

A Study of the Practical Knowledge Regarding Osteoporosis and Health Promoting Behavior Among University Students

The purpose of this study is to identify the practical knowledge about osteoporosis and health promoting behavior possessed by male and female university students in their twenties. Next, the study seeks to analyze the difference in the degree of knowledge and practice of health promoting behavior depending on the students' area of study (health-related or non-health-related major) and previous education about osteoporosis. A survey was given to 300 male and female university students in Jeju Island from November 18 to December 6, 2013. Regarding knowledge about osteoporosis, the accuracy rate of health science major participants was 16.8 % higher than that of those of non-health science, and the accuracy rate of participants with previous education about osteoporosis was 12.9 % higher than those who had not. Health promoting behavior showed a higher degree of practice among students in health-related majors and those with previous applicable education. There were significant differences between the knowledge of osteoporosis and major and the presence and absence of prior education. Regarding the degree of health promoting behavior and major, the presence or absence of prior education showed significant differences. Among male and female students in their twenties, the recognition of knowledge about osteoporosis is very low. There is a need to develop various programs that focus on osteoporosis prevention rather than treatment, to improve the quality of education and training content according to the individual, and to lower the target age for osteoporosis education.

Key words: *Osteoporosis; Health Promoting Behaviors; Health-related; Non-health-related*

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INTRODUCTION

The World Health Organization(WHO) defined osteoporosis as a whole-body bone disease characterized by low bone mass and a disruption of bone microarchitecture, compromised bone strength, and an increased risk of fracture. Osteoporosis is a major health problem among females in middle and advanced ages who are vulnerable to low bone mineral density(BMD), deteriorated bone microarchitecture, and fractures(1). Age is a factor which considerably affects bone mass. Bone desorption outpaces the formation of new bone mass during the aging process, which leads to an increased risk of bone loss and fractures(2). Post-menopausal women are continuously exposed to the risk of osteoporosis for

about thirty years. With the onset of menopause, women experience an annual decrease of 2-4% in BMD for the following 5-10 years, and a reduction of 15-30% compared to the maximum BMD at the age of 60(3). Therefore, osteoporosis can cause fractures even when there is no visible injury, leading to decreased quality of life due to chronic pain, postural changes, reduced mobility, low self-esteem, and depression(4). The six-month mortality rate following hip fracture is 10-20% among those with osteoporosis, making it a life-threatening illness. The world-wide number of patients who suffer a hip fracture attributable to osteoporosis increased from 1.3 million to 1.6 million (25%) in 2000(5). As the incidence of hip fractures is expected to grow more than three times after 2050 due to the increased

number of senior citizens, osteoporosis has emerged as a major health problem at home and abroad(6). This study relied on the database of public health insurance claims to analyze the patterns of medical service sought by patients diagnosed by a medical doctor with osteoporosis. The results show that the annual number of patients aged 50 with a diagnosis of osteoporosis gradually increased from 1.07 million in 2005 to 1.20 million in 2006, 1.33 million in 2007, and 1.46 million in 2008. The annual incidence of osteoporotic fractures recorded a growth of 3.8% from 220,000 in 2005 to 240,000 in 2008. In addition, about 77% of osteoporotic fractures were found in women(7). The BMD analysis of female college students showed that 42% of young women have osteopenia due to excessive dieting, disordered eating habits, and lack of exercise. However, more recently, the prevalence of osteoporosis has increased among both sexes as the population ages. Reports indicate that the prevalence of osteoporosis in females showed a marginal change from 7.4% in 2005 to 7.2% in 2007, while the prevalence of osteoporosis in males recorded an increase of 1.5 times from 0.49% in 2005 to 0.8% in 2007. Statistics indicate that males are not free from osteoporosis; 20% of total osteoporosis patients are male, and once osteoporosis occurs, males typically experience more difficulties in recovery than females. However, most existing studies focus on the treatment of osteoporosis in postmenopausal women rather than prevention. Additional studies on osteoporosis prevention are imperative. Because osteoporosis can cause other chronic illnesses and cancers, a full recovery from osteoporosis contributes to the prevention of these diseases(8). Osteoporosis is a silent disease that patients gradually develop without detectable symptoms, making early diagnosis difficult. Particularly, vertebral compression fractures often occur in postmenopausal women. In order to enhance the quality of life in later years, it is important to raise awareness regarding the prevention, early diagnosis, and treatment of osteoporosis among young people as well as middle-aged people. Enhancing one's lifestyle through a healthy diet and regular exercise beginning in the early twenties can help promote bone formation and eliminate the risk factors of bone loss.

