

The Effects of a Preventive Educational Program on the Osteoporosis Knowledge among the Middle-Aged Women in Korea

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I . Introduction

Osteoporosis is a systemic skeletal disorder characterized by low bone mass and microarchitectural deterioration of bone tissue, with a consequent increase in fracture(Decherney & Nathan, 2003). Osteoporosis causes bone mass loss and is related to aging, even though it is a preventable disease (Edwards & Fraser, 1997). It generally affects women (DeCherney, 1996; National Osteoporosis Foundation, 1998; Sedlak, Doheny, & Jones, 2000), especially during the years preceding

and following menopause. Bone mass peaks during the third decade of life, decreases approximately 1% annually during the middle of the fourth decade and accelerates rapidly during menopause. By the fifth decade, women experience a 10% loss of vertebral bone mass (DeCherney, 1996; Rodin et al., 1990).

Osteoporosis is a serious health problem, affecting approximately 6 million people in Korea. Current estimates indicate approximately 35% of Koreans will be at a high risk for developing osteoporosis by the year 2020 (Han & Cho, 1996). It is estimated that 50% of Korean women and 25% of

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Korean men will develop fractures due to osteoporosis after the age of 65 (Min, 1998). Similar estimates were reported in the United States, where osteoporosis affected 10 million Americans (National Osteoporosis Foundation, 2003). At least 50% of women living in the United States will suffer from fractures caused by osteoporosis after the age of 50 (Lips, 1997; Melton et al., 1997) and 41 million Americans will be at risk for developing osteoporosis by the year 2015 (National Osteoporosis Foundation, 1997).

Current estimates indicate health care costs of fractures resulting from osteoporosis at \$ 10 to \$ 18 billion per year and these costs are expected increase to more than \$ 60 billion per year by the year 2020 in the United States (National Osteoporosis Foundation, 1998). Therefore, prevention programs should be initiated to decrease the incidence of the osteoporosis in a timely manner.

A variety of risk factors associated with osteoporosis are identified, such as pre and post menopause, gender, age, a longer use of steroids, ethnicity, family history, a petite body shape, inadequate calcium and vitamin D intake, excessive alcohol and caffeine consumption, use of tobacco products, and a sedentary life style (Berarducci, Burns, Lengacher, & Sellers, 2000; Chapuy, Arlot & Delmas, 1994). Generally accepted strategies for preventing or reducing

osteoporosis include dietary and supplemental intakes of calcium and vitamin D, regular exercise, and life-style modification have been recommended to prevent bone loss in women. However, most of the women in the United States consume below the recommended average daily intake of calcium and vitamin (U.S. Department of Health and Human Services, 2000) and do not consistently comply with the prescribed medication and exercise regimens (Balkrishnan, 1998; Kim, Choi, Kim, Hong & Park, 1995; McElnay, McCallion, AlDeagi, & Scott, 1977). Furthermore, in Korea, most of the public is not aware of the seriousness and risks associated with osteoporosis until they suffer from pain or fractures (Woo, Bae & Kim, 1995).

Despite the aforementioned risks of osteoporosis, middle-aged women having the highest prevalence of osteoporosis had low levels of awareness and knowledge in Korea (Kang, 1999; Lee, 2001). These findings are consistent with previous research reported in the United States regarding middle-aged women's lack of knowledge on osteoporosis (Alinger & Emerson, 1998; Berarducci, 2001; Berarducci, Lengacher, & Keller, 2002; National Osteoporosis Foundation, 1997). Therefore, educational program is urgently needed to increase knowledge of and preventative methods towards osteoporosis.

Based on these backgrounds, this study

examined the effects of an educational program on the osteoporosis knowledge among the middle-aged women. The specific purposes of this study were two-fold: (a) to assess whether an osteoporosis preventive educational program has changed middle-aged women's knowledge of osteoporosis, and (b) to evaluate the participants' satisfaction with the program.

