

Outcomes of Nursing Educational Interventions concerning Osteoporosis on Adults' Awareness and their practice of Health Habits

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Abstract: Osteoporosis is called a silent disease because bone loss occurs without symptoms. It is the main cause of age-related fractures and disabilities with a consequent increasing healthy, social and economic impact. An awareness and knowledge towards bone health and osteoporosis is a particularly important strategy for successful prevention of osteoporosis. Aim: evaluate the outcomes of nursing educational interventions concerning osteoporosis on adults' awareness and their practice of healthy habits. Design: A quasi-experimental research design with one group (pre-posttest) was utilized. Setting: The study was conducted at rehabilitation and orthopedic outpatient's clinic, Zagazig, and Menoufia University Hospitals. Subjects: A convenience sample of total 350 adult women, men, and their relatives' attended for rehabilitation and orthopedic outpatient clinics were engaged after their expressing willingness to participate and give permission for the interview. Tools: a structured interviewing questionnaire containing 44 questions covered sociodemographic data, general medical history, and specific female history, awareness regarding osteoporosis and life habits, sources of their knowledge. Results: Three quarters of subjects had a negative family history of osteoporosis and nearly two-thirds of them had a negative history of previous fracture. There were a statistically significant difference as regards life habits and adults' awareness of general knowledge score about osteoporosis, prevention knowledge, nutrition knowledge. Conclusion: the application of nursing educational intervention accepted the study hypothesis by significantly improving the level of the studied adults' awareness about osteoporosis and their practice of healthy habits as nutrition and preventive measures. More ever, the total adequacy awareness score of the studied participants significantly associated with their level of education. Recommendations: Continuous applying of health nursing education sessions about osteoporosis and using lectures, handouts, educational pictures, and videos. Empowering the role of health care providers in improving awareness about osteoporosis, modifying life habits through mass media and scientific programs. National public survey for early detection of Vit D deficiency and osteoporosis risk factors.

Keywords: adults' awareness, health habits, nursing educational intervention, outcomes, osteoporosis.

1. INTRODUCTION

Osteoporosis is described as a silent and progressive bone disease. This disease characterized by a decrease in body bone mass, density, and weakness of the skeleton those results in bone fragile, fractures, and affecting quality of life (Pavon, 2015). In addition, clinicians' trust reached the deterioration in bone density and its complications uniquely affect postmenopausal women, which may create health disparities. However, osteoporosis and its complications affect both genders but at different ages and rates (Seeman, 2001).

In this context, osteoporosis and associated fractures are an important cause of mortality and morbidity. Females with osteoporosis are need for caring in hospital more than those with other diseases care. they may be asymptomatic until it presents with a fracture, and even then, it is probable that only one of three vertebral fractures come to clinical care. (Middle East and Africa Regional Audit, 2011).

The incidence of osteoporosis occurrence in Egypt is as follows: among those between 40 and 50 years of age, 42% of women and 43% of men had low BMI, whereas a third of the elderly population of both sexes (65 to over 80 years of age) were osteoporotic. The unexpectedly high prevalence of low bone mass density among Egyptians, especially adults, might be attributed to unhealthy lifestyle as, increased smoking, reduced physical activity, and increased consumption of soft drinks, adding to low calcium intake, squat omega 3 fats in diets, and increased animal protein intake (Cairo University Hospitals, 2012).

In Europe, in 2010, 22 million women and 5.5 million men aged between 50 and 84 years were estimated as having osteoporosis. Middle East and Africa showed a high prevalence of hypo-vitamin D and high fracture rates (Eltawab et al., 2015).

(Zaidi, 2007) pointed to osteoporosis is initiated by an imbalance between bone resorption and formation and point to a number of risk factors for osteoporosis. The modifiable risk factors are inadequate nutritional absorption, reduced physical activity or fall risk, weight loss, cigarette smoking, alcohol consumption, air pollution, stress, while some factors are non-modifiable including history of falls, older age, sex, white ethnic background, prior fracture, reproductive factors (family history of osteoporosis). (Heidari et al., 2015) added, secondary causes of osteoporosis chronic use of certain medications as prolonged corticosteroid use, hypogonadism, hyperparathyroidism, chronic liver disease, inflammatory diseases, rheumatoid arthritis, vitamin D deficiency, history of kidney stones, cardiovascular disease, diabetes mellitus, dementia.

