical analysis were used (frequency, percentages, mean, and standard deviation). The paired-sample *t*-test was used to compare mean scores before and after the intervention. The significance of association (p) was accepted as statistically significant at an alpha level of ≤ 0.05.

Ethical considerations

An official permission was obtained from Ministry of Education, each selected zone in public educational directorate, and from each participating school. Then, participants approached and informed about the purpose and significance of the study and a written consent to participate in the study was obtained from each teacher. The participants were reassured that their information will remain confidential. In addition, arrangement was made for questionnaires to be completed by the selected teachers.

Results

The total number of female teachers who participated in the study was 200, of which 100 participated as a control group and 100 participated in the educational program as intervention group. Table 1 presents the subjects' personal and socio-demographic information.

Table 2 presents the percentage scores for osteoporosis knowledge about risk factors of in pre-post intervention stages. In pre-intervention stage, the majority of the control and the intervention groups knew and answered correctly about advanced aging (92.0%; 85.0%), and excessive intake of carbonated beverages (95.0%; 82.0%, respectively) as risk factors for osteoporosis. On the contrary, 10..0% and 15.0% of the control and the intervention groups knew and answered correctly about excessive exercise, being white woman with fair skin (22.0%; 12.0%) and having big bones (18.0%; 13.0%, respectively). In post-intervention stage, 100% of the teachers scoring correct responses were observed for ten of the 18 risk factors items in the intervention group. In addition, there was a significant change in the scores for the other eight items, but still the less percentages in the items that included

excessive exercise (79.0%) and having ovaries surgically removed (88.0%). On the other hand, there were little changes in knowledge about risk factors among the control group. The majority of the control group knew about excessive intake of carbonated beverages (97.0%) and advanced aging (95.0%),
respectively as risk factors for osteoporosis. On the contrary, 10.0% knew and answered correctly about excessive exercise, having big bones (18.0%) and being white woman with fair skin (22.0%), respectively.

Table 1 Personal and socio-demographic characteristics of the study population (N=200, Control group=100, Intervention group= 100)

Characteristics	**Control group**		**Intervention group**	
	Frequency	**%**	**Frequency**	**%**
Age				
25-29 years	14	14.0	18	18.0
>29-34 years	28	28.0	33	33.0
>34- 39 years	30	30.0	24	24.0
>39-44 years	18	18.0	16	16.0
>44-49 years	10	10.0	9	9.0
Marital status				
Single	21	21.0	28	28.0
Married	71	71.0	66	66.0
Divorced	6	6.0	4	4.0
Widow	2	2.0	2	2.0
Number of children				
No children	6	7.6	3	4.2
1- 3	48	60.8	44	61.1
4- 6	25	31.6	24	33.3
7 and more	…	……	1	1.4
Level of education				
Diploma	7	7.0	7	7.0
Baccalaureate	71	71.0	75	75.0
Graduate education	22	22.0	18	18.0
Family income/ Month				
Enough and spared	22	22.0	20	20.0
Enough and not spared	61	61.0	61	61.0
Not enough	17	17.0	19	19.0
Body frame				
Small	7	7.0	10	10.0
Medium	79	79.0	79	79.0
Large	14	14.0	11	11.0
Skin color				
White	32	32.0	29	29.0
Fair	59	59.0	63	63.0
Brown	8	8.0	7	7.0
Dark	1	1.0	1	1.0
Osteoporosis in the family				
Yes	18	18.0	21	21.0
No	82	82.0	79	79.0

Table 2 Correct knowledge about risk factors of osteoporosis among the study population in pre-post intervention stages (N=200, Control group=100, Intervention group= 100)

