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EFFECT OF HEALTH EDUCATION INTERVENTION ABOUT OSTEOPOROSIS ON KNOWLEDGE AND DIETARY HABITS OF WOMEN EMPLOYEE

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ABSTRACT

Background: Osteoporosis is a disorder of decreased bone mass density. The aim of this study was to examine the effect of health education intervention about osteoporosis on knowledge and dietary habits of women employee. **Design:** A quasi-experimental design was used with pre-post test. **Setting:** The study was conducted in administration building at Fayoum University. **Sample:** A systematic random sample of 104 women employees that represent 20% of total number of women 518 under certain criteria. Instruments: Two tools were used, the first tool was interviewing questionnaire cover the demographic characteristics of women, reproductive health data, medical history, dietary habits and their knowledge about osteoporosis. The second tool was physiological measurement for measuring bone mineral density and body mass index. **Results:** The study revealed that, less than half of the women's age was between 45<55 years with mean age of 46.16±7.12 years old. More than half of the subjects have normal mineral density, more than one third have osteopenia and the minorities of the subjects have osteoporosis. There was highly statistical significant improvement in the post program than pre program in the total dietary habits and women knowledge about osteoporosis and relation between bone mineral density and intake of milk and soft drinks. **Conclusion:** The health education intervention about osteoporosis on knowledge and dietary habits of employees' women was effective for increasing their knowledge level about osteoporosis and their dietary habits. **Recommendations:** Periodic check up for bone mineral density testing for early detection of bone loss. Health education about risk factors and consequences of osteoporosis should be started early as possible from pre-school age until adulthood.

Keywords: Osteoporosis, Health education intervention, Osteoporosis

INTRODUCTION

Osteoporosis is a serious disease that affects the bones. It can strike people of any age, but is more prevalent in older people. Osteoporosis is widely viewed as a major public health concern. Osteoporosis – literally "porous bone' – is characterized by excessive bone loss, low bone mass, and structural deterioration of skeletal tissue, leading to an increased risk of fracture under minimal trauma (Janz & Becker, 1984; Greer, Krebs & American Academy of Pediatrics, 2006). In addition, it is called a "silent condition" that happens slowly over years, the rate of bone loss exceeds, the rate of new bone formation (a cretion), many times neither a person nor a doctor is aware of weakened bones until one breaks unexpectedly (Smith & Maurer, 1764).

The incidence of osteoporosis increases with age and females are six times more likely than males to develop primary osteoporosis and senile osteoporosis affects approximately 50% of women aged 70 years (Rodriguez, Langley & Dimarco, 2009). According to the criteria of World Health Organization (WHO) 30% of menopausal women have osteoporosis. Women lose bone mass more rapidly than men. Following the cessation of menses the rate of bone loss is accelerated for approximately 5 to 8 years after menopause (Center

for Disease Control and Prevention, 2010).

In the early stages of osteoporosis, the patient probably will not have symptoms. As the disease progresses, symptoms related to weakened bones occur. It includes the symptoms of chronic dull pain particularly in the lower back or neck, loss of height and stooped posture, a curved upper back (dowager's hump) and broken bones (fractures) that might occur with a minor injury, especially in the hip, spine and wrist (Sampson, 2002).

Risk factors for osteoporosis can be classified as modifiable and non-modifiable. Modifiable risk factors include: smoking, current low body weight regardless of height, early menopause (<45 years of age), excessive alcohol intake and soft drink, sedentary lifestyle, low calcium intake and poor general health (Janz & Becker, 1984). Non-modifiable factors among women include female sex, ethnic, advanced age, family history, immobilization, delayed puberty and nulliparity (Allegrante, Peterson & Kasper, 2001).

Bone fractures, particularly in the spine or hip, are the most serious complication of osteoporosis. Hip fractures can result in disability, decreased quality of life, lost workdays, and patients suffering from a hip fracture will require long-term nursing home care. Elderly patients can further develop pneumonia and blood clots in the leg veins that can travel to the lungs (pulmonary embolism) due to prolonged bed rest after a hip fracture. Some 20% of women with a hip fracture will die in the subsequent year as an indirect result of the fracture (Leslie, 2000). In addition, once a person has experienced a spine fracture due to osteoporosis, he or she is at very high risk of suffering another fracture in the next few years. About 20% of postmenopausal women who experience a vertebral fracture will suffer a new vertebral fracture of bone in the following year (Lindsay *et al.*, 2001).