It was previously recognized that maternal diet can influence bone mass in the offspring and a good general nutritional status with adequate dietary protein, calcium, vitamin D, fruits and vegetables has a positive influence on bone health, while a high-caloric diet and heavy alcohol consumption have been associated with lower bone mass and higher rates of fracture (Levis & Lagari, 2012). It is now proven that a dietary pattern with high intake of dairy products, fruits, and whole grains and other sources of calcium, including sardines, spinach and almonds may contribute positively to bone health and dietary pattern-based strategies could have potential in promoting bone health (Chan et al., 2013 & Shin & Joung, 2015). Different societies have different information and awareness about health. Regular physical activity is suggested in all age groups to maximize peak bone mass and maintain bone strength. Both aerobic exercise and resistance training, weight-bearing exercise are increase the rate of bone remodeling in postmenopausal women (Hong & Kim, 2018).

Life-habits changes have an important role in reducing or eliminate the risk of osteoporosis. Those modifications may include smoking cessation because smokers have lower bone density than non-smokers, exposure to sun because exposure of some skin to the sun needs to occur on most days of the week to allow enough vitamin D production, limit alcohol and caffeinated drinks – excessive caffeine can affect the amount of calcium that our body absorbs. Drink no more than two to three cups per day of cola, tea or coffee (Mohamad & Tayel, 2012). Diet should contain micronutrients like calcium, magnesium, phosphorus, sodium, potassium, various trace elements, vitamins and macronutrients as protein and fatty acids are important elements to prevent the risks of bone fractures, these nutrients, and food ingredients have a positive or negative impact on bone health (Estanislao, 2013).

(MOH, 2018)) highlighted that, both men and women can take steps to prevent osteoporosis by making sure that they: have a healthy and varied diet with plenty of fresh fruit, vegetables, and whole grains, at calcium-rich foods, limit caffeine and do regular weight-bearing and strength-training activities.

Life health habits and behaviors, such as consuming a healthy diet, could lessen the impact of chronic diseases such as osteoporosis and cardiovascular diseases (Cohen et al., 2016).

Sufficient daily calcium and vitamin D are required to maximize bone mass and for the subsequent preservation of bone health. Post-menopausal women should consume at least 1,200 mg per day of calcium and 800–1,000 international units of vitamin D per day (Kendler et al., 2018)

Educational programs for the community awareness of osteoporosis demonstrated that the greatest achievement in acquire knowledge and developed health behavior for disease prevention, so Great responsibility rests with the nurses to contribute to prevention of osteoporosis (Chan, 2006).

The purpose of osteoporosis educational intervention is to reduce environmental risk factors for osteoporosis and to provide information as to affect attitudes, beliefs, and intentions for behavior change through weight-bearing, physical activity, and calcium consumption (Nguyen et al., 2012).

Osteoporosis is a challenging human disease. In spite of using numerous therapeutic attitudes for the prevention or treatment of osteoporosis, their side effects are undeniable. Increasing our knowledge about the signaling pathways involved in bone remodeling will help us to design new therapeutic options for osteoporosis (Kendler et al., 2018).

Significance of the Study

Osteoporosis is the most common progressive, asymptomatic type of bone disease, called silent killer, characterized by loss of bone tissue and bone mass caused in multiple fractures. This disease is serious but preventable (Pavone, 2015). According to (Kavanagh, 2015) 200 million people worldwide are affected by osteoporosis; one in 5 men and one in 2 women over the age of 50 will developed a fracture by osteoporosis. This fracture decrease QoL, increase morbidity, mortality, and prolonged hospital admission period for treating and surgical intervention that result in increased management costs directly and indirectly. (Boonen et al., 2004) reported that both calcium and vitamin D are essential nutrients of an integrated strategy for the prevention and treatment of osteoporosis in patients with dietary insufficiency. Early awareness and attention to life-habits modifications can delay or prevent osteoporosis.

Aim

The aim of the existing study included two folds: 1. assess the level of adults' awareness concerning osteoporosis and their practice of healthy habits.

2 Evaluate the outcomes of nursing educational interventions concerning osteoporosis on adults' awareness and their practice of healthy habits.

Research hypotheses:

1. Adults' men and women who attained nursing educational interventions concerning osteoporosis will have a high post-test score on their awareness compared with the pre-test.
2. Adults' men and women who attained nursing educational interventions concerning osteoporosis will have changes in their practice of healthy habits as nutrition and preventive knowledge post-test compared with pre-test.
3. There will be a positive relation among studied participants' awareness and their demographic characteristics.