Health habits formed during childhood may serve as critical factors that determine the health behaviors of adults(9). Maintaining one's can easily become a habit, and an established health habit rarely changes(10). In addition, knowledge about diseases affects health promoting behaviors, which further

contributes to prevention and treatment, as knowledge plays an important role in self-care and prevention behaviors(11). This study intends to investigate practical knowledge about osteoporosis and health promoting behavior of health science college students and non-health science college students, analyze how the knowledge and practice of health promoting behaviors are affected by whether students are studying health science and whether students had prior education about osteoporosis, and utilize the results of the study to promote an osteoporosis education program for students.

METHODS

Subject

The study recruited 150 health science major students and 150 non-health science major students enrolled in two universities located in Jeju Island from November 18 to December 6, 2013. Among the students who were fully informed about the purposes of the study and survey, only those who were interested in participating and submitted a written consent received and completed questionnaires.

Procedure

Participants' knowledge about osteoporosis was assessed by an adapted version of the Facts on Osteoporosis Quiz (FOOQ) that was developed by Ailinger, Howard, and Braun and used in Min and Won(10,12,13). The revised quiz for this study consisted of 10 "true," "false," or "don't know" statements. Each item was coded as 0 for incorrect and "don't know" responses, or 1 for the correct answer. Internal consistency for this study was Cronbach $\alpha = 0.82$. Participants' practice of health promoting behavior was measured by an instrument developed by the author of this study. The quiz consisted of 12 questions with choices for "always agree" (coded as 4), "mostly agree" (coded as 3), "mostly disagree" (coded as 2), and "strongly disagree" (coded as 1). The range of possible score was from 12 to 24. The higher the total score, the more frequent the participant practices health promoting behaviors. Internal consistency for this study was Cronbach $\alpha = .73$.

Data Analysis

Returned questionnaires were analyzed through SPSS statistics version 21.0. While general questions

were assessed through frequency analysis, knowledge about osteoporosis and practicing health promoting behavior were examined through reliability, descriptive statistics, and frequency analysis of questionnaire results. The independent samples *t*-test was used to analyze the difference in knowledge about osteoporosis and practice of health promoting behavior depending on majors and prior education about osteoporosis. The significance level was .05.

RESULTS

General Characteristics of Participants

The age of participants varied from 19 to 29 years, with 175 participants in the 19–21 age bracket (58.3%). Participants consisted of 145 males (48.3%) and 155 females (51.7%). Half of the participants were studying health science and other half were involved in non-health science majors. About 177 participants (59%) showed a normal body mass index (BMI), and 233 participants (77.7%) were non-smokers. About 194 participants (64.7%) had no prior education on osteoporosis (Table 1).

Table 1. Characteristics of Subjects (N=300)

Characteristics	Categories	N(%)
Age	19~21	175(58.3)
	22~25	119(39.6)
	27~29	6(2.0)
Sex	Man	145(48.3)
	Woman	155(51.7)
Major	Health related	150(50.0)
	Non health related	150(50.0)
BMI	Underweight	35(11.7)
	Normal weight	177(59.0)
	Overweight	58(19.3)
	Obesity	26(8.7)
	Over-obese	4(1.3)
Smoking	Yes	233(77.7)
	No	67(22.3)
Osteoporosis education	Yes	106(35.3)
	No	194(64.7)
Total		300(100.0)

Knowledge Regarding Osteoporosis

The questionnaire results presented the percentage of participants who correctly answered the knowledge-related items. The highest level of accuracy was found on “There are various ways to prevent osteoporosis” (80.0%), whereas participants showed the lowest level of accuracy on “The incidence of osteoporosis is higher in low body weight women than overweight women” (34.3%). Health science major students showed more knowledge than non-health science major students for 8 out of 10 items relating to osteoporosis. However, non-health science students responded more correctly than health science students on the following two items: “The incidence of osteoporosis is higher in low body weight women than overweight women” (30.7% vs. 38%); “Weight-bearing exercises such as jogging and jumping rope improves bone health and strength” (50.7% vs. 51.3%).

Participants with prior education on osteoporosis exhibited a higher accuracy rate for most of the items than those without prior education. Participants with prior education on osteoporosis showed an accuracy rate of more than 90% on the following two items: “Insufficient calcium intake and excessive caffeine intake increase the risk of osteoporosis” (92.5% vs. 72.2%); “There are various ways to prevent osteoporosis” (91.5% vs. 73.7%). However, participants with no prior education responded more correctly on “The incidence of osteoporosis is higher in low body weight women than overweight women” (24.5% vs. 39.7%) (Table 2).

