



OSTEOPOROSIS PREVENTION EDUCATION FOR YOUNG WOMEN

Bachelor's thesis

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ABSTRACT

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The purpose of this Bachelor's thesis was to explore effectiveness of an osteoporosis education intervention for young women. The objective of this study was to collect evidence-based research articles, analyze and evaluate effectiveness of intervention.

The method of this study was literature review. According to the literature search, finally seven scientific articles were selected. Those studies were conducted between years 2001-2008 and four experimental designs research articles and three randomize-controlled designs research articles. The studies of literature review were from Thailand, Iran. Two articles were from Hong Kong and three articles were from USA. In this literature review, deductive analysis was conducted. The articles were analyzed based on education program design, contents of studies, education method and material and the measurement for effectiveness of osteoporosis education.

Results of this study provided evidence that osteoporosis prevention education was effective for young women. All of studies have shown positive changes in osteoporosis knowledge. Five studies state that prevention behaviour show improvement in the pre-post test. However, two studies described that there was no so change in preventive behaviour.

The results of literature review showed that to change young women's behaviour was not easy. However, it is important to encourage young woman to have interest in osteoporosis. This health education contributes to the prevention of osteoporosis. Therefore, this thesis is useful for healthcare workers who are working osteoporosis-related education and also adolescents and young adult women.

Keywords: osteoporosis education, osteoporosis prevention, young women

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1 INTRODUCTION

Osteoporosis is a serious disease all over the world and it affects nowadays more than 75 million people in Europe, Japan and the USA (Chang, Anderson & Lau 2003, 827). National Osteoporosis Foundation (2010) has estimated that two million fractures result from osteoporosis in 2005 and \$19 billion in costs. By 2025, there will be three million osteoporotic fractures and \$25.3 billion in costs each year. Osteoporosis cause significantly negative impact on demand for health services and on people's physical, psychological health and quality of life. (Ontario Osteoporosis Strategy 2003, 13.)

In many cases, osteoporosis occurred among elderly people and postmenopausal women. Low-estrogen has no effect on osteoporosis prevention. However, adequate diet and lifestyle can help to prevent osteoporosis from young age. It is important to store bone mass while the menstrual periods continue. The lifestyle behaviours develop during adolescence and continue into adulthood. It is not easy to change the individual long-term lifestyle behaviours. Furthermore osteoporosis is not usually found until a bone has fractured so that many women are unaware that they are at risk of osteoporosis. (Curry & Hogstel 2002, 26.)

An osteoporosis educational intervention will contribute to reduce environmental risk factors for young and pre-menopause women. Osteoporosis prevention intervention for young women research was conducted by Piaseu, Schepp & Belza (2002, 364) who stated that "the goal of health care education is to provide information to affect attitudes, beliefs, and intentions for behavior change". In this study the method is conducted by literature review, the articles of osteoporosis prevention education for young women were collected, analyzed intervention and evaluated effectiveness of intervention. The aim of this study was to describe the effectiveness of osteoporosis prevention education for young women.

2 THEORETICAL FRAMEWORKS

2.1 Osteoporosis

Osteoporosis is “a progressive systemic skeletal disease characterized by reduced bone mass/density and micro-architectural deterioration of bone tissue” (National Institute for clinical Excellence, 2004). Osteoporosis proceeds silently without any significant symptoms (Korkia 2007,166). A bone mineral density test (BMD) is used in the diagnosis for osteoporosis. The treatment of osteoporosis includes medication (calcium and vitamin D supplementation, adequate diet, a regular exercise) a adequate and a healthy life style. (Smeltzer, Bare Hinkle & Cheever 2007, 2404-2414).

2.1.1 Risk factors for osteoporosis

The causes of osteoporosis include several controllable and uncontrollable risk factors. The uncontrollable factors are gender, family history, ethnicity and race, advancing age, postmenopausal status and body frame size. Environmental risk factors (controllable) include low activity level, sedentary lifestyles over many years, smoking, alcohol abuse, and inadequate diet including eating disorders, low calcium intake, low vitamin D intake. Excessive consumption of soft drinks and caffeinated drinks cause calcium loss via the kidney. Caffeine use of more than three cups of coffee every day might increase calcium excretion in the urine and it affects bone health. (National Osteoporosis Foundation 2011.)

During adolescence, a human’s bone structure becomes strong and an adequate bone mass is increased. And while there in menstruation, women have maintained a certain amount of bone mass. Estrogen hormone protects against bone loss. However after menopause, the ovaries discontinue to product

estrogen. Women's estrogen levels decrease dramatically at menopause. Therefore the osteoporosis risk factors for women are irregular menstruation period, amenorrhea, early menopause, and reduced estrogen after menopause. (Rodzik 2008, 2.)