2. SUBJECTS AND METHODS

Design

A quasi-experimental research design with one group (pre-posttest) was utilized to achieve the aims of this study. In the design data collected from research subjects both before and after applying the educational sessions.

Setting

The study was conducted at rehabilitation and orthopedic outpatient's clinic, Zagazig and Menoufia University Hospitals during the period of August to December 2019.

Subjects (Participants):

A convenience sample of total 350 adult women, men, and their relatives' attended for rehabilitation and orthopedic outpatient clinics were engaged for this study.

In order to calculate the required sample size, the researcher used the Epi statistical program from the Open Source Statistics for Public Health. The assumptions were: a two sided confidence level of 95% = $(1 - \alpha)$; a power $(1 - \beta)$ or (% chance of detecting) of 80%. The final sample size estimated to be 350 with power 80% and confidence level of 95%.

The participants who express their willingness to participate and give permission for the interview were included according to the following.

Inclusions criteria:

Age (20 - 60 years old), able to communicate verbally, and not receive previous education program and misunderstand.

Exclusion criteria: Un-diagnosed with osteoporosis and free from any symptoms of osteoporosis. In addition, participants with critical health problems as cardiovascular, hepatic or renal diseases, uncontrolled diabetes mellitus, as well as any diseases that could affect bone health (thyroid, parathyroid, adrenal) were excluded.

Tools

To achieve the aims of the study a structured interviewing questionnaire was utilized according to the extensive review of the literature to collect the data related to awareness and life habits. It included (5 parts):

Part one covered sociodemographic data included (9) questions about age, sex, marital status, level of education, occupation, smoking habits...etc.

Part two: General medical history (4) questions about family history, expose to fracture, take vitamin or dietary supplement, and presence of chronic disease.

Part three: 5 questions covered female history as the number of pregnancy, regularity of the menstruation, using hormonal replacement and contraceptive pills.

Part four: Awareness assessment questionnaire regarding osteoporosis and life habits (25 questions) covered osteoporosis definition, onset, causes and risk factors, clinical manifestations, diagnostic tests, treatment strategies, complications, preventive measures, nutritional habits and sources of nutrients, physical activities, smoking habits, sleeping and stress management.

Part five Sources of knowledge about osteoporosis.

The time needed for completing the questionnaire was 30 minutes for each participant.

Scoring System

Participants' responses to the questions regarding awareness about osteoporosis were scored as (1) for correct and accurate answer and (0) for incorrect answer and no answer. The total score of each participant was categorized into "inadequate knowledge" when he achieved less than or equal $\leq 50\%$ of the total score, and adequate knowledge was considered when he achieved more than $> 50\%$ of the total score.

Content validity and reliability

Tools were revised by 3 experts in the field of medical surgical nursing to test the content validity. Modifications were carried out according to the panel judgment on clarity of sentences and correctness of content to achieve the aims of the present study. The reliability test was assessed by applying the questionnaire on 35 pilot subjects using test-retest and using Cronbach Alpha the said tool was found to be reliable as indicated by the value of 0.71.

Pilot study

A pilot study was conducted for 10 % (35 participants) before starting the actual data collection to clarify the validity and strength of the questionnaires and to test the research feasibility, clarity and objectivity of the tools as well as to estimate the time needed for data collection which approximately 30 minutes. In addition, to identified obstacles and problems that

may be encountered during data collection. Then modifications, omission, and rearrangements of questionnaire questions were done. It revealed that the average length of time needed to complete the structured interview was approximately 30 minutes with each participant. The pilot study sample excluded from the total study subjects.

Technique of the program:

Human rights and ethical concerns

Before starting the study, approval was obtained from the ethics review committee and administrative personnel, after that, acceptance of the participants who were included in the study.

All adult participants were informed that participation in this study is voluntary and availability to withdraw from the study at any time without giving reasons and explanations. After that, the aims of the study were explained to all participants.

A verbal and written informed consent was obtained from the participants. Confidentiality and anonymity of the participants were assured during coding of the data without reused in another research without her acceptance.

The study was conducted over a period of five months from August to December 2019).

