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Evaluation of Health Education Intervention Program for Female Employees Towards Osteoporosis

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Abstract: Osteoporosis is a disorder of decreased bone mass density, micro architectural deterioration, and fragility fractures that can progress in silence to be undetectable for decades. Aim of the work: is to improve knowledge through implementing a health education intervention program for Egyptian female employees about osteoporosis to prevent or delay its development. Methodology: A cross sectional study was done over a period of one year from April 2006 to March 2007 in National Research Centre (NRC). A stratified random sample of 365 (NRC) female employees was subjected to a pre-test self-administrated designed questionnaire including demographic data and questions about osteoporosis. Health education intervention program was planned and implemented based on the degree of their knowledge and awareness about osteoporosis. Post-test was done using the same questionnaire. Printed booklets and pamphlets about osteoporosis were distributed to participants for knowledge sustainability after post-test. Data entry and analysis were done using SPSS version 15. Results: The mean age of the studied group was (42.81±11.13). Nearly 52% of female employees' answers about different knowledge aspects of osteoporosis pre-test questionnaire were correct. This figure changed to 86% during post-test with high statistically significant difference ($p<0.001$). The highest levels of general correct knowledge among the participants were reported about; the magnitude of the disease and its occurrence with percentages of 86.6% & 84.1% respectively. This study showed significant improvement in participants' awareness regarding all general items during post-test after health education intervention program. The least awareness during pre-test was about dietary habits that may lead to osteoporosis e.g. excess consumption of sugars & salts, proteins & fats and brown bread which represented (20.0%, 21.1% and 29.0%) respectively. The awareness regarding this topic showed statistically significant improvement ($p<0.001$) during post-test (70.7&, 76.2% and 64.6%) respectively. About prevention and diagnosis; many items of knowledge upgraded after health education program e.g. the type of preventive sports (lifting weights and going upstairs) that was represented 12.3% increased to be 83.0% during post-test. Moreover, regarding the participants' awareness about diagnostic methods e.g. diagnosis by doing biochemical tests, their correct answers represented 53.4% during pre-test versus 88.4% during post test with high statistically significant difference ($p<0.001$). A statistically significant improvement in the mean score of all items of knowledge during post-test versus pre-test was observed. Both age and level of education were found to be the main predictive factors for upgrading score of knowledge. Conclusion: Health education intervention program among Egyptian female employees in National Research Centre was an effective method for raising their awareness level about osteoporosis.

Key words: Osteoporosis, health education, intervention program, knowledge, pre-test, post-test

INTRODUCTION

Osteoporosis is a disorder of decreased bone mass density, micro architectural deterioration, and fragility fractures that has lately become recognized as an important disease[1,2]. Osteoporosis is a silent disease that can progress undetectable for decades[3].

The prevalence, the clinical and social importance of osteopenia and osteoporosis are increasing in western societies. It reaches 15.8% for both lumbar spine and femoral neck in Canadian women aged 50 years or more[4]. Prevalence of osteoporosis at various regions of the hip in Chinese women is 10.1-19.8%, in Japanese women is 11.6-16.8% and in Caucasian women is 13.0-20.0 %[5]. Salem *et al.,*[6] reported that (16.7%) of 1190 Egyptian menopausal females had lumbar osteoporosis. Constructed Bone mineral density charts for Egyptian women showed that, in general, they have a lower bone mineral density compared to their western counterparts[7].

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Although, osteoporotic fractures are a major cause of morbidity and mortality among the elderly population costing the health service e.g. in UK £1.7 billion per year[8], yet different chronic conditions including osteoporosis may be controlled and prevented by proper educational campaigns[9].

Prevention programs should start at an early age to avoid the behavioral risk factors[10,11]. These programs will have to consider the socioeconomic and cultural background of the population strata that run a greater risk of osteoporosis[12]. Effective community-based educational programs proved to have profound effect on improvement of the knowledge and health behavior related to osteoporosis and its care[13,14,15], and may help to delay the development of osteoporosis[14,15].

Progressive increase of the elderly may well explain the interest to educational programs at this age[9]. Grahn Kronhed *et al.,*[16] suggested a public health intervention model, including both population-based and individual interventions, to change behavior in physical activity patterns amongst the elderly people.