2.1.2 Osteoporosis prevention

Osteoporosis prevention have several aspects, including nutrition, exercise, lifestyle, and early screening. The WHO (2004) states that in osteoporosis prevention one should be awareness of a balanced diet such as adequate calcium vitamin D intake and weight-bearing exercise. Especially calcium intake and weight-bearing exercises are effective as osteoporosis preventive behaviors.

People can get calcium from milk-products and calcium rich diet, supplement and medication. The calcium is mineral component of bone, absorbed from the intestine and stored in bones. When intestinal calcium absorption is decreased, calcium not can store to in the bone. If there is lack of calcium in the blood, it dissolves the calcium from the bones to compensate. It leads to osteoporosis (Curry & Hogstel 2002, 27.) Therefore, it is important to take enough calcium when people are young. Elderly people have poor calcium absorption from intestine. Furthermore if gravity is not given to the bone because bedridden and lack of exercise, calcium is dramatically degraded and excreted.

Vitamin D improves the absorption of calcium from the intestine, and may prevent the loss of calcium from the body as urine from the kidney. Vitamin D is obtained from the diet, 10 to 15 minutes a day exposure to sunlight, vitamin D supplement and medications. However, to compensate for vitamin D through exposure of sunlight is limited, because of variation in the sun exposure. Especially inadequacy of vitamin D may occur in the winter time and in areas of the country with shorter hours of daylight. There is also age related decrease in

the ability for skin to make the vitamin. Furthermore elderly people have limited mobility and it can cause a decreased exposure to sunlight. (Curry & Hogstel 2002, 28.)

Table1. Recommendation for daily calcium and vitamin D intake from International Osteoporosis Foundation.

Children & adolescents	Daily calcium intake	Daily vitamin D intake
9-18years	1300mg	200 IU
Adult Men & Women	Daily calcium intake	Daily vitamin D intake
19-49 years old	1000mg	200 IU
Over 50 years old	1200mg	400 IU

Source: World Health Organization and Food and Agriculture Organization of the United Nations: Human Vitamin and Mineral Requirements, 2002.

Weight bearing exercises such as walking, running, jumping, dancing or using weight machines are good for osteoporosis prevention. The gravity-defying exercise can maintain and increase bone strength by increase bone mass or by slowing age related bone loss. Muscle strength is also increased with exercise. It is important for supporting the joints and preventing falls. People need exercise a minimum of 20 minutes daily at least three times a week. (Curry & Hogstel 2002, 29 ; Osteoporosis Australia, 2011.) Many studies state that the most common fracture reason for elderly people is falling and osteoporosis fracture is a significant cause of morbidity and mortality.

2.1.3 The lifestyle behaviors in young women

The lifestyle behaviors establish during adolescence and young adulthood, afterwards long-term behavior change is not easy. Adolescents become more aware of the society and many things influence. On the other hand they become

egocentric and are not interested in healthy life. Tammelin, Näyhä, Laitinen, Rintämäki and Järvelin (2003, 378-379) identified that if people have lower physical activity in youth, it does not change in their adulthood. Some young girls do not eat meals enough because they want to get a slim body. Eating disorders such as anorexia have low body weight and can cause missed menstruation periods due to less estrogen. (Papadopoulos 2007, 27-28.) They are high risk of osteoporosis. And any researches stated that many young women know less about osteoporosis and have low level at awareness of the risk factors (Anderson, Chad & Spink 2005, 310; Gurney & Simmonds 2007, 267).

2.2 OSTEOPOROSIS PREVENTION EDUCATION

2.2.1 The purpose of osteoporosis education

Health education has an increasing meaning in the field of public health and it aims to prevent disease and improve people's lives around the world. According to World Health Organization (WHO 2010), "Health education is any combination of learning experiences designed to help individuals and communities improve their health, by increasing their knowledge or influencing their attitudes". The purpose of health education is to promote people's healthy life. Therefore, people can get the knowledge that how they can protect from disease and maintain healthy life. And also, people can decide their own health plan and act in a healthy way. Nurses contribute that people keep an interest in healthy life. (Laslett, McNeil & Lynch 2004, 121; Whitehead & Russel 2004, 170.)