Data collection was carried out through using the nursing process; interviewing and assessment, planning, implementation and evaluation phase. During the interviewing and assessment phase, all participants are interviewed for collecting all relevant pre-test data. The examiners organized the subjects into nine small groups' for easy interview. Subjects consisted of adult men and women who fulfilled the inclusion criteria and the researchers explained the purpose of study.

Implementation phase:

During this phase, all engaged adults' women and men divided into nine groups according to availability with the average number who attend the instructional session were ranged between 30-39 participants. An instructional program concerning about osteoporosis general knowledge (definition, causes, risk factors, clinical manifestations, complications, diagnostic tests and screening, and treatment) and prevention strategies through life habits modification (stress management, quality of sleep, regular exercise, and allowance and restricted diet, more emphasizing on Vit D, Ca, Mg, and exposure to sun) was given to the participants. The educational nursing sessions were contained two instructional sessions per week two days interval, each session took about 30-45 minutes by using PowerPoint presentation, colored brochures with picture, simulator for skeletal bones, displaying film and lecture group discussion. The first session covered the introduction to osteoporosis and its manifestations, complications, and diagnosis. The second session covered osteoporosis risk factors and treatment. The third session covers preventive measures of osteoporosis and healthy life's habits (diet, exercise, stress management and quality of sleep).

Each participant was given a handout developed by the researchers 'booklet' after broad literature review and contain knowledge concerning osteoporosis in clear Arabic language with color pictures. The researchers followed the participants for 3 months during their visit outpatient clinics to clarify any questions and know the next clinic visit for interviewed them again to apply the posttest questionnaire.

Evaluation phase

During this phase, the researchers evaluated the delivered educational sessions regarding osteoporosis by applying the post-test questions after 3 months.

Statistical analysis:

Data collected throughout history, basic clinical examination, and outcome measures coded entered and analyzed using Microsoft Excel software. Data were then exported to Statistical Package for the Social Sciences version 20.0 software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represented by mean \pm SD, the following tests were used to test differences for significance; Difference and association of qualitative variable by Chi-square test (X²). Differences between quantitative independent groups by t-test. P-value was set at <0.05 for significant results & <0.001 for high significant result.

3. RESULTS

The study sample included 350 adults' men and women selected from the outpatient clinic, their mean age was 45.95±9.87 years. In addition, table (1) illustrated the demographic characteristics of the studied sample. It showed that more than half (60.4), the number of their family members was more than 4 and their income was not enough (53.1%). The majority of the studied sample was non-smoker (85.4%). with regard to occupation, nearly half (43.4%) was household.

Figure (1) showed that nearly two-thirds (69.70%) were female. According to educational level, Figure (2) illustrated that one-third of the participants was the primary level of education (30.9%). According to marital status, figure (3) illustrated that; more than two-thirds of the studied sample was married (72%). referring to social class, figure (4) clarified that; approximately half of the studied sample was moderate social class (47.4%).

With reference to the distribution of medical history among the studied sample, table (2) showed that approximately three quarters (73.4%) had negative family history of osteoporosis and nearly two-thirds of them (66.3%) had a negative history of previous fracture. In addition, more than half of them (60%) were have not received nutritional supplements.

Concerning Specific medical history for female (n= 244) table (3) clarified more than half of the studied females had regular menstruation and still menstruate (61% & 78.6%). In addition, two-thirds of the studied females were using contraceptive pills and not receiving hormonal replacement (75.4 &78.2%).

Around source of information about osteoporosis, figure (5) clarified nearly half of the studied sample were receiving their information from friends (46%) while (0.9%) of them acquiring information from magazines and newspapers.

Regarding comparison between mean scores of participants' awareness pre and post-intervention, table (4) highlighted that, there were a statistically significant difference as regards life habits and adults' awareness toward general knowledge score about osteoporosis, prevention knowledge, nutrition knowledge (paired t= -35.4, -24.4 and -44.07 respectively at p<0.05).

Concerning total adequacy of adults' awareness of osteoporosis, table (5) showed there were statistically significant differences as regards the adequacy of the participants' awareness pre-post intervention in items of general knowledge, prevention knowledge, nutrition knowledge and habits at (P<0.05).

Table (6) displayed the relation between pre-intervention total adequate awareness score and demographic characteristics. Adequate participants' awareness in pre-intervention was significantly associated with female sex, high educational level, enough and more income, employer and positive family history (21,3%, 37.1%, 40%, 24,7%, 24,7% respectively at (P <0.05 significant).