Objective: The aim of this work is to assess and upgrade knowledge among Egyptian female employees about osteoporosis through implementing health education intervention program to prevent or delay the development of the disease.

MATERIALS AND METHODS

A cross sectional study was performed from April 2006 to March 2007 on a stratified random sample of 365 female employees, working in National Research Center in Egypt. This sample was calculated according to statistical equation from all female employees who were stratified previously into five age groups from below 30 to over 60. Consent was taken from each participant in the study, which was approved by the Medical Ethical Committee of National Research Center. A self-administered designed questionnaire including demographic data and questions measuring knowledge about osteoporosis was used. Questions about knowledge were divided into six groups including: general knowledge, life style, dietary habits, some risk factors, preventive, and diagnostic methods of osteoporosis. A pilot study was done on 40 females to test the questionnaire and modifications were done. The pre-test questionnaire was distributed to each participated female at her workplace.

Quality control measures were taken in consideration for accuracy of data collection and entry. On receiving the questionnaire from the participants, verification of data was done.

Health education intervention program was designed based on the pre-test data analysis. This program was implemented on previously grouped employees of the participants at their work places by the team work members in the form of lectures which were followed by general discussion. The program was implemented on three occasions to include the entire drop outs. An immediate knowledge post-test was done using the same pre-test questionnaire. For sustainability and revision of knowledge, the health education program was printed in the form of a booklet and pamphlet that were distributed to employees after collecting the post-test questionnaire. The prints were designed in attractive, colorful and easy material written in the form of questions and answers. The pamphlet contains a table that enables the user to take the daily calcium requirement from different types of nutrients consumed.

Statistical Analysis: Data entry and analysis were done using the statistical software program SPSS under version 15. The data were presented in the form of percentages and means ± standard deviation. T- Paired test was done for comparing two dependent means. Z-test was used for comparison between two proportions. One way ANOVA and Post Hock test was done for comparison between more than two means. Multivariate regression analysis was done in order to define the independent predictor variables significantly associated with level of knowledge about osteoporosis. P value less than 0.05 was considered significant.

RESULTS AND DISCUSSION

Results: The study sample included 365 female employees working in National Research Center with mean age 42.68±11.2.

Table (1) shows that the highest percentages of females were found within age groups from 40-49 years (36.4%) and 30-39 years (24.1%). Regarding their educational level, postgraduates represented the highest percentage followed by highly educated group

Table 1: Characteristics of the participated female employees working in National Research Center

Characteristics	N (%)
Age groups:	
<30	57 (15.6)
30-39	88 (24.1)
40-49	133 (36.4)
50-59	67 (18.4)
60+	20 (5.5)
Education:	
Middle education	113 (31.0)
High education	125 (34.2)
Post graduated	127 (34.8)
Family history of osteoporosis:	
Yes	91 (24.9)
no	274 (75.1)

Table 2a: Percent distribution of correct general knowledge about osteoporosis among the participated females (pre vs post-test).

Indicators (general knowledge about osteoporosis)	Pre-test		Post-test*	
	Frequency	(%)	Frequency	(%)
Definition	257	(70.4)	347	(95.1)
Magnitude	316	(86.6)	360	(98.6)
Nature	160	(43.8)	291	(79.7)
other nomenclatures:				
porous bone	162	(44.4)	320	(87.7)
discomfort fractures	116	(31.8)	271	(74.3)
loss of height& dowager's hump	153	(41.9)	318	(87.1)
Incidence of occurrence among both sex	307	(84.1)	365	(100.0)
Starting age of the disease	185	(50.7)	305	(83.5)
Starting age of complications	207	(56.7)	260	(71.2)
we should take care of the disease because:				
it is silent without progressive signs	171	(46.8)	312	(85.4)
it causes fractures with least effort	278	(76.2)	334	(91.5)
it causes disability	194	(53.2)	298	(81.6)
it has a bad psychiatric effect on patients	178	(48.8)	276	(75.6)
complications of the disease:				
back pain	228	(62.5)	329	(90.1)
frequent fractures& disability	267	(73.2)	340	(93.2)
loss of height	194	(53.2)	338	(92.6)
kyphosis	189	(51.8)	33	(88.4)
mean score ± SD	9.75±4.26		14.78±2.07	