Osteoporosis prevention education enhance awareness of risk factors and preventive behaviors. Especially young and pre-menopausal women need educational interventions. There are critical research opinions that osteoporosis education has not been much among young women or prevention behavior

change will not occur even with prevention education. However, for young, pre-menopausal women, osteoporosis prevention is important because it helps later in life. (Laslett et al, 2004, 121; Howard 2001,134 ; Papadopoulos 2007, 6.)

The purpose of osteoporosis prevention education can be in two parts, one is the knowledge of osteoporosis measurement and the other is prevention behaviour, self-efficacy measurement. Many osteoporosis education researches combine two purposes or only knowledge measurement. Education method is a teaching session by the health educator. In the session, participants are taught about osteoporosis pathology/bone anatomy, bone density measurement, self management principles, fall prevention, risk factors for osteoporosis, problem solving, exercise, posture, personal goal setting, pain management, relaxation, working with doctor, nutrition, medications and support from others. And also participants will have brainstorming sessions, group work, discussion, role-playing activities and demonstration. Materials include slide presentation, posters, booklets, pamphlets and leaflets. (Laslett 2004,122-123 ; Osteoporosis Australia 2011.) Several interventions are also followed by telephone consultations. Many programs include daily calcium intake and diet record writing and weight- bearing exercise.

Nowadays, osteoporosis foundations are established in the developing countries. Among them National Osteoporosis Foundation (NOF) and International Osteoporosis Foundation (IOF) are working worldwide. These two organizations contribute awareness of knowledge about osteoporosis, by providing osteoporosis education, collecting and providing information on osteoporosis and supporting osteoporosis research studies. (National Osteoporosis Foundation 2011; International Osteoporosis Foundation 2011.)

2.2.2 Self- efficacy

According to Bandura's (2004,1) theory of self-efficacy refers to an individual's confidence in his or her ability to perform a behavior in many situations (Redding et al. 2000 185). Especially self-efficacy is adequate to use in health education programs. The important factors of self-efficacy are knowledge, skills, attitudes, and behavior change. Among them behavioral change is key factor for self-efficacy. As a main constituent of the theoretical framework, self-efficacy for behaviour change has been used in many studies. (Piaseu et al. 2001, 365; Elliott, Jacobson & Seals 2006, 481.)

Self-efficacy can be influenced by four main sources. Mastery experiences is the first source which strongest influence self-efficacy. (Bandura 1994, 5.) Successful experiences enhance to increased self-efficacy. On the other hand, repeated failures lead to lower self-efficacy (Barlow 2010,3). In many osteoporosis educations, participants have experiences in keeping calcium intake diary or doing weight-bearing exercises. Participants can actually experience what they do to prevent osteoporosis. It enhances the self- efficacy. The second source is vicarious experience, seeing people similar to oneself succeed affect self-efficacy strong. Osteoporosis education is a group program. When observing other people's exercise, participants can see and know other's performing as common task and behaviour or necessary skills.

The third source is verbal persuasion. The knowledge of osteoporosis prevention from health care professionals is reliable and persuasive information (Barlow 2010,4). The information and verbal encouragement provided by a health educator during intervention is likely regarded positively by participants and may help to increase their self-efficacy for achieving goals. The fourth source is physiological and emotional states. Positive mood enhances self-efficacy. On the other hand, when people feel stressed or depressed, self-efficacy affects negatively (Bandura 1994,3). For osteoporosis prevention, women need take

daily calcium 1000mg and exercise regularly. Participants can understand that it is difficult to continue on a regular basis. Osteoporosis education process is following the four sources of self- efficacy. And the emotional states, processing of information and people's environment are interacting to the process building self-efficacy (Bandura 1994, 2-3 according to Elliott et al, 2006, 480).

Self-efficacy has been affected to increase weight-bearing exercise and calcium intake from diet. (Wallace 2002, 397 according to Hsieh et al. 2007, 338).In the osteoporosis education intervention, participants learned knowledge of osteoporosis, risk factors and prevention behaviour. It creates the precondition for change. When people realize that changing behaviour for reducing risk of osteoporosis is beneficial, it becomes a motive for action. Motivation can lead to behaviour change which is very important. (Laslett et al. 2004, 122.)

3 PURPOSE, TASKS AND OBJECTIVE

The purpose of literature review was to explore effectiveness of an osteoporosis education intervention for young women. This study identified whether education had enhanced osteoporosis prevention knowledge and behavior. The objective of this study was to collect evidence-based research articles, analyze and evaluate intervention. This thesis is useful for healthcare workers who are working in the osteoporosis-related education and also for adolescents and young adult women.