Items	Pre-intervention				Post-intervention			
	Control group		Intervention group		Control group		Intervention group	
	N	%	N	%	N	%	N	%
Risk factors								
• Advanced aging	92	92.0	85	85.0	95	95.0	100	100.0
• Male gender	51	51.0	41	41.0	48	48.0	100	100.0
• Being a white woman with fair skin	22	22.0	12	12.0	22	22.0	93	93.0
• Having a mother or grandmother or sister with osteoporosis	64	64.0	63	63.0	68	68.0	100	100.0
• Being menopausal before 45 years or absence of period for 3 months	60	60.0	58	58.0	60	60.0	100	100.0
• Having big bones	18	18.0	13	13.0	18	18.0	94	94.0
• Excessive dieting	41	41.0	41	41.0	39	39.0	93	93.0
• Diet low in milk products	70	70.0	71	71.0	82	82.0	100	100.0
• Excessive exercise	10	10.0	15	15.0	10	10.0	79	79.0
• Eating dark green leafy vegetables	40	40.0	32	32.0	38	38.0	92	92.0
• Smoking	78	78.0	68	68.0	79	79.0	100	100.0
• Excessive intake of carbonated beverages	95	95.0	82	82.0	97	97.0	100	100.0
• Excessive coffee consumption	68	68.0	60	60.0	68	68.0	100	100.0
• Lack of exposure to sunlight	81	81.0	78	78.0	81	81.0	100	100.0
• Getting regular exercise	60	60.0	66	66.0	85	85.0	100	100.0
• Having a history of previous fracture	39	39.0	32	32.0	35	35.0	99	99.0
• Having ovaries surgically removed	32	32.0	23	23.0	30	30.0	88	88.0
• Taking steroids	69	69.0	59	59.0	68	68.0	99	99.0

Regarding to osteoporosis knowledge about preventive strategies in pre-post intervention stages, the results in pre-intervention stage revealed that the majority of the control and the intervention groups knew about cheese as a good source of calcium (92.0%; 91.0%) and yogurt as a good source of calcium (84.0%; 86.0%, respectively) as preventive strategies for osteoporosis. On the contrary, 9.0% and 7.0% of the control and the intervention groups knew about recommended daily intake for calcium, ice cream as a good source of calcium (16.0%; 22.0%, respectively), and bicycling as a best type of exercise (27.0%; 20.0%, respectively) as preventive strategies. Furthermore, in post-intervention stage 100% of the teachers scoring correct responses were observed for eight of the 17 preventive strategies items in the intervention group. In addition, there was a significant change in the scores for nine items, but the less percentages in the items that included level of exertion of exercise (71.0%), bicycling as a best type of exercise (75.0%) and recommended daily intake for calcium (77.0%). On the contrary, there were little changes in knowledge about preventive strategies among the control group, the majority of the control group knew about cheese as a good source of calcium (94.0%), and yogurt as a good source of calcium (93.0%), respectively as preventive strategies for osteoporosis. On the contrary, 6.0% of the control group knew about recommended daily intake for calcium, ice cream as a good source of calcium (19.0%), level of exertion for exercise (23.0%), amount of milk to supply calcium recommended daily intake (24.0%) , and bicycling as a best type of exercise (25.0%), respectively as preventive strategies as shown in table 3.

Table 3 Correct knowledge about preventive strategies of osteoporosis among the study population in pre-post intervention stages (N=200, Control group=100, Intervention group= 100)