P<0.001*
N=365

Table 2b: Percent distribution of correct knowledge about life style, dietary habits & some risk factors that may lead to osteoporosis (pre versus post-test)

Items of knowledge	Pre-test		Post-test*	
	Freq.	(%)	Freq.	(%)
life style:				
un exposure to sun	209	(57.3)	332	(90.9)
non sports performance	200	(54.8)	323	(88.4)
smoking	162	(44.4)	332	(90.9)
Mean score ± SD	1.56±1.28		2.70±0.52	
dietary habits:				
shortage of dairy product consumption	279	(76.4)	356	(97.5)
excess consumption of:				
carbonated beverage	306	(83.8)	361	(98.9)
brown bread	106	(29.0)	236	(64.6)
caffeinated drinks	160	(43.8)	329	(90.1)
proteins and fats	77	(21.1)	278	(76.2)

Table 2b: Continued

sugars and salts	73	(20.0)	258	(70.7)
preserved juices and foods	146	(40.0)	254	(69.5)
Mean score ± SD	3.14±2.04		5.67±1.48	
-long administration of some medications as cortisone, tranquilizers etc....	207(56.7)		349(95.6)	

P<0.001*
N=365

Table 2c: Percent distribution of correct knowledge about preventive and diagnostic methods of osteoporosis ((pre versus post-test)

Items of knowledge	Pre-test		Post-test*	
	Freq.	(%)	Freq.	(%)
Preventive exercises:				
daily walking or three times/week for one third or half an hour	238	(65.2)	360	(98.6)
quite running	95	(26.0)	243	(66.5)
going upstairs	84	(23.0)	300	(82.2)
lifting weights& going upstairs	45	(12.3)	303	(83.0)
Mean score ± SD	1.26±1.28		3.30±1.06	
Preventive foods:				
calcium rich diet	325	(89.0)	365	(100.0)
phosphorous rich diet	219	(60.0)	338	(92.6)
green leafy vegetables	188	(51.5)	300	(82.2)
legumes	124	(34.0)	294	(80.5)
nuts specially almonds	128	(35.1)	296	(81.1)
Mean score ± SD	2.69±1.74		4.36±0.95	
diagnostic methods:				
some biochemical reactions	195	(53.4)	323	(88.4)
measuring bone density	284	(77.8)	340	(93.2)
bone x-ray	158	(43.3)	307	(84.1)
follow up of height and weight	190	(52.1)	291	(79.7)
Mean score ± SD	2.26±1.44		3.46±0.91	

P<0.001*
N=365

Table 3: Pre versus post-test mean score of correct knowledge about osteoporosis distributed by age group & level of education

variable	Pre-test (mean±SD)	Post-test (mean±SD)
	-Age group:	
<30	23.14±9.27	38.09±4.81
30-39	20.47±10.45	35.36±5.94
40-49	21.65±9.57	34.23±5.92
50-59	19.00±9.87	33.58±4.28
60+	24.40±11.73	39.20±1.51
P value of ANOVA	p>0.05	P<0.001
	-level of education:	
Middle	18.57±10.37	34.12±5.9
High	19.51±8.83	33.69±6.23
post graduates	25.37±9.44	37.83±3.31
p value	<0.001	<0.001

Total number=365

(34.8% & 34.2%) respectively. About one fourth of the study sample had family history of osteoporosis.

According to the level of knowledge about osteoporosis, figure (1) shows that during pre-test 52% of participants' answers were correct, 13% were wrong while 35% were unknown. However, in the post-test they were found to be 86%, 8% & 6% respectively with high significant difference between all groups (p<0.001).