II. Materials and Methods

Design and Sample

A one group pretest-posttest design was used. The sample consisted of volunteers who participated in osteoporosis preventive program supported by a community center located in Kwangwon province. A total of 27 women (at pretest) and 27 women (at posttest) participated. All women were pre-tested for their knowledge level on osteoporosis prior to intervention.

Description of Intervention Program

The intervention program content included a lecture and exercise entitled, *The Prevention of Osteoporosis*. The PowerPoint presentations, hand-outs, a quiz, and a question & answer (Q & A) were used in the lecture. Demonstrations and a variety of music and kinetic instruments were used in exercise program. The exercises used were

specifically developed for middle-aged women, but were used with both younger and older women. This program design consisted of one 3-hour session per week and lasted over a 4-week period. The three hour session included one hour of lectures and two hours of exercise. Therefore, a total of 12 hours were scheduled for the entire program.

The intervention program was developed by researchers and provides a broad overview of osteoporosis, risk factors, diagnosis, treatment, prevention, and exercises. The specific contents for each week were as follows:

- Week 1: Anatomy and function of bones, a definition, the etiology, risk factors, and diagnosis of osteoporosis, and prevention of osteoporosis (I): exercise for flexibility
- Week 2: Prevention of osteoporosis (II): General principles and exercises for muscle strengthening.
- Week 3: Prevention of osteoporosis (III): Nutrition and exercise for good walking.
- Week 4: Treatment of osteoporosis: Hormone therapy and safe activities.

Instruments

The instruments used in this study were the Osteoporosis Knowledge Questionnaire (OKQ) and a Satisfaction Scale developed by

the researchers. The OKQ contains 20 true-false items to measure the knowledge levels about osteoporosis. The Kuder-Richardson test (KR 20), used as an estimate of internal consistency for knowledge, was .7783. The response for the items ranged from 0 (false answer) to 1 (right answer). Thus, a perfect test score on the knowledge scale was 20. The Satisfaction Scale consisted of 9 items, 5 categorical scale type statements. But Answers were aggregated only 3 scales.

Procedure

This study was conducted from 22 May, 2003 to 12 June, 2003. Participation was voluntary and consent was assumed by completion of both pretest and posttest measures. Demographic data were collected on the pretest. To assess the outcome of the intervention, levels of knowledge were measured at two points in time, immediately prior to and immediately following the educational program.

Data analysis

Descriptive statistics were used to assess demographic characteristics of the subjects and to evaluate the satisfaction with the educational program. A paired t-test was used to examine changes in osteoporosis knowledge from pretest to posttest.

III. Results

Demographics

Table 1 presents the demographic characteristics of subjects. An overwhelming major of the subjects (88.9%) ranged in age from 40 to 59. For example, their age range was from 40 to 49 years (51.8%) and 50 to 59 (37.0%). The highest level of education achieved varied. About half of the subjects were college graduates and the majority of them (77.8%) had no job. About two thirds (66.7%) perceived their body shape as standard and exercised regularly. About 52% of the subjects consumed health food regularly and 63% experienced weight control.

Sixteen (59.3%) of the participants reported never drinking alcohol and an overwhelming majority of the participants (92.6%) reported never smoking. The majority of participants consumed coffee (77.7%) and perceived their health status as poor (70.4%). Only 10 women (37.0%) had a regular menstrual period.

Osteoporosis-related Knowledge

Table 2 shows the results of paired t test. The paired t tests revealed significantly higher ($t=-2.873$, $p < .01$) osteoporosis knowledge scores at posttest (mean 15.41, $SD=0.51$) compared to pretest (mean=14.00, $SD=2.47$).