As there is delayed cure for osteoporosis, prevention is the key to overcome this disease. Community health nurse (CHN) have the opportunity to help raising public awareness about this disease and to offer information about its consequences, prevention and treatment because of their health promotion and their ready accesses to people at various stages in their lives (Dempster & Lindsay, 1993).

Significance of the study

Community health nurse must consider osteoporosis as a major public health hazard because of two major reasons. Firstly, osteoporotic fractures most commonly observed in the vertebrae, femur, radius, can cause substantial morbidity and mortality (Chung *et al.*, 2003). Secondly, osteoporosis is a common disease among the elderly and with the improvement in health care, the lifetime expectancy in developed countries has increased. This means that the fracture of elderly individual's increases with osteoporosis, it is likely to become more prevalent. As a result, the cost of osteoporosis-related health care expenses to the society is high and is likely to rise (Tuzun *et al.*, 2012).

Aim of the study

The aim was to examine the effect of health education intervention about osteoporosis and the dietary habits of the employed women.

Hypothesis

The knowledge of women about osteoporosis will be improved after implementing the educational program.

MATERIALS AND METHOD

Design: A quasi-experimental design with pre - post test was used.

Setting: The study was conducted in the administration building at Fayoum University.

Sample: A systematic random sample composed of 104 employees women that represent 20% of the total number of employees women, 518 from administrative building at Fayoum University; Subjects were interviewed at conference hall in the building.

They were selected according to the following inclusion criteria:

They were selected if they did not attend lectures on health awareness of osteoporosis before (inclusion criteria).

Instruments:

Two tools were developed by the researcher to collect data.

1- Interview questionnaire: This questionnaire was designed to collect data about the women. It consisted of the following:

A. Demographic Characteristics includes age, level of education, marital status and monthly income number of family member.

B. Reproductive health data includes age at first menarche, number of pregnancies, number of abortion,

number of deliveries, contraceptive methods.

C. Health problems include medical history and family history of osteoporosis.

D. Dietary habits and exercise such as the amount of salt in foods, pickles, foods rich in calcium, protein and fiber. Intake of drinks is milk, tea, coffee and soft drinks etc.

E. Assessment of knowledge about osteoporosis includes meaning, signs & symptoms, main cause of osteoporosis, gender risk, reasons of awareness for osteoporosis, risk factors, sources of calcium in food, method of prevention, diagnostic methods, treatment, protective exercises and protective foods of osteoporosis.

Scoring system: For knowledge items, a correct complete answer scored two points and a correct incomplete answer scored one point, while the wrong answer or unknown was given zero, according to mothers' answers, their knowledge was categorized into good knowledge ≥75%, Average knowledge ≥50%-< 75% and poor knowledge < 50%.

2. Physiological measurement tool: It consisted of two parts.

A. The measurement of bone mass density: peripheral machine (Peripheral dual-energy X-ray absorptiometry (P-DEXA) which measures bone mass density in heel bone was used for each subject of the sample.

B. Assess body mass index (BMI) by measuring body weight and height.

Procedure for data collection

Study period: The process of data collection was carried out in the period from November 2014 to March 2015.

Tool development

Reliability of the tools: Reliability was applied by the researcher for testing the internal consistency of the tool, by the administration of the same tools to the same subjects under similar conditions on one or more occasions. The answers from repeated testing were compared (test-re-test reliability = 0.84%), Cronbach's Alpha reliability = 0.84.

Validity of the tools: The tools tested by five experts in community health nursing and some modification were done according to expertise opinion. The content and face validity of the study tools were measured to evaluate the individual items as well as the entire tools used for the study as being relevant and appropriate to test what they wanted to measure.

Pilot study: It was carried out on 10 women employees at her workplace in October, 2014. They were excluded from the study sample to test the clarity of data collection tools and also to detect any obstacle or problem that might arise in data collection, and estimate the time needed to fill the tools.