The research questions are:

1. What kind of education methods and program designs are mostly conducted in osteoporosis education?
2. Does educational intervention enhance knowledge and preventive behaviour?
3. What is an important factor in osteoporosis prevention education?

4 METHODOLOGY

4.1 Deductive content analysis

Deductive research design for data classification was used in the analysis. The articles were analyzed for education design, teaching method, program contents and effectiveness of intervention and all results were classified and placed in the appendix table. A suitable analysis method for the using earlier practice knowledge is deductive content analysis. "A deductive approach is useful if the general aim is to test a previous theory in a different situation or to compare categories at different time periods" (Elo & Kyngäs 2007 107, 113).

4.2 Data collection

The timeline of publication of the studies was ten years (from 2000 to 2010). The material was searched from databases CHINAL, ScienceDirect, PubMed and Google scholar. Articles had scientific materials, abstracts and full text. Material was collected in English. The search words included osteoporosis education, intervention, adolescence, young adult women and young women.

The inclusion criteria for the research articles are:

1. The articles are based on experimental research including pre- post test.
2. The target age groups are adolescents and young adult women.

Exclusion criteria for the research articles were pharmacological intervention, having chronic disease, taking any weight loss drug program, having a hearing or eyesight problem and pregnancy. In all articles informed consent is conducted. Anonymity and confidentiality are also assured. This paper was written with

ethical considerations. The literature search identified 1715 references. Totally twelve article were selected and finally seven articles met all selection criteria and were included in this review. Those studies which included four experimental designs and three randomized-controlled designs were conducted between years 2001-2008. The studies of literature review were from Thailand and Iran. Two articles were from Hong Kong and three articles were from USA. The main reasons for exclusion of studies from this review were: research for old women, menopause women, men, pre-adolescence girls, having some sickness, test for only asking knowledge of osteoporosis and no pre-post test. The seven studies included 1292 women participants. Their age ranges were 14 – 48. Studies measured osteoporosis knowledge and behaviour, (increased calcium intake from diet, milk products, and vitamin D intake from diet or sunlight, increased regular exercise and decreased caffeine intake). (See Table 2).

Table.2 Search result to database, keyword and number of Hits

Database	Keywords	Hits
CINAHL 25.1.2011	Osteoporosis education for young women	446
Science Direct 28.2.2011	Osteoporosis education	302
Science Direct 28.2.2011	Osteoporosis prevention education	428
Pubmed 28.2.2011	Osteoporosis education for young adult women	124
Pubmed 28.2.2011	Osteoporosis prevention young women	173
Google scholar 24.1.2011	Osteoporosis education for young women	101
Total		1,574

Database	The result number of selection criteria
CINAHL	5
Science Direct	2
Pubmed	2
Google scholar	3
Total	12



Totally 12 articles were picked out and finally 7 articles were selected

4.3 Analysis

In the first step of analysis process, the collected articles were read several times in order to understand the contents. The next step was to find data to research questions. The data was classified into seven groups. There were headings: “author, year of publication, the name of the article and place of publication”, “purpose”, “education period, method and material”, “program contents”, “participants”, “pre-post measurement” and “result of measurement”.

These seven groups of categories for analysis were considered according to three thesis questions. After that the articles were read again and the data suitable for seven categories were entered in the form of table Appendix (Appendix 1).

5 FINDINGS

5.1 Education program design

All studies were short term period researches. The durations were eight weeks (Bohaty, Rocolo, Wehling & Waltman 2008), four weeks (Chan, Ko & Day 2005 & Chan & Ko 2006), three weeks (Sedlak, Doheny & Jones 2000), two weeks (Piaseuet al. 2001, Hazavehei, Taghdisi & Saidi 2007) and one day (Rodzik 2008). The participants were all women and they were included from nursing students (Piaseu 2001), beauty clinic clients (Chan, Ko & Day 2005 & Chan & Ko 2006), a chemistry and medical class college student (Rodzik 2008), women in fitness center clients, a hair dressing school students and daycare center (Bohaty et al.2008), general female volunteers (Sedlak et al. 2000) and school girls (Hazaveheiet al. 2007). The locations of intervention were women school (Hazavehei et al. 2007), a university hospital medical center (Bohaty et al. 2008), a college (Byrne 2008), a school of nursing (Piaseu et al. 2001), a university and two beauty clinics (Chan et al. 2005 and Chan & Ko 2006) and no information (Sedlak et al. 2000). Type of trial, four studies had an intervention and a control group (Chan et al. 2005 & Chan & Ko 2006, Piaseu et al. 2001 and Hazavehei et al. 2007), two studies had three groups such as intervention, didactic intervention and no intervention (Hazavehei et al. 2007 and Sedlak et al. 2000) and two studies had only one group (Rodzik 2008 and Bohaty et al.2008). In the osteoporosis prevention education, the educators were from different health care professional areas. They were nurses, physicians, a dietitian and nutritionist, physical therapists and social workers (Chan et al. 2005 & Chan & Ko 2006, Bohaty et al. 2008 and Rodzik 2008).