Table (7) illustrated the relation between post-intervention total awareness score and demographic data. There was a statistically significant association between total adequate awareness of the participants and their educational level especially illiterate and high education (p 0.003*)

Table (1) Demographic characteristics of the studied sample (N= 350)

Demographic characteristics		Mean± SD 45.95±9.87	
Age			
Family number		N	%
	≤4	211	60.3
	5-7	88	25.1
	>7	51	14.6
Income	Enough for necessary	134	38.3
	Not enough	186	53.1
	Enough and more	30	8.6
Smoking habits	Non	299	85.4
	Smoker	51	14.6
Occupation	Employee	85	24.3
	Manual	114	32.6
	Household	151	43.1

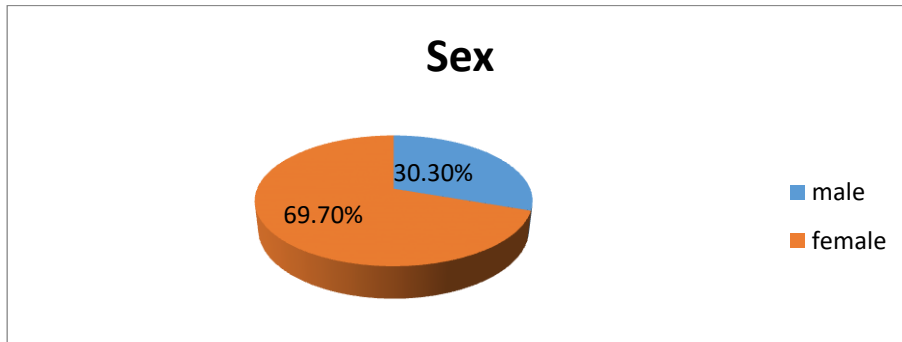


Figure (1) Sex distribution among the study sample.

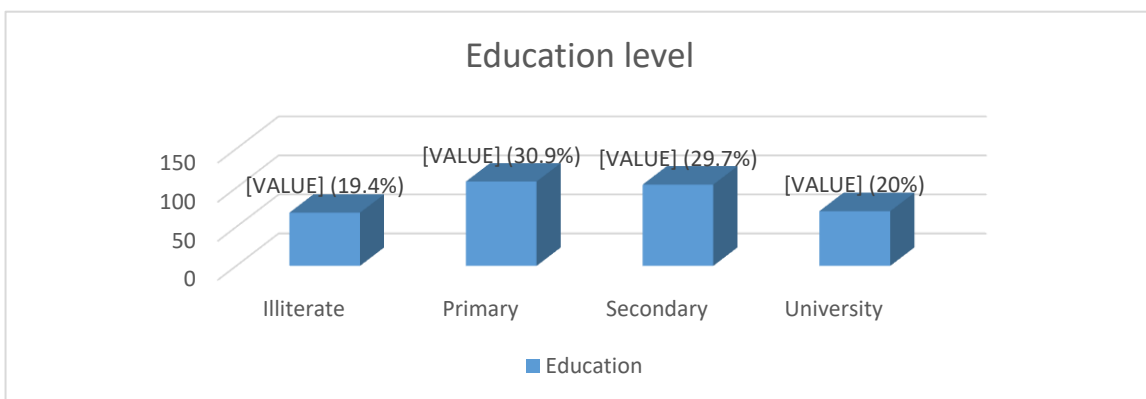


Figure (2) distribution of the study sample according to educational level.

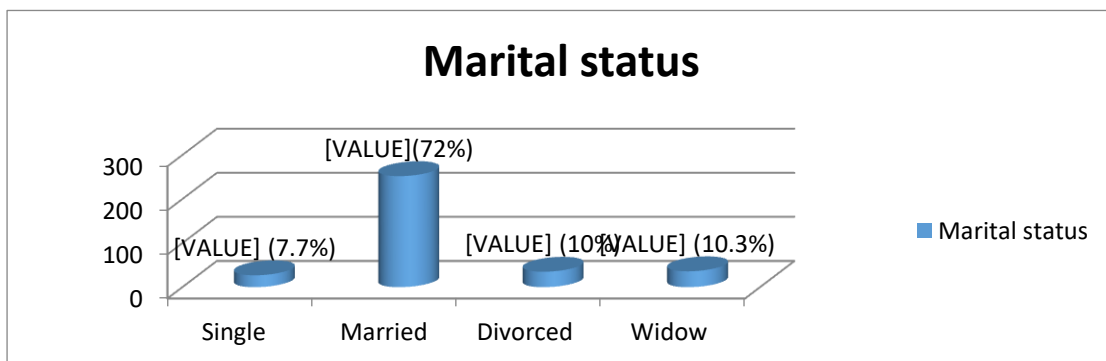


Figure (3): distribution of the study sample according to marital status.