Ethical considerations: The agreements for participation were taken orally after the purpose of the study was explained. Before data collection, the employees' were informed about the aim of the study. They were given an opportunity to refuse to participate and they were notified that they could withdraw at any stage of research. Each Participant was interviewed for 30-45 minutes using the structured interview questionnaire. The researcher started an individual's interview after arranging the suitable time. The purpose of the study was explained to the women in a simple way. The women interviewed two days per week and three women in each day at conference hall in the building.

Health education intervention

The researcher implemented the educational through four phases as following:

- **Assessment phase:** In this phase of the program, assessed knowledge and habits through collection and analysis of baseline data from the filled tools. In this phase the researcher did the pre-test.
- **Planning phase:** The researcher identified the important needs for the target group, set priorities of needs and objectives were developed.
- **Objective:** Improve the knowledge of the employed women and the habits to control osteoporosis.
- **Implementation phase:** In this phase the researcher implemented the educational program to the studied women. They were divided into ten groups, and each group consists of 10 women. The program was divided into six sessions, each session lasted 30 -45 minutes and immediately did the post-test.

First session: At the beginning of the first session, an orientation to the program, introduction and meaning about osteoporosis, taking into consideration the use

of simple language according to the educational level. Discussion, motivation and reinforcement during program/media used/ session were used to enhance learning. Each session started by summary about the previous session and new topics.

Second session: covered types of osteoporosis.

Third session: covered sings, symptoms and risk factors of osteoporosis.

Fourth session: covered method of measuring of osteoporosis and complications.

Fifth session: covered methods of prevention and role of nutrition in preventing of osteoporosis.

Six session: covered example of meals for 24 hours for preventing osteoporosis.

Evaluation phase: After implementing the education program, immediately the researcher applied the post-test to evaluate their improvement.

Statistical Design

Data were analyzed using the statistical package for social sciences (SPSS) version 16. Qualitative data was presented as number and percent. Comparison between groups was done by Chi-square test. $p < 0.05$ was considered to be statistically significant of results.

RESULTS

Figures 1 clarifies that only 8.7% were under weight, 31.7% were ideal weight, 34.6% were overweight and 23.1% were obese and 1.9% was extremely obese.

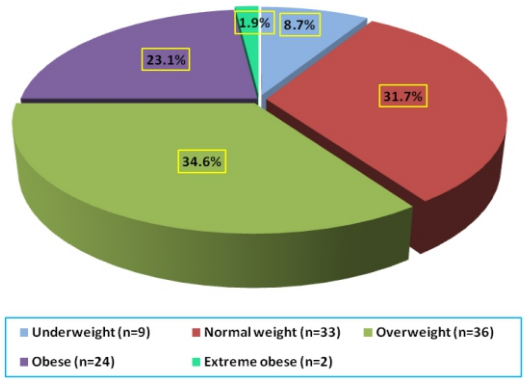

Figure 1: Distribution of the studied subjects according to body mass index (BMI) (n=104)

Figure 2 show that 53.8% had normal bone mineral density, 40.4% having osteopenia while 5.8 % had osteoporosis.

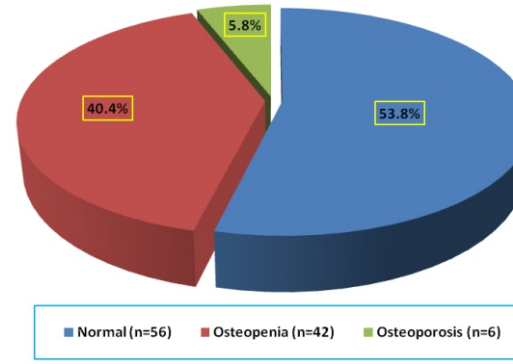

Figure 2: Distribution of the studied subjects according to bone mineral density measurements

Figure 3 shows that highly statistical significance impro vement between pre and post total knowledge score.