Items	Pre-intervention				Post-intervention			
	Control group		Intervention group		Control group		Intervention group	
	N	%	N	%	N	%	N	%
Preventive strategies								
• Best type of exercise:-walking	57	57.0	54	54.0	68	68.0	100	100.0
• Best type of exercise:-bicycling	27	27.0	20	20.0	25	25.0	75	75.0
• Best type of exercise:-aerobic dancing	36	36.0	29	29.0	54	54.0	100	100.0
• Best type of exercise:-jogging	66	66.0	46	46.0	57	57.0	93	93.0
• Frequency of exercise:-3 or more days a week	58	58.0	49	49.0	39	39.0	94	94.0
• Duration of exercise-least amount of time:-20 to 30 minutes	63	63.0	58	58.0	68	68.0	88	88.0
• Level of exertion:-much faster but talking is possible	26	26.0	42	42.0	23	23.0	71	71.0
• A good source of calcium:-cheese	92	92.0	91	91.0	94	94.0	100	100.0
• A good source of calcium:- canned sardines	73	73.0	73	73.0	75	75.0	97	97.0
• A good source of calcium:- broccoli	44	44.0	30	30.0	43	43.0	93	93.0
• A good source of calcium:- yogurt	84	84.0	86	86.0	93	93.0	100	100.0
• A good source of calcium:- ice cream	16	16.0	22	22.0	19	19.0	100	100.0
• Recommended daily intake (RDI) for calcium:-> 800 mg	9	9.0	7	7.0	6	6.0	77	77.0
• Amount of milk to supply calcium RDI: 2 or more glasses daily	28	28.0	26	26.0	24	24.0	100	100.0
• Best reason to take a calcium supplement:-if a person doesn't get enough calcium from diet	64	64.0	60	60.0	64	64.0	99	99.0
• Vitamin is required for the absorption of calcium:-vitamin D	49	49.0	55	55.0	73	73.0	100	100.0
• The best source of that vitamin:-sunlight	55	55.0	62	62.0	60	60.0	100	100.0
Total OKT mean score + SD	18.17+5.55		17.14+4.98		19.08 + 5.0		33.22+ 1.08	
t-test =	1.38				-26.63			
p=	0.17				0.00*			

Significant at p ≤ 0.05

With respect to knowledge, the results showed that before the educational program 46.6% and 42.0% of the control and the intervention groups had moderate knowledge, followed by 39.8% and 45.0% had little knowledge, then 6.8% and 10.0% had poor knowledge and 6.8% and 3.0% had strong knowledge. The average knowledge scores about osteoporosis for the control group was *M= 18.17, SD=* 5.55 and *M=* 17.14, *SD=*4.98 for the intervention group. The results indicated that there were no significant differences between them (t=1.38; p=0.17). While afterwards a significant increase in overall osteoporosis knowledge was detected among the teachers in the intervention group after attending health education sessions. In total, 100 % of the intervention group had strong knowledge. On the contrary, there was no significant increase in overall osteoporosis knowledge among the teachers in the control group. Overall, 55.3% of the control group had moderate knowledge, followed by 35.0% had little knowledge, then 5.8% had strong and 3.9% had poor. The average knowledge scores about osteoporosis in both groups were *M=*19.08, *SD=* 5.00 for the control group and *M=* 33.22, *SD=* 1.08 for the intervention group, and the results of the *t*-test indicated a significant difference between two groups (t= -26.63; p= 0.00).

Regarding to health beliefs, the results showed that before the educational program the perceived susceptibility subscale was evaluated as medium for the control and the intervention groups (*M = 2.72, SD=0.81; M= 2.74, SD=0.81,* respectively). In addition, there were no statistically significant differences in responses between two groups (t= - 0.09;

p=0.93). On the contrary, after the educational program there was a significant effect of health education sessions on perceived susceptibility. The results showed that perceived susceptibility score among the intervention group was a statistically significant higher than in the control group (*M = 2.83, SD=0.64; M= 3.64, SD=0.52,* respectively). Furthermore, there was a statistically significant difference in responses between them (t= - 8.51; p=0.00).

Before the educational program the mean scores for perceived seriousness of the control and the intervention groups were evaluated as medium (*M= 3.17, SD= 0.81; M= 3.17, SD= 0.74*, respectively). There was no statistically significant differences between two groups according to *t*-test (t= - 0.17; p=0.87). These results changed after the educational program, the mean score was (*M= 3.21, SD= 0.62 and M= 4.13, SD= 0.30,* respectively), which showed a statistically significant difference according to *t*-test (t= - 13.41; p=0.00).