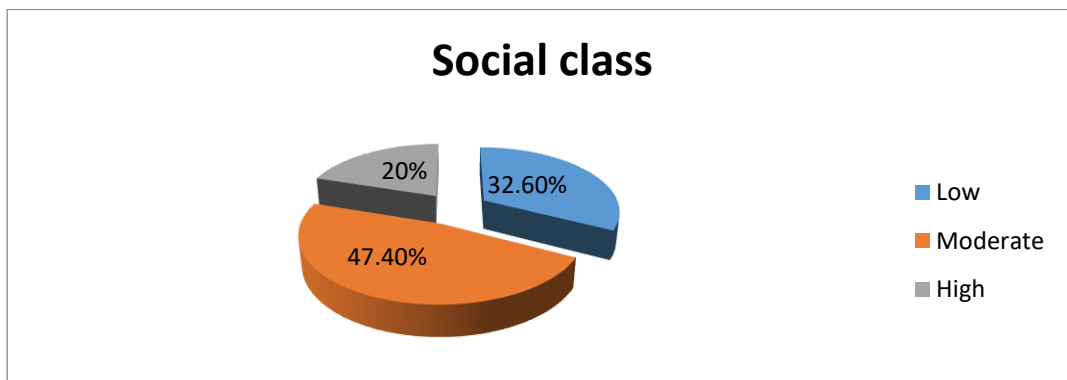


Figure (4) distribution of the study sample according to social class.

Table (2) distribution of Medical history among the study sample (n= 350).

Medical history items		N	%
Family History of osteoporosis	Negative	257	73.4
	Positive	93	26.6
History of Previous fracture	Negative	232	66.3
	Positive	118	33.7
Chronic disease	Negative	192	54.9
	Positive	158	45.1
Taking Nutritional Supplements	Negative	210	60.0
	Positive	140	40.0

Table (3) distribution of Specific medical history for females (n=244).

Females history		N	%
Regularity of menstrual period	No	95	39.0
	Regular	149	61.0
Stopping menstruation	No	192	78.6
	Stop	52	21.4
Using Contraceptive pills	No	60	24.6
	Yes	184	75.4
Receiving hormonal Replacement	No	191	78.2
	Yes	53	21.8
	Total	244	100.0

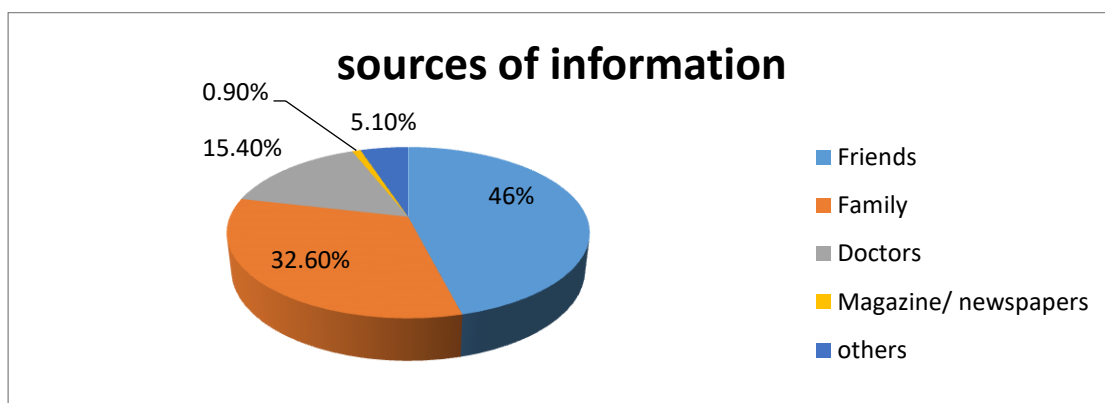


Table (4) Comparison between mean scores of adults' awareness about osteoporosis pre and post-intervention (N=350)

items	Time	Mean	Std. Deviation	Paired t	P
General knowledge score	Pre	5.9200	2.08265	-35.409	0.00**
	Post	10.7343	1.46035		
Prevention knowledge score	Pre	1.7029	2.07530	-24.351	0.00**
	Post	4.6571	.91916		
Nutrition knowledge score	Pre	3.1629	.86927	-30.184	0.00**
	Post	5.8314	1.40716		
Total score	Pre	10.7857	3.58320	-44.069	0.00**
	Post	21.2229	2.60626		

Total score and subtotal scores significantly increased post-intervention in all items of knowledge. P<0.05, significant

Table (5) comparison of adequacy of adults' awareness score about osteoporosis pre and post-intervention (n=350).