<Table 1> General characteristics of subjects

(N=27)

Characteristics	Category	N	(%)
Age(years)	40-44	10	37.0
	45-49	4	14.8
	50-54	7	25.9
	55-59	3	11.1
	60 ≥	3	11.1
Education level	Elementary	3	11.1
	Middle	1	3.7
	High	5	18.5
	College	12	44.4
	over	6	22.2
	other	1	3.7
Job	No occupation	21	77.8
	Part time	2	7.4
	Regular	3	11.1
	other	2	7.4
Economic level	very poor	1	3.7
	poor	3	11.1
	moderate	20	74.1
	abundant	1	3.7
	other	1	3.7
Body shape	Slender	2	7.4
	Standard	18	66.7
	Fat	6	22.2
Regular exercise	No	8	33.3
	Yes	18	66.7
Experience with weight control	other	4	14.8
	No	17	63.0
	Yes	6	22.2
Drinking	never	16	59.3
	most	6	22.2
	sometimes	5	18.5
Smoking	other	1	3.7
	no	25	92.6
	yes	1	3.7
Coffee	other	1	3.7
	never	5	18.5
	most	7	25.9
	sometimes	9	33.3
	always	5	18.5
Perceived Health	poor	4	14.8
	little poor	15	55.6
	good	8	29.6
Menstruation	regular	10	37.0
	irregular	2	7.4
	recently irregular	11	40.7

All participants had perfect knowledge (Mean=1.0) of the beneficial effect of milk and dairy products during pre- and post-test. More than 90% of the participants correctly answered 4 items that "Lying down for long periods increases the risk for osteoporosis", "Drinking alcohol and smoking cause increase the risk for osteoporosis", "Calcium

deficit increase the risk for osteoporosis", and "A salty diet may cause you to lose calcium" at pretest. However, they lack common knowledge of osteoporosis. For example, only 35% of the participants correctly answered the item that "Every old person decreases in height" and 48 % of the participants correctly identified "Calcium deficits increase the risk

<Table 2> Knowledge changes between pretest and posttest

Questions	pre-test	post-test	paired t-test	P
Having back pain, one can doubt osteoporosis	.70 ± .47	0.89 ± .32	-2.431	.022
Every old person decrease in height	.35 ± .49	0.35 ± .49	.000	1.000
Both men and women begin to weaken bone after age of 30	.71 ± .46	0.83 ± .38	-1.141	.266
Women having over weight increase the risk for osteoporosis	.86 ± .35	0.82 ± .39	.370	.715
One whose parent had a history of osteoporosis increases the risk for osteoporosis	.80 ± .41	0.84 ± .37	-.440	.664
Lying down for long periods increases the risk for osteoporosis	.96 ± .19	1.00 ± .00	-1.000	.327
Having gastric disease has nothing to do with osteoporosis	.70 ± .47	0.78 ± .42	-.699	.492
Drinking alcohol and smoking cause increase the risk for osteoporosis	.92 ± .27	1.00 ± .00	-1.443	.161
Irregular menstrual period cause the risk for osteoporosis	.65 ± .49	0.78 ± .42	-1.000	.328
Having meat containing high protein helps to prevent osteoporosis	.54 ± .51	0.62 ± .50	-.811	.425
One liking activity increase the risk for osteoporosis	.88 ± .34	1.00 ± .00	-1.813	.083
Milk and dairy products contain a plenty of calcium	1.00 ± .00	1.00 ± .00	-	-
Calcium deficits increase the risk for osteoporosis	.48 ± .51	0.88 ± .33	-3.464	.002
A salty diet may cause you to lose calcium	.96 ± .21	1.00 ± .00	-1.000	.328
Women experiencing menopause need not take hormone replacement therapy because the menopause is a natural process	.64 ± .49	0.72 ± .46	-1.000	.327
Osteoporosis can be treated by hormone therapy after menopause	.92 ± .28	0.88 ± .33	.569	.574
Parathormone therapy helps to treat osteoporosis	.50 ± .51	0.61 ± .50	-.809	.430
Osteoporosis is incurable	.61 ± .50	0.57 ± .51	.327	.747
Gastric disease increases the risk for osteoporosis	.88 ± .33	0.88 ± .33	.000	1.000
Stress has nothing to do with osteoporosis	.75 ± .44	0.75 ± .44	.000	1.000
Total	14.00 ± 2.47	15.41 ± 0.51	-2.873	.008

for osteoporosis" as the correct answer during the pretest.