Before the educational program, the perceived benefits of exercise subscale was the highest for the control and the intervention groups (*M= 3.95, SD= 0.79; M= 3.80, SD= 0.87*, respectively). The *t*-test showed no statistically significant differences in responses between them (t= 1.19; p=0.24). After the educational program, this subscale was strong and there was a significant increase in the scores among the teachers in the intervention group and little increase but not significant among the control group. The mean score for the benefits of exercise subscale was (*M= 3.97, SD= 0.60; M= 4.46, SD= 0.36*, respectively) for the control and the intervention groups, and *t*-test showed a statistically significant difference between the two groups (t= - 6.91; p=0.00).

On perceived benefits of calcium intake before the educational program, the mean was high for the control and the intervention groups (*M= 3.88, SD= 0.65; M= 3.74, SD= 0.70*). As shown in table 4, *t*- -test did not suggest any significant difference among perceived benefits scores between the two groups (t= 1.35; p=0.18). After the educational program these mean scores were 3.87 (SD 0.50) and 4.36 (SD 0.31). There was a statistically significant difference between the groups (t= - 8.28; p=0.00).

Before the educational program, the control and the intervention groups had medium mean scores of barriers of exercise (*M= 2.82, SD= 0.73; M= 2.88, SD= 0.75*). There were no statistically significant differences in responses between them (t= - 0 .67; p=0.51). After the educational program, there was a significant decrease in subscale scores among the intervention group and little changes but not significant among the control group. There was a statistically significant difference between the groups (*M= 2.74, SD= 0.54; M= 2.22, SD= 0.40*) and t= 7.62; p=0.00.

Prior to the educational program, barriers to calcium intake subscale had the lowest mean scores for the control and the intervention groups ((*M= 2.46, SD= 0.71 and M= 2.52, SD= 0.73)*. There were no statistically significant differences in responses between them (t= - 0.39; p=0.69); however, these scores after the educational program were changed. The mean scores were *M= 2.71, SD= 0.56 and M= 1.85, SD= 0.56* for the control and the intervention groups, and the *t*-test indicated statistically significant differences in responses to this subscale between them (t= 11.66; p=0.00).

Regarding to health motivation before the educational program, the teachers in the control and the intervention groups were more highly motivated to take care of their health with *M= 3.61, SD= 0.73 and M= 3.46, SD= 0.68*, respectively. There were no statistically significant differences among them (t= 1.31; p=0.19) as shown in table 4. After the educational program there was a statistically significant difference between the groups in the responses to this subscale (*M= 3.5, SD= 0.53; M= 4.15, SD=0.34* and t= - 10.27; p=0.00.

Table 4 Difference in the participants' health belief model subscales pre and post intervention (N=200, Control group=100, Intervention group= 100)

Subscale	Pre-intervention				Post-intervention			
	Control group	Intervention group	*t*-value	*P*-value	Control group	Intervention group	*t*-value	*P*-value
	Mean (SD)	Mean (SD)			Mean (SD)	Mean (SD)		
Perceived susceptibility	2.72 (0.81)	2.74 (0.81)	- 0.09	0.93	2.83 (0.64)	3.64 (0.52)	- 9.97	0.00*
Perceived severity	3.16 (0.81)	3.17 (0.74)	- 0.17	0.87	3.21 (0.62)	4.13 (0.30)	-13.41	0.00*
Perceived benefits of exercise	3.94 (0.80)	3.80 (0.87)	1.19	0.24	3.98 (0.58)	4.54 (0.33)	-8.69	0.00*
Perceived benefits of calcium intake	3.88 (0.65)	3.74 (0.70)	1.35	0.18	3.87 (0.50)	4.36 (0.31)	-8.28	0.00*
Perceived barriers to exercise	2.82 (0.73)	2.88 (0.75)	-0.67	0.51	2.74 (0.54)	2.22 (0.40)	7.62	0.00*
Perceived barriers to calcium intake	2.45 (0.72)	2.52 (0.73)	- 0.39	0.69	2.71 (0.56)	1.85 (0.56)	1.66	0.00*
Health motivation	3.60 (0.72)	3.46 (0.68)	1.31	0.19	3.28 (0.33)	3.55 (0.22)	- 6.61	0.00*

*** Significant at $p \leq 0.05$**

The research hypotheses were proven true. The Jordanian female teachers who engaged in osteoporosis education program based on Health Belief Model demonstrated higher levels of knowledge about risk factors and preventive measures of osteoporosis than those who did not engage, in addition, they demonstrated stronger health beliefs of osteoporosis than those who did not engage.