5.2 Contents of studies

Osteoporosis is explained mainly from the medical point of view and the nutritional point of view. The educators explained about osteoporosis diagnosis, risk factors, prevention, treatment and how osteoporosis affect women's body and what is prevention for women. Furthermore osteoporosis is affected by calcium intake and exercise. Many articles were mentioned the need to take calcium with vitamin D. The importance of dairy product consumption, calcium intake, vitamin D, physical activity and maintain a healthy lifestyle were also mentioned. (Chan et al. 2005 ; Chan & Ko 2006 ; Bohaty et al. 2008.)

The participants learned about the amount of daily calcium intake and calcium-rich food sources. They also got information about non- milk product diet for women who are lactose intolerant. As a calcium intake, three studies explained milk product as calcium source (Hazavehei et al. 2007, Rodzik 2008 and Bohaty et al. 2008). Two studies explained soy-bean products as calcium source (Chan et al.2005 & Chan & Ko 2006). Sedlak et al. (2000), Piaseu et al. (2001) and Bohaty et al. (2008) mentioned about calcium rich foods as calcium source. There were differences in teaching methods about vitamin D intake. Two studies mentioned that vitamin D was obtained from diet (Rodzik 2008 and Bohaty et al. 2008). The other three studies mentioned that exposure to sunlight was the source of vitamin D (Chan et al. 2005, Chan & Ko 2006 and Hazavehei et al. 2007). Sedlak et al. (2000) and Piaseu et al. (2001) did not mentioned about vitamin D intake. Two studies had used National Osteoporosis Foundation (NOF)'s contents as instructional material in the slide presentation (Sedlak et al. 2000 and Bohaty et al. 2008).

5.3 Education method and material

Every research had their own program. All studies had group lectures and seminars. The education session included power point presentation. There were

also group discussions about osteoporosis with woman patients as well as role-playing activities. There was a 42-year-old woman volunteer explaining about her own osteoporosis fracture experience (Hazavehei et al. 2007). Various materials were given such as posters, booklets, handouts, and pamphlets. Two studies had follow-up phone calls (Chan et al. 2005, Chan & Ko 2006 and Bohaty et al 2008). Three studies required the preventive behaviour exercises. Three studies required keeping the diary. Amongst them, Bohaty et al. (2008) was dietary for intake of calcium and vitamin D. Piaseu et al. (2001) required calcium intake and diet record, 7 days weight bearing exercise and Sedlak et al. (2000) was diary for calcium and caffeine intake and other nutrients related with osteoporosis prevention. And also 7days weight bearing exercise.

5.4 The measurement for effectiveness of osteoporosis education.

Effectiveness of intervention was measured by using instruments about knowledge aspect and preventive behaviour aspect. Several studies had used measurement scales which were developed already earlier. Sedlak et al (2000) measured the knowledge of osteoporosis with knowledge test (OKT) and osteoporosis behaviours survey (OPBS). Piaseu et al. (2001) had used OKT, osteoporosis self-efficacy scale (OSES) and Osteoporosis health belief scale (OHBS). Rodzik (2008) measured OKT, OHBS and osteoporosis health belief scale, (OSES). On the other hand, some researches measured using their own instrument and they tested for reliability and validity (Paradopoulos 2007, 48). Two studies (Chan et al. 2005, Chan & Ko 2006) had used 5-point likert scale, Hazavehei et al. (2007) developed their own 67 questionnaire based on the health belief model (HBM). Bohacy et al. (2008) have used 20-item true / false instrument to assess knowledge of osteoporosis. All articles had pre-post test. The effectiveness of intervention about osteoporosis knowledge and preventive behavior was measured.