Table 2 Knowledge about Osteoporosis

(n=%)

Items	Health related/Non health related	Learned/Never learned	Correct
Osteoporosis is more common in women of underweight than overweight.	30.7/38.0	24.5/39.7	34.3
The amount of bone (bone matrix) increases after 30 years old among people.	62.0/37.3	58.5/44.8	49.7
The most important period of bone density is from 9 to 17 years old.	80.7/70.7	84.0/71.1	75.7
The speed of bone loss accelerates after menopause.	82.7/52.7	75.5/63.4	67.7
The risk of osteoporosis increases attributed by the lack of calcium as well as excessive caffeine intake at the same time.	88.7/70.0	92.5/72.2	79.3
Alcoholism is not associated with the incidence of osteoporosis.	70.0/44.0	71.7/49.0	57.0
The activity of daily living raises the risk of osteoporosis.	67.3/45.3	68.9/49.5	56.3
Weight-bearing exercise (jump rope, running, etc.) promotes the density of bones.	50.7/51.3	57.5/47.4	51.0
There are many ways to prevent osteoporosis.	87.3/72.7	91.5/73.7	80.0
20% of women over the age of 50 is more likely to get fracture due to osteoporosis in case of not preventing in the future.	85.3/54.7	80.2/64.4	70.0
Average answer ratio	70.5/53.7	70.4/57.5	62.1

Alternate header suggesting: Health Promoting Behavior

The highest number (185) of participants responded “strongly disagree” on “I have a regular medical checkup” (90 health science majors, 95 non-health science majors). On the item “I go to see the doctor only when I have a health problem,” 57 health science major participants and 54 non-health science major participants responded “mostly agree” (111 total respondents).

In terms of exercise practice, 56 health science major participants and 66 non-health science major participants responded “mostly disagree” (122 total respondents) on “I engage in weight control to maintain normal weight.” A similar number of health science major participants and non-health science major students responded “mostly agree” (50 vs. 56) and “mostly disagree” (57 vs. 50) on “I know which exercise programs are beneficial to me considering my physical conditions.” On the item “I practice exercise fit for my physical condition more than 3 times a week,” 60 health science major participants and 60 non-health science major participants responded “mostly disagree” (120 total respondents).

In terms of dietary habits, 85 health science major participants and 88 non-health science major participants responded “strongly disagree” (173 total respondents) on the item “I am currently taking

dietary supplements such as vitamins, dietary calcium or omega-3 supplements.” On the item “I eat a variety of five basic food groups, sources of carbohydrates, protein, fat, vitamins, minerals, and calcium,” 69 health science major participants and 65 non-health science major participants responded “mostly disagree” (134 total respondents). On the item “before buying foods, I check nutritional facts labels which contain information on trans-fat, calories, sodium, calcium, protein, fat, and sugars,” 63 health science major participants and 68 non-health science major participants responded “strongly disagree” (131 total respondents). On the item “I check the expiration date before buying food products,” the answer “mostly agree” achieved the highest response rate from 61 health science major participants and 65 non-health science major participants (126 total respondents), followed by the answer “always agree” from 52 health science major participants and 34 non-health science major participants (86 total respondents). On the item “I tend to eat salty food,” the answer “mostly agree” achieved the highest response rate from 72 health science major participants and 73 non-health science major participants (145 total respondents), followed by the answer “mostly disagree” from 60 health science major participants and 43 non-health science major participants (103 total respondents). On the item “I usually have dinner after 6 p.m.,” the answer “mostly agree” recorded the highest response rate

from 82 health science major participants and 82 non-health science major participants (164 total respondents). On the item “Eating snacks between meals affected the type or number of meals,” the

answer “mostly agree” recorded the highest response rate from 62 health science major participants and 71 non-health science major participants (133 total respondents)(Table 3).