Tables (2 a, b &c) show that the highest level of general correct knowledge among the participated females during pre-test were reported about; the magnitude of the disease and its occurrence with percentages 86.6% & 84.1% respectively. There was an increase in percentage of all items of general correct knowledge during the post-test with high significant difference ($p<0.001$). About life style that may lead to osteoporosis, smoking represented the least correct answers among female employees during pre-test (44.4%). This figure was improved after health education to be (90.9%) with high significant difference ($p<0.001$). Concerning dietary habits that may lead to osteoporosis, some aspects reported the least levels of correct knowledge during pre-test e.g.: excess consumption of (sugars&salts, proteins & fats and brown bread) that represented (20.0%, 21.1% and 29.0%) respectively. These became (70.7%, 76.2% and 64.6%) during post-test with high statistically significant difference ($p<0.001$). Regarding preventive measures for osteoporosis, knowledge about the type of preventive exercise (lifting weights and going upstairs) represented the least correct knowledge among all knowledge items (12.3% in pre-test which became 83.0% in post-test with $p<0.001$). While, knowing that calcium rich diet is important to prevent osteoporosis represented the highest correct knowledge during pre-test (89.0%) which increased to (100%) in post-test with high significant difference ($p<0.001$). Moreover, about half of the pre-test correct answers concerning the diagnostic methods of the disease was for some biochemical tests and follow up of height and weight while, three fourths of answers was for measuring bone density.

There was a high significant increase in the mean score of each group of knowledge after health education ($p<0.001$). When total mean score of correct knowledge was calculated, a high statistically significant difference was observed between pre-test (21.26±9.98) and post-test (35.23±5.58) with p value < 0.001.

Table(3) shows that mean score of total correct knowledge for each age group showed increase with high significant difference in post-test ($p<0.001$). When ANOVA test was applied, no significant difference in the mean score of total correct knowledge among different age groups in the pre-test was observed while it was highly significant in the post test ($p<0.001$). The same table shows that the female group who was post graduated achieved the highest mean score of total correct knowledge about osteoporosis in both pre and post-test with high statistically significant difference compared to other groups of different educational levels in both pre- and post-test ($p<0.001$). Comparison between pre & post mean score of correct knowledge of different educational levels showed increase in post-test with high significant difference between groups of the same educational level.

Discussion: Osteoporosis has recently been recognized as a major public health problem[17]. It is no longer confined to the growing older population but has implications for all age groups[18]. Hence, increasing knowledge of osteoporosis should be a priority for future intervention programs in order to promote specific behavioral strategies for osteoporosis prevention[19].

The study that was conducted in National Research Centre on a representative sample of the female employees revealed that there was a significant improvement in the mean score of total correct knowledge during post-test after health education intervention program compared with mean score during pre-test. This result reflected the importance of health education intervention programs in raising the level of knowledge among target groups. This was in agreement with similar studies performed in different ages namely; middle school girl students[23], young adults[22], and old adults[20,21] in different countries, that showed statistically significant improvement in osteoporosis knowledge test scores after intervention with health education program ($p<0.001$). On the other hand, Cram *et al.,*[24] found no changes in osteoporosis specific knowledge after intervention.

Concerning definition of osteoporosis, about three fourths of the pre-test participants' answers in present study were correct, with improvement in post-test ($p<0.001$). It also revealed improvement in post-test correct answers in identifying being female sex as a major risk factor for osteoporosis development. This coincided with the study of Schulman *et al.,*[25] that performed to investigate whether patients could be effectively aware by osteoporosis and lifestyle modification during their outpatient visits to an orthopaedic surgeon' office. They reported that in response to educational intervention, significant improvements were seen in terms of the patients' ability to define osteoporosis, the ability to identify being female as a major risk factor, and the understanding that females should begin adequate calcium intake at a young age. However, their post menopausal group demonstrated a less response to educational intervention. However, Alexandraki *et al.,*[19], in their study that was done to assess Greek female population knowledge about osteoporosis risk factors, found that 96% of the participants knew osteoporosis definition.

Most of the participants in the current study considered osteoporosis to be a serious disease. The same result was reported by Von and Wham[26] in their

Table 4: Multiple regression analysis to predict variables affecting knowledge

variable	Regression coeff.	t	Sig.
Age	-0.110	-2.082	0.038
Level of education	0.291	5.531	0.001
Family history of osteoporosis	0.028	0.548	0.584
constant		6.642	0.001

Multiple regression showed that the most significant predictive variables for knowledge were age and level of education p values were <0.03 and <0.001 respectively, as shown in table (4).