Satisfaction of an educational program

Table 3 shows subjects' satisfaction with the education program. Subjects responded "overview of osteoporosis" as being strongly satisfactory (85.2%), followed by "diagnosis of osteoporosis" (77.8%), "flexibility of exercise" (66.7%), "walking" (66.7%), "fracture and falling down prevention" (63.0%), prevention of osteoporosis: diet" (59.3%), muscle strengthening exercise" (55.6%), "relaxation" (55.6%), and "treatment of osteoporosis" (40.7%).

IV. Discussion

The osteoporosis educational program significantly ($p=.008$) increased middle-aged

women's knowledge during the posttest. The findings of these results are consistent with those of middle-aged women in the United States (Berarducci, 2001; Davis & White, 2000; Sedlark, Doheny & Jones, 1998) and in Korea (Lee & Rhee, 1997). According to findings of Sedlark, Doheny & Jones (1998), participants in the experimental group had a significantly higher knowledge score after receiving the osteoporosis preventive program than their pretest scores, while subjects in the control group had no change in scores between pretest and posttest. The findings of Lee and Kim (2001) showed that intervention significantly increased participants' knowledge about osteoporosis after intervention.

Numerous studies indicated that primary prevention of osteoporosis through increased knowledge of risk factors and preventative behaviors is important (Berarducci, 2001;

<Table 3> Satisfaction with Education Program

	Strongly satisfied N(%)	Just a bit satisfied N(%)	So-so N(%)	No response N(%)
Overview of Osteoporosis	23(85.2)	-	-	4(14.8)
Diagnosis of Osteoporosis	21(77.8)	2(7.4)	-	4(14.8)
Prevention of Osteoporosis: Diet	16(59.3)	7(25.9)	-	4(14.8)
Treatment of Osteoporosis	11(40.7)	4(14.8)	2(7.4)	10(37.0)
Flexibility exercise	18(66.7)	5(18.5)	-	4(14.8)
Muscle strengthening exercise	15(55.6)	6(22.2)	1(3.7)	5(18.5)
Walking	18(66.7)	4(14.8)	1(3.7)	4(14.8)
Fracture and fall down prevention	17(63.0)	5(18.5)	1(3.7)	4(14.8)
Relaxation	15(55.6)	7(25.9)	1(3.7)	4(14.8)

Davis & White, 2000; Geller & Derman, 2001; Sedlark, Doheny & Jones, 1998). The reason is that knowledge is the easiest factor to change through preventative educational programs (Sedlark, Doheny & Jones, 1998). In a similar manner, Magnus (1996) identified that education is the strongest predictor to attain knowledge regarding osteoporosis.

Participants already knew that milk and calcium products are beneficial in preventing osteoporosis. Although most of the participants knew that milk and dairy products are beneficial for health, this knowledge did not guarantee a change in behavior (Sedlark, 2000).

Following the educational program, the majority of the participants were unaware that not everyone decreases in height, although the risk for osteoporosis increases with age. That is, educational programs did not change the participants' knowledge about this fact. A possible explanation may be that the contents of the educational program did not include this fact. Another explanation may be the participants had a fixed misconception about age and bone strength.

Overall, middle-aged women's knowledge of osteoporosis in this study at pretest was not low, in comparison with other studies. These findings were not consistent with previous research that despite the seriousness of this disease, the level of knowledge was relatively low at all ages, including nursing

students (Bararducci, 2004), nurses (Bararducci, Lengacher & Keller, 2002), college students (Sedlark, Doheny & Jones, 2000) and the greater population (Berarducci, 2001). According to Ungan and Tumer (2001), more than 65% of the women were unaware that osteoporosis directly influences the incidence of hip fractures, and more than 49% of the women failed to recognize the risk factors.

According to the National Osteoporosis Foundation (2003), 20% of the Asian and Caucasian women over 50 years of age are affected by osteoporosis, compared with 10% of Hispanic and 5% of Black women of the same age. This fact indicated more osteoporosis prevention programs should be implemented at all ages with Korean women.