6 DISCUSSION

Education method, program and designs

Particularly education sessions using slides were used in many research interventions. However, the results showed that teaching had used various methods. In the osteoporosis education sessions, women participants could learn about osteoporosis from many aspects. Participants got many kind of material such as pamphlets, booklets and leaflets so they could check information at home. They could deepen the knowledge of osteoporosis better. Many education research programs had a group discussion. In the group discussion, women could share opinion, recognize that this women's issue and also understand about calcium intake diet. Their dietary intake of calcium and vitamin D improved. Because of group discussion and problem solving, they could get high motivation (Bohaty et al. 2008, 96). It was an effective method that the osteoporosis woman volunteer talked about her own experience (Hazavehei et al 2007). Participants could realize how it was a real situation and unhealthy habit could cause osteoporosis in the future. Three studies required participants to write down diet records and exercises. The participants were able to experience a method of prevention. (Sedlak et al. 2000, Piaseu et al. 2001& Bohaty et al. 2008.)

Does education intervention enhance knowledge and prevention behaviour ?

The results of this study provided evidence that osteoporosis prevention education was effective for young women. There were differences in results before and after the test. Despite the exercise or no exercise in the training plan, all of studies showed positive changes in osteoporosis knowledge. Conceivable reasons are that women participants were collected from education and health related facilities. They had interest in health topics and it was easy to provide health education for them. And people were interested in beneficial knowledge.

(Sedlak et al.2000, 401, Chan et al 2005,1121 and Chan & Ko 2006,168.) Five studies (Piaseu et al. 2001, Chan et al. 2005, Chan & Ko 2006, Hazavehei et al. 2007 and Rodzik 2008) stated that prevention behaviour show improvement in the pre-post test. However, two studies (Sedlak et al. 2000 and Bohaty et al. 2008) which described the participants of preventive behaviour, in both of studies preventive behaviour could not be improved during intervention. “Although participants knew more, this knowledge did not guarantee a change in health beliefs or behavior” (Sedlak et al. 2000, 402). In this research it was shown that effectiveness of knowledge is not in proportion to effectiveness of preventive behaviour. Osteoporosis prevention might affect regular purchase of calcium products. For some of the participants, it became difficult to continue to buy calcium products. Or some of participants returned to their favorite products such as non calcium product diet because it is easy to purchase and it does not need to be cooked.

Three important factors

The purpose of literature review was to explore effectiveness of an osteoporosis education intervention for young women. According to the review, the effectiveness of osteoporosis education has been affected by three factors.

1 Women get correct information

Women need to know about osteoporosis prevention when they are young. Especially, the adolescent girls have priority to be taught about osteoporosis. Osteoporosis is a preventable disease and many risk factors are modifiable such as calcium intake and physical activity. In addition to getting right knowledge it is also important to enhance women’s self-efficacy. Today women want to know more about osteoporosis prevention so that all participants are interested in participating the educational programs (Selak et al. 2000 401-402). Therefore,

results show that preventive education improved women's knowledge of osteoporosis. Even though people have knowledge, it does not affect behaviour change, however without adequate knowledge, behaviour cannot change (Ailinger, Braun, Lasus & Whitt 2005 140).

2 Variety of teaching method

Education program with the variety of teaching methods make understand the various perspectives of osteoporosis. In addition to education session, group discussion, role-play and listening to osteoporosis experience from patient enhanced awareness of disease. To require diary-record was good practice for behaviour change education. Participants can see whether they get adequate calcium intake diet and how they can improve diet if it does not contain enough calcium. This variety of teaching method deserves to enhance self-efficacy.

Osteoporosis prevention education need aspects from various fields such as medical, nutritional, physiological fields. Various health care professionals could teach osteoporosis prevention more significantly, because osteoporosis is a lifestyle disease and prevention knowledge need medical aspect and also lifestyle aspect such as daily diet and exercise. To enhance self-efficacy, this verbal persuasion from health professional is important. Among them nurse can become the center of health education.

3 Participants' self efficacy (high motivation) affect preventive behaviour

The results showed that two studies described that preventive behaviour could not be improved by intervention. It means changing behaviour is not easy and it might take time because increasing self-efficacy influences emotional status. When women are high in self-efficacy, they are positive and active to do preventive behaviour. However, if women are in negative mood they are not

active to preventive behaviour. Teaching to young women about osteoporosis prevention life style it might be complicated for them. It is difficult to modify their current lifestyle habit for future healthy life. (Anderson et al. 2005, 310.) And also for adolescents, if health educator's requests are difficult, they will resist because they feel that their freedom will be controlled (Whitehead & Russell 2004,167). Whether changing behaviour, it depends on individual situation or recognition. For example, there is a different situation between a person who has risk to get disease and a person who has got the disease (Curry & Hogstel 2002, 32-33 according to Chan et al. 2005, 1116). Menopausal women have higher motivation in osteoporosis prevention than pre-menopausal women because they start to lose bone mass at that time (Ailinger et al. 2005, 140).