Discussion

The total osteoporosis knowledge scores in pre-intervention stage were moderate among the conrol and the intervention groups and lower than expected in this studied population of well-educated women, which was similar to that found in the results of studies conducted by Riaz et al. (2008), Chang (2006), Hernandez-Rauda et al. (2004), Sedlak et al. (2000), Waller et al. (2002), Ungan et al. (2001). The findings of this study indicated that the health education program was successful in increasing knowledge. All items of osteoporosis knowledge shown significant differences across the pre-intervention and post-intervention scores.The significant increase in the teachers' knowledge among the intervention group after the health education program was similar to results reported by other studies of osteoporosis education were found that knowledge improved and increased after the educational program (El-Sayed et al., 2013; Sanaeinasab et al., 2013; Abushaikha et al., 2009; Nejati et al., 2009; Abd El Hameed et al., 2008; Chan et al , 2007; Hazavehei et al., 2007; Kutsal et al., 2005; Brown et al., 2004;Turner et al., 2004; Ribeiro et al., 2001; Piaseu et al., 2001; Sedlak et al., 2000; Ribeiro et al., 2000). This success of osteoporosis education program recmmends for adopting such education program on future osteoporosis education programs. Also, more attention should be devoted to information, education and communication (IEC) programmes concerning osteoporosis.

In this study, the osteoporosis education program was designed to significantly increase the osteoporosis health beliefs of perceived susceptibility to osteoporosis, perceived severity to osteoporosis, perceived benefits of exercise and perceived benefits of calcium intake to prevent osteoporosis, and to significantly decrease perceived barriers to exercise and perceived barriers to calcium, in order to predict an increase in self-reported health motivation.

Before the educational program, over two-thirds of the subjects in the control and the intervention groups did not feel and consider themselves susceptible to developing osteoporosis and they did not believe that osteoporosis would significantly affect their lives, so that according to the HBM, they will not take preventive measures toward off the disease. This is consistent with the previous study in New Zealand (von Hurst et al., 2007). The program resulted in a statistically significant increase among the intervention group with the majority of the teachers in the intervention group agreeing that their susceptibility to osteoporosis are high. This reflects that the majority of the intervention group believed that osteoporosis would significantly affect their lives. It is similar to previous studies suggested that education program increased perceptive susceptibility to osteoporosis (***T***ussing et al., 2005; Piaseu et al., 2001; Hazavehei et al., 2007; and Ghaffari et al., 2012). Thus, it is prudent to provide the necessary education about osteoporosis to Jordanian female and other females worldwide.

In this study, there was a higher level of agreement about the seriousness (severity) of osteoporosis in the control and the intervention groups in pre-intervention stage, but less than a quarter of the teachers in both groups regarded osteoporosis as a crippling disease. This finding was consistent with the report of von Hurst et al., (2007), but different from the findings of Hernandez-Rauda et al., (2004). After the program, there was a significant increase in the scores among the teachers in the intervention group and little increase but not significant among the control group. Also, the most of the teachers among the intervention group reported that it would be serious if they got osteoporosis. This finding was consistent with the finding of Hasavehei et al., (2007) but different from the report of Tussing et al., (2005). So that, the osteoporosis education program did emphasize the visible severity of osteoporosis with images and markers pointing out looking frail and disfigured, having a hunch back, and being shorter in height.