Table 3. Practice about Health Promotion Behavior related health department and non related (n=person)

	Strongly agree		Mildly agree		Mildly disagree		Strongly disagreed	
	Health related/Non health related	Total	Health related/Non health related	Total	Health related/Non health related	Total	Health related/Non health related	Total
Subject have regular medical check up.	0/1	1	11/11	22	49/43	92	90/95	185
Visit health care institutions (hospitals, community health centers) when have health problem.	10/10	20	57/54	111	47/37	84	36/49	85
In order to maintain normal body weight monitor the body weight .	15/8	23	54/42	96	56/66	122	25/34	59
Knew proper exercise to their physical condition.	11/9	20	50/56	106	57/50	107	32/35	67
Did a appropriate exercise depending on their body condition three times a week at least .	6/9	15	25/29	54	60/60	120	59/52	111
Taken health supplements (vitamins, calcium, omega-3, etc.) currently.	5/1	6	17/22	39	43/39	82	85/88	173
Taken enough five standard food groups on daily basis (carbohydrates, proteins, fats, vitamins and minerals, calcium) evenly .	6/3	9	51/41	92	69/65	134	24/41	65
Check the nutrition components table before buying food (trans fat, calories, sodium, calcium, protein, fats, sugars, etc.)	6/5	11	34/29	63	47/48	95	63/68	131
Check the expire date before buying food .	52/34	86	61/65	126	27/38	65	10/13	23
Have a habit of salty eating whenever eat.	8/19	27	72/73	145	60/43	103	10/15	25
Have a meal after at 18:00 usually.	26/33	59	82/82	164	33/26	59	9/9	18
Due to eating junk food except meal time, the form and frequency of eating has been affected.	11/17	28	62/71	133	52/44	96	25/18	43

Differences in Osteoporosis Knowledge and Practices of Health Promoting Behaviors Depending on Major and Prior Education on Osteoporosis

There were statistically significant differences in the level of osteoporosis knowledge between health science major participants (7.05 points) and non-health science major participants (5.36 points) ($p=.000$). There were statistically significant differences in the level of osteoporosis knowledge between participants with prior education on osteoporosis

(7.04 points) and those without prior education on osteoporosis (5.75 points) ($p=.000$). The level of practices of health promoting behavior was significantly correlated with participants' major ($p=.029$): the scores of health science major participants were 1.22 points higher than those of non-health science major. The level of practices of health promoting behavior was also significantly correlated with participants' prior education on osteoporosis ($p=.000$): the score of participants with prior education was 2.37 points higher than those without prior education (Table 4).

Table 4. The difference between the knowledge of osteoporosis and the practice of health promoting behavior depending on majors and the prior educational experience (n=score)

	Osteoporosis knowledge			Health promoting behavior		
	M±SD	t	p	M±SD	t	p
Health related	7.05±1.89	6.111	.000*	26.30±4.91	2.189	.029*
Non health related	5.36±2.79	4.807	.000*	25.08±4.78	4.125	.000*
Learned	7.04±1.91			27.22±4.63		
Never learned	5.75±2.70			24.85±4.82		
Total	6.21±2.53			25.69±4.88		
Range	1~10			12~48		

* $p<.05$

DISCUSSION

Unlike other diseases, osteoporosis has few detectable symptoms and rarely interferes with daily activities at its initial stage. However, once it occurs, treatment is difficult and creates serious side effects as well as a heavy economic burden on patients(14). Therefore, osteoporosis is a major health problem which has caused a rise in the price of osteoporosis-related health insurance. Many health experts are paying more attention to osteoporosis because the incidence of osteoporosis increases with growing number of senior citizens. This study intends to evaluate the level of osteoporosis knowledge and practices of health promoting behaviors among college students in their twenties, and to provide a foundation to develop an effective preventive program for osteoporosis.

With respect to the level of osteoporosis knowledge, the mean score of health science major participants was 7.05 (70.5%) out of 10, while that of non-health

science major participants was 5.36 (53.6%). The scores of both health science major and non-health science major participants in the current study were higher than those from a previous study targeting adults living in New Town (Shin), which reported a result of 11.1 out of 23 (48.3%)(11).

A previous study targeting middle-aged women showed an average score of 14 out of 24 (58.3%), which is lower than the average score of health science major participants in this study, but higher than that of non-health science major participants(15). A previous study targeting adult females indicated an average score of 13.2 out of 20 (66.1%), which is lower than the average score of health science major participants in the current study. Given the fact that the highest possible average score is 10 in the current study, the average accuracy rate of 62.1% indicates that college students have a low level of osteoporosis knowledge compared to the 79% accuracy rate seen in previous foreign studies. One possible explanation for this discrepancy is that the participants of this study were in their twenties and