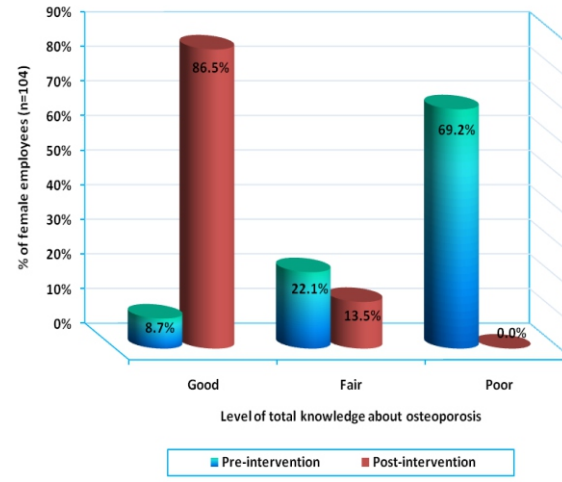

Figure 3: Comparison between pre- post total score of knowledge about osteoporosis of the studied subjects

Table 1 displayed the reported demographic characteristics of the subject, with mean age 46.16 ± 7.12 years. About 82.7% of the subjects are married. Regarding their monthly income, 52.9% reported having enough monthly income, 78.9% reported having three to five family members. About 45.2% have secondary education, while 29.8% have university education and only 4.8% are above university education.

Table 1: Knowledge about different items of osteoporosis of the studied women pre and post educational program (N=104)

Knowledge about osteoporosis	The studied subjects (N=104)				χ^2	*P*
	Pre-program		Post-program			
	No.	%	No.	%		
▪ Meaning:						
Poor	65	62.5	2	1.9	135.387	0.0001*
Fair	27	26.0	7	6.7		
Good	12	11.5	95	91.3		
▪ Symptoms:						
Poor	62	59.6	3	2.9	127.055	0.0001*
Fair	31	29.8	10	9.6		
Good	11	10.6	91	87.5		
▪ Main causes:						
Poor	55	52.9	0	0	132.610	0.0001*
Fair	41	39.4	16	15.4		
Good	8	7.7	88	84.6		
▪ Gender risk						
Poor	77	74.0	0	0	140.400	0.002*
Fair	18	17.3	17	16.3		
Good	9	8.7	87	83.7		
▪ Reasons of awareness of osteoporosis						
Poor	59	56.7	0	0	140.106	0.0001*
Fair	37	35.6	13	12.5		
Good	8	7.7	91	87.5		
▪ Risk factors:						
Poor	70	67.4	3	2.9	129.361	0.0001*
Fair	23	22.1	10	9.6		
Good	11	10.5	91	87.5		
▪ Sources of calcium in food:						
Poor	57	54.8	0	0	120.220	0.0001*
Fair	33	31.7	14	13.5		
Good	14	13.5	90	86.5		
▪ Preventive measures :						
Poor	72	69.2	1	1.0	140.94	0.0001*
Fair	24	23.1	13	12.5		
Good	8	7.7	90	86.5		
Poor	72	69.2	1	1.0	140.94	0.0001*
Fair	24	23.1	13	12.5		
Good	8	7.7	90	86.5		
▪ Methods of measuring bone density:						
Poor	86	82.7	0	0	170.730	0.0001*
Fair	14	13.5	9	8.7		
Good	4	3.8	95	91.3		
▪ Treatment:						
Poor	77	74.0	2	1.9	141.696	0.0001*
Fair	18	17.3	10	9.6		
Good	9	8.7	92	88.5		
▪ The period of treatment:						
Poor	77	74.0	1	1.0	141.621	0.0001*
Fair	16	15.4	9	8.7		
Good	11	10.6	94	90.4		
▪ The goal of treatment:						
Poor	67	64.4	0	0	147.088	0.0001*
Fair	27	26.0	8	7.7		
Good	10	9.6	96	92.3		
▪ Protective exercises:						
Poor	76	73.1	0	0	168.641	0.0001*
Fair	24	23.1	8	7.7		
Good	4	3.8	96	92.3		
▪ Protective foods						
Poor	64	61.6	0	0	153.642	0.0001*
Fair	33	31.7	9	8.7		
Good	7	6.7	95	91.3		

**Significant (P<0.05)*

Table 2 shows that there was highly statistical significant improvement in the post program than that of pre as *p*-value (0.0001).