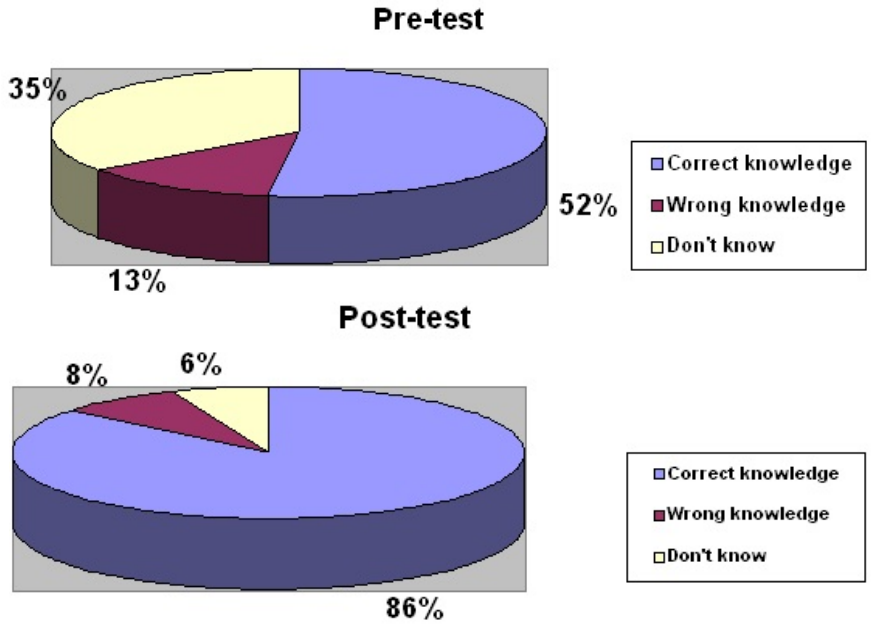

Fig. 1: Percent distribution of different levels of knowledge about osteoporosis among the participated females (pre versus post-test)

study that was done to investigate the knowledge and health beliefs regarding osteoporosis risk factors of New Zealand women.

Regarding smoking as a risk factor for osteoporosis, 44.4% of participants' answers in the present study were consistent with this knowledge. However, in a study that was done by Donze *et al.,*[27], it was found that female smokers who participated in their study didn't know that smoking increases osteoporosis risk.

Defective knowledge about prevention of osteoporosis was observed in the present study. This was in agreement with Cadarette *et al.,*[28] from Canada who reported significant knowledge deficits in the areas of osteoporosis consequences, prevention and treatment.

Regarding the onset of the disease, about half of the pre-test females' answers of current study revealed that it started after 35 years. While, in a study done by Sallam *et al.,*[7] in Egypt, women answered that the incidence of osteoporosis increases at a higher age mainly after menopause.

As regards the effect of age, a controversy was observed in different studies in different countries. The present study revealed that it was a predictive variable affecting level of knowledge which coincided with that reported by Von Hurst and Wham,[26] in New Zealand, as they reported that mean scores for osteoporosis knowledge were statistically different in different age groups. They found that women aged 40-49 years scoring higher than those aged 30-39 years. On contrary, the result of Alexandraki *et al.,*[19] study showed that older ages were associated with less knowledge. However, Vaytrisalova *et al.,*[2] in their study reported that the age didn't affect knowledge level of participants.

After health education intervention, in present study, there was a significant improvement in level of knowledge in all different age groups. In Thailand, Aree-Ue *et al.,*[20] reported a significant improvement in osteoporosis knowledge level among older adults after health education. They also reported that educational health program helps older adults acquire new knowledge and skills into their daily lives and helps them maintain bone health.

Concerning the effect of level of education, the present study discovered it as a predictive variable affecting level of knowledge of female employees. This was in consistency with the finding of Kutsal *et al.,*[17] in Turkey who revealed the same results.

Conclusion: Health education intervention program among Egyptian female employees in National Research Centre was an effective method for raising their knowledge level about osteoporosis. Health education may result in the avoidance of osteoporosis risk factors. Increasing knowledge of osteoporosis should be a priority for future intervention programs in order to promote specific behavioral strategies for osteoporosis prevention.

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