In many studies education requires several kind of prevention behaviour such as calcium and vitamin D intake diet and weight-bearing-exercise. It could be a more simple setting or realistic goal, so participants can concentrate on practice (Whitehead, D.& Russell, G 2004,169). When teaching to change healthy life style for young people, changing might be slow. Long term research could be further research. Combination of bone mineral density test (BMD) could be effective also. Moreover, Rodzik (2002, 29) proposed that there is a need for participation of parents in osteoporosis education for school girls. Parents can support children's diet and exercise at home.

7 ETHICAL CONSIDERATION

There were limitations in the research articles: the sample size was small and most of sample subjects were collected from health care related place such as nursing school. One study conducted different types of intervention for three groups. However, participants were two general volunteer women groups and one professional nurse group. There was different knowledge level. In some research questions were not answered completely due to self report method. It may have influenced the validity of the review. Because of every research studies had its own education period, there were difference in time interval after education intervention until post-test. Further, as a reviewer's own experience, this literature review was written by an inexperienced reviewer itself. Therefore reviewer's decision may affect the reliability of the review. However, reviewer had a clear literature review plan. The scientific journals were collected according to inclusion and exclusion. The limitation of criteria was detailed and strict. Although it took time to select articles, the reviewer could collect reliable data.

8 CONCLUSION

Recently due to aging population and change in eating habits and conveniently change in modern society, osteoporosis has also increased. Osteoporosis is the long process lifestyle disease. Therefore, young women need to get right knowledge and prevention behaviour. Osteoporosis prevention education for young women has been conducted in many countries. The studies had shown that those researchers had made an effort to the osteoporosis prevention education. The results of literature review indicated that to change young women's behaviour was not easy. However, it is important to get right knowledge and encourage repeatedly young women to have interest in osteoporosis. This health education contributes to the prevention of osteoporosis.

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APPENDIX1 Articles used for literature review of the study

Author	Purpose	Education period, method and material	Program contents	Participants	Instrument for test measurement	Result of post-test measurement
Sedlak,C.,Doheny, M. & Jones,S.2000, Osteoporosis Education Programs: Changing Knowledge and Behaviours. Public Health Nursing Vol 17 No5 398-402. USA.	Measure knowledge of osteoporosis (weight bearing exercise and dietary calcium, and decreased caffeine intake)	Over a 3-week period. Intense program: three 41 slide consist sessions The format of a brochure was given. Keeping diary of their calcium and caffeine intake and other nutrients related to osteoporosis prevention. Weight bearing activity and exercise Intermediate program: a 3-hour session program. Brief program: a 45-minute session program	Session with about Osteoporosis including risk factors, diagnosis, prevention and treatment designed for use at group lectures and seminars.	Intense program: 31 Women. Mostly under 25 years old College Age Intermediate program: 35 women . 22 to 83 years old. Brief Program: 18 women nurse 35 - 59 years of age. Age average were 35 -45 years.	Osteoporosis Knowledge Test (OKT) Osteoporosis Preventing Behaviors Survey (OPBS)	Participants in all programs improved significantly higher levels of knowledge. However, overall, there was no change in health beliefs or behaviors. Intervention group's caffeine intake decreased significantly.
Piaseu,N.,Schepp,K. &Belza,B.2002. Causal analysis of exercise and calcium intake behaviours for osteoporosis Prevention Among Young women in Thailand. Health Care for Women International. 23:364–376. Thailand.	Measured knowledge, attitude, and self-efficacy on exercise and calcium	2 weeks period. Three-hour course instructional materials and a slide presentation. Three days record to calcium intake and diet. 7 days Weight-bearing exercise (aerobic exercise and jumping rope)	Osteoporosis risk factors, potential consequences of osteoporosis, and strategies to prevent osteoporosis, including effective exercise and maintenance of the daily calcium requirement	140 women who are 17-21years old (Intervention and control group). All participants were nondrinkers and nonsmokers.	Osteoporosis Knowledge Test (OKT). osteoporosis health belief scale (OHBS). Osteoporosis Self-Efficacy Scale (OSES)	Intervention group improved knowledge of osteoporosis and increased calcium intake and exercise
Chan, M., Ko, C., & Day, M. 2005. The effectiveness of an osteoporosis prevention education programme for women in Hong Kong: a randomized controlled trial. Blackwell Publishing Ltd, Journal of Clinical Nursing, 14, 1112–1123. Hong Kong.	Measured the four behaviours (consumption of soy foods, milk and vitamin D/more exposure to sunlight and increased exercise)	4 weeks period. A 45-minute education session, followed by two telephone consultations that were conducted within 1 month (days 3–7 and days 14–20, each call lasted 10– 20 minutes).	The formation of osteoporosis and clinical features of osteoporosis. The relationship between calcium and the development of osteoporosis the different kinds of calcium rich food and provide some examples Explain the four main behaviours	41 women (20 cases and 21 controls). 18 – 45 + years old. (The majority ranged 18-30 and 40-45 age).	Demographic data 5-point Likert scale with options ranging from 5 (strongly agree) to 1 (strongly disagree)	Intervention group result was significantly increased consumption of calcium including soy-based foods, milk and vitamin D. Specially vitamin D intake was strongly changed. And participants had positive feedback.