Table 2: Distribution of the studied women by their dietary habits pre& post intervention (N=104)

Dietary habits	The studied subjects (N=104)				χ^2	*P*
	Pre-program		Post-program			
	No.	%	No.	%		
•Food intake:						
▪ Salt intake:						
Without salt	18	17.3	27	26.0	30.344	0.0001*
Average salt	51	49.0	73	70.2		
Excessive salt	35	33.7	9	8.7		
▪ Pickles intake:						
Never	8	7.7	24	23.1	30.728	0.0001*
Sometimes	30	28.8	53	51.0		
Always	66	63.5	27	26.0		
▪ Food rich in calcium:						
Never	3	2.9	0	0	28.083	0.0001*
Sometimes	47	45.2	15	14.4		
Always	54	51.9	89	85.6		
▪ Food rich in protein:						
Never	4	3.8	0	0	19.324	0.0001*
Sometimes	43	41.3	25	24.0		
Always	57	54.8	79	76.0		
▪Food rich in fiber:						
Never	7	6.7	0	0	27.497	0.0001*
Sometimes	43	41.3	16	15.4		
Always	54	51.9	88	84.6		

**Significant (P<0.05)*

Table 3 reveals that there was statistically significant improvement in the post program than the pre program as *p*-value (0.0001).

Table 3: Distribution of the studied women by their intake of drinks pre & post program (N=104)

Intake of drinks	The studied subjects (N=104)				χ^2	*P*
	Pre-program		Post-program			
	No.	%	No.	%		
▪ Milk intake:						
Never	29	27.9	6	5.8	49.455	0.0001*
Sometimes	42	40.4	15	14.4		
Always	33	31.7	83	79.8		
▪ Tea intake:						
Never	23	22.1	69	66.3	44.970	0.0001*
Sometimes	36	34.6	23	22.1		
Always	45	43.3	12	11.5		
▪ Nescafeintake:						
Never	18	17.3	59	56.7	60.495	0.0001*
Sometimes	23	22.1	34	32.7		
Always	63	60.6	11	10.6		
▪ Coffee intake:						
Never	42	40.4	81	77.9	30.651	0.0001*
Sometimes	38	36.5	16	15.4		
Always	24	23.1	7	6.7		
▪ Soft drink intake:						
Never	15	14.4	41	39.4	26.208	0.0001*
Sometimes	28	26.9	36	34.6		
Always	61	58.7	27	26.0		

**Significant (P<0.05)*

Table 4 shows that there is a statistical significant improvement in the range and mean habits score in the post program than that of the pre-program as *p*-value (0.0001).

Table 4: Mean total scores habits of the studied women pre and post educational intervention program (N=104)

Total habits scores	The studied subjects (N=104)				χ^2	*P*
	Pre-program		Post-program			
	No.	%	No.	%		
Poor	56	53.8	3	2.9	23.120	0.0001*
Fair	40	38.5	48	46.2		
Good	8	7.7	53	50.9		
Range	18.00-36.00		23.00-37.00		9.684	0.0001*
Mean±SD	27.43±4.63		34.83±3.40			

**Significant (P<0.05)*

Table 5 shows that there was highly statistical significant relation between the pre-post total knowledge score of the women and their level of education (*p*-value <0.001).

Table 5: Relation between level of education and total score knowledge for pre- post program

Variable	Education										χ^2	*P*
	Primary Education (N=8)		Preparatory education (N=13)		Secondary (N=47)		University (N=31)		Above university (N=5)			
	No.	%	No.	%	No.	%	No.	%	No.	%		
Total score pre	8	100	13	100	44	93.6	7	22.6	0	0	111.07	<0.001 HS
Poor	0	0	0	0	3	6.4	20	64.5	0	0		
Fair	0	0	0	0	0	0	4	12.9	5	100		
Good												
Total score post	6	75	8	61.5	0	0	0	0	0	0	64.71	<0.001 HS
Fair	2	25	5	38.5	47	100	31	100	5	100		
Good												

Table 6 shows a statistical significance relation between bone mineral density and number of pregnancies, number of abortions, number of deliveries and menopause as *p*- value (0.0001).

Table 6: Relation between bone mineral density & number of pregnancies, abortions and deliveries

Obstetric history	BMD						χ^2	*P*
	Normal (N=56)		Osteopenia (N=42)		Osteoporosis (N=6)			
	No.	%	No.	%	No.	%		
Number of pregnancies								
Gravida above 4	2	3.6	11	26.2	3	50.0	44.83	<0.001 HS
Gravida 3-4	14	25.0	26	61.9	2	33.3		
Gravida 1-2	33	58.9	5	11.9	1	16.7		
None	7	12.5	0	0.0	0	0.0		

Table 7 shows a statistical significance relation between bone mineral density and salt intake, pickles, food rich in calcium, protein, fiber and passive smoking as *p*-value (0.0001).