included males (48.3%). The findings of this study are inconsistent with a previous study which demonstrates that: people in their mid-twenties to early thirties acquire peak bone mineral density (BMD) and rarely experience bone health threatening symptoms, thereby paying little attention to osteoporosis, and that health promoting programs for osteoporosis should be focused on middle-aged women (1). On the test of osteoporosis knowledge, the highest accuracy rates were achieved on the following two items: "There are various ways to prevent osteoporosis" (80%) and "Insufficient calcium intake and excessive caffeine intake increase the risk of osteoporosis" (79.3%) (13). The former is similar to the results of the study targeting adult women, which reported 89.4% accuracy on a similar question, while the latter question demonstrated a lower accuracy than the 92% accuracy rate seen in the study targeting adult women. High accuracy rates for these two items indicate a high awareness on the importance of dietary habits to prevent osteoporosis. The lowest accuracy rates were recorded on the following items relating to osteoporosis knowledge. First, "The incidence of osteoporosis is higher in low body weight women than overweight women" recorded an accuracy rate of 34.3%, higher than the 26.6% reported by the study targeting adult females (13). This finding demonstrates a low awareness of the fact that the risk of osteoporosis is higher for those with lower body weight than for overweight people. Second, "BMD increases after 30 years" recorded an accuracy rate of 49.7%, similar to the 51.9% accuracy reported by the study targeting female college students (13). This shows a low level of knowledge that the decrease in hormone production after the age of 30 leads to reduced bone mass. Therefore it is important to improve education on the correlation between age and bone mass. The item "Weight-bearing exercises such as jogging and jumping rope improves bone health and strength" achieved an accuracy rate of 51%, similar to the 53.8% accuracy reported by the study targeting female college students. This demonstrates a low awareness on the importance of weight-bearing exercise as an osteoporosis preventive program.

On most of the items, a higher level of knowledge about osteoporosis was found among health science major participants than non-health science major participants, and in participants with prior education on osteoporosis than participants without prior education. In particular, on the item "Without preventive efforts, about 20% of females aged 50 and over are vulnerable to fractures due to osteoporosis," the

accuracy rate of health science major participants was 85.3%, about 30% higher than the 54.7% accuracy achieved by non-health science major participants, while the accuracy rate of participants with prior education on osteoporosis was 80.2%, some 15% higher than the 64.4% accuracy achieved by participants without prior education. This finding is attributable to the fact that health science students acquire knowledge about osteoporosis through classes, clinical practices, self-study, and mass media. Therefore, osteoporosis education programs highlighting the maintenance and improvement of bone health should be created to improve knowledge on osteoporosis, specifically targeting students in their twenties. Moreover, acquiring knowledge on osteoporosis can affect health promoting behaviors, which contribute to prevention and treatment of the disease and play an important role in self-care and prevention behaviors. A previous study showed that the increasing number of female senior citizens presented a chance to recognize the importance of knowledge on osteoporosis, which established a social consensus on the importance of the prevention and treatment of osteoporosis (18). It also underlined the importance of prevention and the need to develop self-care and self-diagnosis methods (11). Education of students in their twenties is imperative because early knowledge about osteoporosis helps prevent development of the disease in later years.

According to one study, participants showed a higher level of knowledge on diseases and an increased practice of health promoting behavior after attending educational programs (19). This study showed that the mean score for health promoting behavior was 26.30 points in health science major participants, slightly higher than 25.08 points in non-health science major participants, while a score of 27.22 points was reported among participants with prior education on osteoporosis, higher than the score of 24.85 points that was recorded by participants without prior education. This finding is consistent with the study which demonstrated that health education programs improve health promoting behavior and the level of knowledge on diseases among patients and healthy college students is important in changing behaviors (20). The study result showed that the level of knowledge on osteoporosis and practices of health promoting behaviors are higher than previous domestic studies but lower than previous studies in other developed countries. Therefore, further education on osteoporosis prevention and the practice of health promoting behaviors is imperative. However, because uniform and unilateral

education cannot satisfy the individual's desire for education, it is necessary to develop customized education programs.

The overall results of the analysis on differences in the level of knowledge regarding osteoporosis and practices of health promoting behaviors based on the student's major (health science and non-health science) and prior education on osteoporosis are as follows.

First, regarding knowledge of osteoporosis, the accuracy rate of health science major participants was 16.8% higher than that of non-health science major participants, while the accuracy rate of participants with prior education on osteoporosis was 12.9% higher than those without prior education. Second, in terms of practicing health promoting behaviors, the mean score of health science major participants was 1.22 points higher than that of non-health science major participants, while the score of participants with prior education on osteoporosis was 2.37 points higher than those without prior education. Third, there was a statistically significant difference between the level of osteoporosis knowledge and major ($p=.000$) as well as between the level of osteoporosis knowledge and prior education on osteoporosis ($p=.000$). In addition, there was a statistically significant difference between practice of health promoting behaviors and major ($p=.029$) as well as between the practice of health promoting behaviors and prior education on osteoporosis ($p=.000$).