Overall satisfaction with the program was high. However, subjects responded that "treatment of osteoporosis" was the least satisfactory. Possible explanations may be that the contents of the educational program were not good or subjects' expectations were high. Therefore, richer treatment contents should be included in later programs.

Several limitations of this study need to be addressed. First, the results from this study cannot be generalized, because this was a nonprobability sample with a small sample size ($n=27$) from one geographic location. Generalizing these results to the population at large may distort the findings. Second,

since the effects of an educational program were measured immediately after intervention without control group, the effects may be exaggerated. In general, one group pretest-posttest design has a possibility of a third variable (Polit & Hungler, 1995). Therefore, careful consideration should be placed on interpretation of the findings.

Further study using the same educational program with different groups is needed. In addition, repeated measures at some intervals, are needed to examine whether changes in knowledge, attitudes, and behavior were maintained. More stringent design with a random sample and a control group was required.

In conclusion, this study shows that the educational program was effective in increasing knowledge of osteoporosis and subjects valued the content of this program. Because women of all ages are at risk, effective educational programs at all ages are needed to prevent the onset of osteoporosis.

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References

- Ailinger, R. L., & Emersion, H. Women's knowledge of osteoporosis. *Appl Nurs Res* 1998;11:111-114.
- Berarducci, A. The effects of an osteoporosis preventive cognitive behavioral intervention on knowledge, self-efficacy, role strain, and intention in midlife women. Doctoral dissertation, University of South Florida. 2001.
- Berarducci, A. Senior nursing students' knowledge of osteoporosis. *Orthop Nurs* 2004;23(2):121-127.
- Berarducci, A., Burns, P. A., Leengacher, C. A., Sellers, E. Health-promoting educational practices related to osteoporosis. *Appl Nurs Res* 2000;13:173-180.
- Berarducci, A., Lengacher, C., & Keller, R. The impact of osteoporosis continuing education on nurses' knowledge and attitudes. *J Contin Educ Nurs* 2002;33(5):210-216.
- Balkrishnan, Chapuy, M. C., Arlot, M. E. Delmas, P. D. & Meunier, P. J. Effect of calcium and cholecalciferol treatment for three years on hip fractures in elderly women. *Br Med J* 1994;308:1081-1082.
- Davis, G. C. & White, T. L. Planning an osteoporosis education program for older adults in a residential setting. *J Gerontolo Nurs* 2000;26(1):16-23.
- DeCherney, A. H. Bone-sparing properties of oral contraceptives. *Lancet* 1996;341:797-801.
- DeCherney, A. H. & Nathan, L. *Current obstetric and gynecologic diagnosis and treatment*. 9th edition, McGraw Hill:

- New York. 2003.
- Edwards, L., & Fraser, M. How do we increase awareness of osteoporosis: *Baillieres Clin Rheumatol* 1997;11: 631-634.
- Han, I. K. & Cho, N. H. *Osteoporosis in Korea*. The Third symposium for Osteoporosis in Seoul. 1995:47-64.
- Hong, S. M. & Kim, H. J. A Study of Calcium Status and Effect of Nutrition Education of Prevention Osteoporosis in Middle-aged Women. *J Korean Dietet Associ* 2001;7(2):159-166.
- Jeong, T. H., Jeon, T. H., Kim, M. C., Kim, Y. I., Jeon, D. J., Yang, S. O., Ham, S. Y., o, B. K. & Kim, S. Y. The effect of audiovisual instruction that influences hormone replacement therapy uptake and changes of lifestyle behaviors related to osteoporosis in perimenopausal women. *J Korean Acad Fam Med* 2000;21(11):1406-1414.
- Kang, Y. M. *A study on relationships between osteoporosis knowledge, health belief and self-efficacy of middle aged women*. Unpublished master's thesis. Ehwa Women's University. 1999.
- Kim, M. C., Choi, J. W., Kim, T. H., Hong, I. P. & Park, H. S. Women's recognition about postmenopausal osteoporosis. *J Korean Acad Fam Med* 1995;16(5): 298-306.
- Lee, H. Y. *A study of correlation among the knowledge of the disease health promoting behaviors and the quality of life in the female patients with osteoporosis*. Unpublished master's thesis. Graduate school of public. 2001.
- Lee, H., & Rhee, H. Y. The effect of the structured education on the early rehabilitation knowledge and activity performance of the C.V.A. patients. *J Korean Acad Nurs* 1997;27(1):109-119.
- Lips, P. Epidemiology and predictors of fractures associated with osteoporosis. *Am J Med* 1997;103:3S-11S.
- Magnus, J. H., Joakimsen, R. M., Berntsen, G. K., Tollan, A. Soogaard, A. J. What do Norwegian woman and men know about osteoporosis?, *Osteoporosis Int* 1996;6:32-36.
- Melton, L. J., Thamer, M., Ray, N. F., Chan, J. K., Chesnut, C. H., Einhorn, T. A. et al. Fractures attributable to osteoporosis: Report from the National Osteoporosis Foundation. *J Bone Miner Res* 1997;12: 16-23.
- Min, Y. K. Osteoporosis and disorder of menopause. Open Forum supported by Chosun ilbo and Samsung Hospital. 1998.
- National Osteoporosis Foundation. Gallup survey: women's knowledge of osteoporosis. *Am Fam Physician* 1991;44:1052.
- National Osteoporosis Foundation. Women

delay osteoporosis diagnosis because they confuse bone-thinning disease with arthritis. Newsline for *Nurse Pract* 1997b;3:14-15.

National Osteoporosis Foundation. Osteoporosis. 2003.

Polit, D. F. & Hungler, B. P. *Nursing research: Principles and methods*. 4th edition. J. B. Lippincott Company: New York. 1995.

Riggs, B. L. & Melton, I. j. The prevention and treatment of osteoporosis. *N Engl J Med* 1992;327:620-625.

Rodin, A., Murby, B., Smith, M. S., Caleffi, M., Fentiman, T., Chapman, M. G., & Fogelman, T. Premenopausal bone loss in the lumbar spine and neck of femur: A study of 225 Caucasian women, *Bone* 1990;11:1-5.

Sedlak, C. A., Doheny, M. O. & Jones, S.

L. Osteoporosis Prevention in Young Women. *Orthop Nurs* 1998;17(3): 53-60.

Sedlak, C. A., Doheny, M. O. & Jones, S. L. Osteoporosis education programs: Changing knowledge and behaviors. *Public Health Nurs* 2000;17:398-402.

Ungan, M. & Tumer, M. Turkish women's knowledge of osteoporosis. *Fam Pract* 2001;18(2):199-203.

United States Department of Health and Human Services. Healthy people 2010. Washinton, DC: Superintendent of Documents, Government Printing Office. 2000.

Woo, S. O., Bae, S. S., Kim, D. H. 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.

ABSTRACT

The purpose of this study was to assess whether the osteoporosis preventive educational program has changed the middle-aged women's knowledge on osteoporosis.

A one group pretest-posttest design was used. A total of 27 women (at pretest) and 27 women (at posttest) who were volunteers participated.

The intervention program content included lecture and exercise entitled The Prevention of Osteoporosis. This program design consisted of one 3-hour session per week and lasted over 4-week period.

Osteoporosis Knowledge Questionnaire (OKQ) was used. The OKQ contains 20 true-false items to measure the knowledge levels about osteoporosis. The Kuder-Richardson test (KR 20), used as an estimate of internal consistency for knowledge, was .7783.

Overwhelming majority of the participants (96.2%) were ranging in age from 40 to 60. About half of the participants were college graduates and the majority of them (77.8%) had no jobs. The educational program significantly increased osteoporosis knowledge in middle-aged women.

Results of this study shows that educational program is effective in increasing knowledge of osteoporosis. Further study using the same program with different age group is needed to measure knowledge, behavior and attitude on osteoporosis.

Key Words: Osteoporosis, Middle-aged Women, Preventive Educational Program, Knowledge