Table 7: Relation between bone mineral density (BMD), their dietary habits and smoking among the studied women (n=104)

Dietary habits & smoking	BMD of the studied subjects (N=104)						χ^2	*P*
	Normal (N=56)		Osteopenia (N=42)		Osteoporosis (N=6)			
	No.	%	No.	%	No.	%		
▪ Salt intake:								
Without salt	14	77.8	3	16.7	1	5.6	10.808	0.029*
Average salt	30	58.8	18	35.3	3	5.9		
Excessive salt	12	34.3	21	60.0	2	5.7		
▪ Pickles intake:								
Never	27	40.9	33	50.0	6	9.1	15.668	0.003*
Sometimes	21	70.0	9	30.0	0	0		
Always	8	100	0	0	0	0		
▪ Food rich in calcium:								
Never	0	0	1	33.3	2	66.7	79.773	0.0001*
Sometimes	7	14.9	36	76.6	4	8.5		
Always	49	90.7	5	9.3	0	0		
▪ Food rich in protein:								
Never	0	0	1	25.0	3	75.0	103.76	0.0001*
Sometimes	4	9.3	36	83.7	3	7.0		
Always	52	91.2	5	8.8	0	0		
▪ Food rich in fiber:								
Never	0	0	1	14.3	6	85.7	182.757	0.0001*
Sometimes	2	4.7	41	95.3	0	0		
Always	54	100	0	0	0	0		
▪ Passive smoking:								
Yes	26	72.6	29	47.5	6	9.8	9.552	0.0001*
No	30	69.8	13	30.2	0	0		

**Significant (P<0.05)*

DISCUSSION

Osteoporosis has recently been recognized as a major public health problem in the developed and developing countries. It is not confined to the growing older population but has implications for all age groups. Knowledge of osteoporosis should be a priority for future intervention programs in order to promote specific behavioral strategies for osteoporosis prevention and people education forms an important part in the management of osteoporosis (Galworthy & Wilson, 1996).

Concerning body mass index, the present study showed that a minority of the subjects were under weight, more than one quarter had ideal weight, more than one third were over weight, less than one quarter were obese and the mean BMI was 29.027±7.52. This finding is supported by Frisancho, Gran & Ascoli, (1971) who studied "Relationship of body composition with bone mineral in northern American women by body mass index levels". This study found that more than one quarter had ideal weight, more than one third were over weight, about one quarter were obese, also the minority were under weight and extreme obese. While, this finding was not in the same line with Allen (1999) who found that more than two thirds were over weight and more than one quarter were obese. This discrepancy between the results may be due to differences between them dietary habits.

Regarding bone mineral density, the present study showed that more than half of the subjects had normal bone mineral density, more than one third had osteopenia and the minority had osteoporosis. This finding agree with Hong *et al.*, (2003) who studied Chinese women aged 45 years and above living in Teban gardens (community on the western side of Singapore) to determine "the awareness, knowledge of risk factors and attitudes toward osteoporosis in middle aged and elderly women in Singapore". They found that nearly half of their sample has normal bone mineral density, about one third suffering from osteopenia and small percentage suffering from osteoporosis.

Concerning, the research hypothesis, the dietary habits among the studied women before and after the intervention, it showed that there was a statistical significant improvement in the post test than that of the pre-test where women reported increased food rich in calcium, protein, fiber and decreased salt and Pickles intake. The present study finding is supported by Ribeio, Blakely & Laryea, (2000) who studied "the Women's practices regarding the prevention of osteoporosis" to assess women's knowledge and practices pre-post intervention. They found that an improvement in dietary habits in post intervention. These findings agree with Lloyd *et al.*, (1993) who found increase in calcium and fiber intake after the intervention.