The study shows a low level of osteoporosis knowledge among male and female students in their twenties. It is imperative to develop various programs that focus on osteoporosis prevention rather than treatment, to improve the quality of education and training content according to the individual, and to lower the target age for osteoporosis education. Western lifestyles contribute to an increased risk of adult diseases. Therefore, it is important to educate students on health promoting behaviors in various ways and encourage them to engage in health maintenance efforts. Further studies are necessary to develop customized exercise programs according to age and gender and to provide alternative health promoting behaviors. Finally, as this study was conducted on a limited number of students from two universities in Jeju Island, the results should not be widely applied.

REFERENCES

1. Peterson JA. Osteoporosis Overview. *Geriatr Nurs* 2001; 22(1): 17-23.
2. Seeman E. Pathogenesis of bone fragility in women, men. *The Lancet* 2002; 359(9320): 1841-1850.
3. Ribeiro V, Blakeley JA. Evaluation of an Osteoporosis Workshop for Women. *Public Health Nurs* 2001; 18(3): 186-193.
4. Kannus P, Parkkari J, Niemi S, Pasanen M, Palvanen M, Järvinen M, Vuori I. Prevention of Hip Fracture in Elderly People with Use of a Hip Protector. *N Engl J Med* 2000; 343(21): 1506-1513.
5. Johnell O, Kanis JA. An estimate of the world wide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int* 2006; 17(12): 1726-1733.
6. Lim JH, Bae HS, Lee SM, Ahn HS. Dietary and non-dietary factors related to bone mineral density in female college students. *Korean J Community Nutr* 2008; 13(3): 418-425.
7. Han SM. Health Promotion Behaviors of the Diets and Exercises to Prevent Osteoporosis in College Students. *J Exerc Nutr Biochem* 2006; 10(2): 89-98.
8. Woo SO, Bae SS, Kim DH. A Case-Control Study on Risk Factors of Osteoporosis in some Korean Outpatient Women of One General Hospital of Seoul. *Korean J Prev Med* 1995; 28(3): 609-622.
9. Kim YM, Kim MH. A study of the osteoporosis related life style and health promotion behavior of university and college female student. *J Muscle Joint Health* 2002; 9(1): 53-67.
10. Min HJ, Oh HY. A Study on Osteoporosis Knowledge, Health Beliefs and Health Behaviors among Female College Students. *J Korean Acad Community Health Nurs* 2011; 22(2): 111-120.
11. Shin SJ, Shin KR, Yi HR, Ju SK. Knowledge, health belief, and self-efficacy related to osteoporosis. *J Korean Acad Nurs* 2005; 35(5): 850-857.
12. Ailinger R, Howard L, Braun M. Revision of facts on Osteoporosis Quiz. *Nurs Res* 2003; 52(3): 198-201.
13. Won IS. A study on Osteoporosis Knowledge, Self-Efficacy, Health Promoting Behaviors and BMD among Adult Women. Eulji University. Dissertation of Master's Degree. 2009.
14. Shin KL, Kang YM. A Study on the Relationships between Osteoporosis Knowledge, Self-efficacy and Health Belief of Women in an Island. *J Korean Acad Nurs* 2002; 32(1): 89-99.

15. Kim MH, Kim MS. A study on the relationships between knowledge about osteoporosis and cognitive factors in middle-aged women. *Korean J Women Health Nurs* 2005; 11(1): 52-57.
16. Ziccardi SL, Seldak CA, Doheny MO. Knowledge and health beliefs of osteoporosis in college nursing students. *Orthop Nurs* 2004; 23(2): 128-133.
17. Berarducci A, Burns PA, Lengacher CA et al. Health-promoting educational practices related to osteoporosis. *Appl Nurs Res* 2000; 13(4): 173-180.
18. Seo SH. Review: Long-Term Therapy of Postmenopausal Osteoporosis, *J Korean Soc Menopause* 2005; 11(1): 9-15.
19. Lee HJ. The effects of hypertensive education on knowledge, self-efficacy, self-care behavior in clients with coronary artery disease. Aju university, Suwon, Dissertation of master's Degree. 2007.
20. Min SY, Paek KS. The effects of a health education program on health promoting behavior and self-efficacy in university students. *J Korean Acad Community Health Nurs* 2007; 18(4): 562-571.