Author	PURPOSE	Education period, method and material	Program contents	Participants	Instrument for test measurement	Result of post-test measurement
Chan, M.& Ko,C.2006. Osteoporosis prevention education programme for women. Journal of advanced nursing 54(2), 159–170. Hong Kong.	Measured the four behaviours (consumption of soy foods, milk and vitamin D/more exposure to sunlight and increased Exercise)	A 4- week period. A 45 minute education session, followed by two times telephone consultations that were conducted within 1 month (days 3–7 and days 14–20, each call lasting 10–20 minutes).	The formation of osteoporosis and clinical features of osteoporosis. The relationship between calcium and the development of osteoporosis	76 women (38 cases and 38 controls 18- 46+ years women (majority ranged 18-30 age).	5-point Likert scale with options ranging from 5 (strongly agree) to 1 (strongly disagree)	Intervention group result was significantly increased consumption of calcium including soy-based foods, milk and vitamin D. Specially vitamin D intake was strongly changed.
Hazavehei, SM., MH Taghdisi,M. & Saidi, M.2007.Application of the Health Belief Model for Osteoporosis Prevention among Middle School Girl Students, Garmsar, Iran. Education for health Volume 20, issue 1. Iran.	Measured knowledge and behaviour of osteoporosis	A 2-week period. Group 1- 2 one-hour-long lectures, slide shows, group discussion and role-playing activities. The teaching materials (poster, booklet, and pamphlet) were used. Group 2- didactic osteoporosis education. Group 3- no intervention.	Group 1- A female volunteer explained own osteoporosis fracture experience and her unhealthy habits related to nutrition and physical activity that might have contributed to her condition. Group 2- didactic health education curriculum on osteoporosis	206 middle school girls. (average 14.34 age). Group 1 (Intervention group), Group 2 (didactic education group), Group 3 (non- intervention group).	67 questionnaire about knowledge, perceived threat benefits, barriers, cues to action, and healthy behavior action for osteoporosis prevention Group 1 had pre-tests, post- tests and one month follow up tests	Intervention group had significant increase knowledge and preventive behavior. Group 2 increase only knowledge of osteoporosis and group 3 was no significant changed.
Rodzik, E . 2008 Osteoporosis education in college-age of women. Eastern Michigan University Masters Theses. USA.	Measured dietary intake of calcium and exercise and self-efficacy, or confidence, for behaviors related to physical activity and calcium intake.	1 day period. 30 minutes education program included a pre-test, 15-minute Power Point presentation, and a post-test. These sessions were offered five times to obtain a total of 149 participants.	Osteoporosis risk factors, potential consequences of osteoporosis, and strategies to prevent osteoporosis, including weight-bearing exercise and daily calcium intake requirements	149 female college student aged 18-48. The majority age of these participants was 29.8 years old. All student got intervention.	Osteoporosis Knowledge Test(OKT) Osteoporosis Self-Efficacy Scale (OSSES)	knowledge of Osteoporosis and prevention behaviors such as calcium intake and exercise were showed higher self-efficacy.
Bohaty,K,. Rocole, H,. Wehling,K. & Waltman, N. 2008. Testing the effectiveness of an educational intervention to increase dietary intake of calcium and vitamin D in young adult women. Journal of the American Academy of	Measured increase dietary intake of calcium and vitamin D.	A 8- week period. 45-min presentations, group discussion and a follow-up phone call. Handout of calcium rich foods and sources of vitamin D. Require 3- day diet record.	Explain Osteoporosis is a painful, disabling illness and prevention of osteoporosis is a lifelong process.	80 women who are 19– 30 years of age.	20 item true / false instrument	Knowledge of osteoporosis, calcium intake and vitamin D were improved after intervention. However, there was not so change in calcium intake, vitamin D, and dairy products from pre- to post-intervention.

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