Current study clarified that regards the pre-test knowledge about osteoporosis, the women had poor

knowledge about meaning, causes, signs and symptoms, main causes, gender risk, risk factors, methods of prevention, methods of measuring and treatment of osteoporosis. The findings of the current study was consistent with Berarducci (2004) who studied "The senior nursing students' knowledge of osteoporosis", to explore the terminal knowledge of senior nursing students regarding osteoporosis at the end of their baccalaureate programs at University on the Coast of Florida. Who found that senior nursing student's demonstrated poor knowledge related to definition, risk factors, main causes, treatment and preventive measures of osteoporosis. This was also in line with the study of Polinski *et al*., (2005) who studied "The older adults' knowledge and beliefs about osteoporosis". They found that poor knowledge of the older adult about osteoporosis before the program and improved in all item after the program. The present study finding also, supported by Braun *et al.*, (2005) who studied "The factors influencing osteoporosis knowledge". They mentioned that the majority of the women in their study had inadequate knowledge about osteoporosis before the intervention. This means that the subject's knowledge improved after intervention.

The comparison between the pre and post total knowledge score of subjects in the present study, revealed statistically significant improvement in the post total knowledge score, nearly three quarters had poor knowledge score pre program while in post program there was no one with poor knowledge. These findings are agreement with Schrager (2003) who studied "The perceived risks and reported behaviors associated with osteoporosis and its treatment". This study investigates older American women's knowledge and risk perceptions about osteoporosis and its treatment; they reported that women gets good score knowledge after the intervention. Also, the present study finding is supported by Tripathi *et al.*, (2005) who studied "Assess knowledge about osteoporosis in learned Indian women" and study the correlation of level of knowledge with other variables. The study found statistically significant difference in the total score pre and after the program and the majority of the sample had good knowledge scores after program.

The present study showed that there was highly statistical significant difference between levels of education and total score knowledge. This finding is supported by Yu & Huang, (2003) who found that the majority of the sample who got high scores of knowledge had university education and postgraduate level of education. This result is also congruent with Shawa, Favela & Diaz, (2011) who studied "The relationships of knowledge and related factors with educational level and osteoporosis-related life habits". They found a significant relationship between level of knowledge and education but the relationship of education level and osteoporosis-related life habits was not significant. While this result comes in contrast with Waller *et al.*, (2002) who conducted a study in Sweden which showed that performing a general intervention program concerning the knowledge about osteoporosis in participants is not associated with their level of education.

The current study showed a statistical significant relation between body mineral density (BMD) and number of pregnancies and number of deliveries. This may be attributed to pregnancy, the baby growing needs plenty of calcium to develop its skeleton. If the mother doesn't get enough calcium, her baby will draw from her bones. This finding is in agreement with Matsushita *et al.*, (2002) who studied "Relationship between parity and bone mass in young women according to number of parities". They found that bone mineral density (BMD) values decreased as the number of pregnancies increased. Among women with four and more pregnancies were seen to have significantly lower BMD. While this result is contradicted with Frisnacho *et al.*, (1971) who found no association between number of pregnancies and number of deliveries and decreased in body mineral density. This could be due to antenatal services rendered to pregnant women.

Additionally, the present study results revealed that there was statistical significance relation between bone mineral density and food rich in calcium, food rich in protein and food rich in fiber. This finding is supported by Schuette, Zemel & Linkswiler, (1980) who studied "calcium and Protein intake: effects on bone mineral density and the rate of bone loss in elderly women". This study investigated the associations of dietary calcium and protein intake with baseline bone mineral density (BMD) and the rate of bone loss over 3 years in postmenopausal elderly women. This study found that a higher intake of calcium and protein was associated with higher BMD (bone mineral density).

CONCLUSIONS

The implementation of the health education intervention for female employees towards osteoporosis had lead to improve employee s' knowledge regarding osteoporosis. This improvement in employees' knowledge was also associated with improvement in the dietary habits and exercise. The health education intervention for female employees educate towards osteoporosis was an effective method for raising their knowledge level to prevent and control of osteoporosis.

RECOMENDATIONS

1. Health education about risk factors and consequences of osteoporosis should be started as early as possible from pre-school age until adulthood (maintain regular exercise for building and increasing bone density and maintain a healthy body weight).

2. Periodic check up for bone mineral density for early detection of bone loss.

3. Further studies needed to be performed with different factors and different setting.

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