Perceived benefits of calcium intake and physical activity were high both before and after the program among the control and the intervention groups. There was a significant increase in the scores among the teachers in the intervention group and little increase but not significant among the control group after the program as reported by previous studies (Piaseu et al., 2001; Tussing et al., 2005; Hazavehei et al., 2007; Jalili et al., 2007; Ghaffari et al., 2012), which found that program significantly increase perceived benefits of calcium intake and physical activity. The change may be due to exposure to osteoporosis information. The high score seems to imply that young adults understand the benefits of calcium intake and exercise and the teachers' knowledge and beliefs regarding benefits of exercise and calcium intake improved after health education sessions and this may lead to improvement in osteoporosis preventive practices among participants.

In this study regarding perceived exercise barriers, before program most teachers in both groups belonged to a medium level of barriers with about one third of the teachers in the control and the intervention groups agreeing regarding this subscale, which similar to a previous study that indicated few women perceived barriers to exercise participation (Jalili et al., 2007). Thus, programs aimed at personal change may be more effective if they help people feel better about themselves than if they focus exclusively on knowledge of the health benefits of physical activity and exercise. The program resulted in significant decrease in barriers among the intervention group. The same findings have also been reported by Piaseu

et al., (2001), Hasavehei et al., (2007), and Franko et al., (2008). According to Ziccardi et al., (2004) these barriers were possibly belief-based and were reduced by education. Perceived barriers to exercise may have decreased because various examples of weight-bearing physical activity were provided to give the sense of many options. In addition, the examples of weight-bearing physical activity may have been desirable activities that the participants would want to engage in. Also, the amount of weight-bearing physical activity listed, 2-3 or 3-5 times per week for resistance training or activities that are weight-bearing and/or involve jumping, respectively, may have seemed underwhelming, which may have also decreased perceived barriers to exercise. This may help explain why perceived barriers to exercise decreased among the intervention group.

In this study, the majority of the teachers in both groups had "low perceived calcium intake barriers". This studied population did not have many barriers to calcium intake. Similarly, a previous study did not view barriers to calcium intake to be problematic (Swaim et al., 2008). In addition, the program resulted in a significant decrease in barriers among the intervention group. This reduction was statistically significant indicating that teachers could overcome perceived calcium intake barriers. Perceived barriers to calcium may have decreased because various examples of good sources of calcium were provided to give the sense of many options, and many or all of the good sources of calcium listed may have been desirable sources that the participants would want to consume.

Health motivation has been found to be related to degree of readiness of people to engage in health behavior (Kim et al., 1991a). In the present study, before educational program the study population demonstrated a quite high level of health motivation. This indicated that there will be a trend towards increasing participation in preventive health care. This result is consistent with a previous study, which indicated that women were more highly motivated to take care of their health (Jalili et al., 2007). After program, health motivation was significantly increased among the intervention group, which probably due to the influence of knowledge gain and changes but not significant among the control group.

Overall, health education programthat based on HBM increased the variables that could encourage people to engage in osteoporosis preventive measures. The majority of the intervention group after educational program had high feelings of susceptibility and seriousness towards development of osteoporosis and increasing in the view of the benefits of physical activity and calcium intake, the view of the barriers of physical activity and calcium intake, and the motivation for positive health. So, it will be expected that teachers will take osteoporosis preventive measures.

Conclusion

In conclusion, considering the fact that the Health Belief Model had a positive effect on increasing knowledge, health belief and health motivation in to combat osteoporosis, this study could be used as a model for promoting a healthy lifestyle in order to prevent diseases associated with old age. The findings of this study could be used as a basis for developing primary healthcare programs regarding osteoporosis preventive strategies based on the Health Belief Model. The findings also support the need to raising public and community awareness toward osteoporosis including extent of the problem, risk factors, signs, complications, diagnosis and preventive awareness campaigns and community mobilization. Further studies need to emphasize more strongly on proven risk factors for osteoporosis and measurement of bone density. An understanding of the characteristics of women with poor knowledge of osteoporosis may help to design more appropriate public health education programs according to community needs. Future studies is advised for all regions to study the effectiveness of health education program for the whole community including adolescents, young women, and middle aged and elderly women are highly recommended.

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