Items of Awareness			Educational Phases		Mac Nammar	P
			Pre	Post		
General knowledge	Inadequate ≤ 50%	N	316	24	451.8	0.00**
		%	90.3%	6.9%		
	Adequate > 50%	N	34	326		
		%	9.7%	93.1%		
Prevention knowledge	Inadequate ≤ 50%	N	240	15	245.29	0.00**
		%	68.6%	4.3%		
	Adequate > 50%	N	110	335		
		%	31.4%	95.7%		
Nutrition knowledge	Inadequate ≤ 50 %	N	236	6	308.6	0.00**
		%	67.4%	1.7%		
	Adequate >50 %	N	114	344		
		%	32.6%	98.3%		
Total Awareness	Inadequate ≤ 50 %	N	289	6	469.23	0.00**
		%	82.6%	1.7%		
	Adequate >50 %	N	61	344		
		%	17.4%	98.3%		

All items significantly improved post-intervention (P<0.05 significant)

Table (6) the relation between pre-intervention total awareness score and demographic data.

			Total Awareness		X ²	P
			Inadequate	Adequate		
Sex	Male	N	97	9	8.44	0.004*
		%	91.5%	8.5%		
	Female	N	192	52		
		%	78.7%	21.3%		
Education	Illiterate	N	63	5	28.94	0.00**
		%	92.6%	7.4%		
	Primary	N	98	10		
		%	90.7%	9.3%		
	Secondary	N	84	20		
		%	80.8%	19.2%		
	University	N	44	26		
		%	62.9%	37.1%		
Marital	Single	N	22	5	2.2	0.53
		%	81.5%	18.5%		
	Married	N	205	47		
		%	81.3%	18.7%		
	Divorced	N	32	3		
		%	91.4%	8.6%		
	Widow	N	30	6		
		%	83.3%	16.7%		
Income	Enough	N	118	16	13.43	0.001**
		%	88.1%	11.9%		
	Not	N	153	33		
		%	82.3%	17.7%		
	Enough and more	N	18	12		
		%	60.0%	40.0%		
Smoking	No	N	243	56		

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	Yes	%	81.3%	18.7%	2.41	0.12
		N	46	5		
Occupation	Employer	%	90.2%	9.8%	19.79	0.00**
		N	64	21		
	Manual	%	75.3%	24.7%		
		N	106	8		
	Household	%	93.0%	7.0%		
		N	119	32		
Social class	Low	%	80.6%	19.4%	2.34	0.309
		N	98	16		
	Moderate	%	86.0%	14.0%		
		N	137	29		
	High	%	82.5%	17.5%		
		N	54	16		
Family History	No	%	77.1%	22.9%	4.69	0.03*
		N	219	38		
	Yes	%	85.2%	14.8%		
		N	70	23		
Total	%	75.3%	24.7%	N	289	61
	%	82.6%	17.4%			

Adequate knowledge in pre significantly associated with female and high education, enough and more, employee and positive Family History (P<0.05, significant)

Table (7) the relation between post-intervention total awareness score and demographic data.

			Total Awareness score post intervention		X ²	P
			inadequate	Adequate		
Sex	Male	N	3	103	1.12	0.28
		%	2.8%	97.2%		
	Female	N	3	241		
		%	1.2%	98.8%		
Education	Illiterate	N	0	68	13.67	0.003*
		%	0.0%	100.0%		
	Primary	N	6	102		
		%	5.6%	94.4%		
	Secondary	N	0	104		
		%	0.0%	100.0%		
	University	N	0	70		
		%	0.0%	100.0%		
Marital	Single	N	0	27	2.37	0.49
		%	0.0%	100.0%		
	Married	N	6	246		
		%	2.4%	97.6%		
	Divorced	N	0	35		
		%	0.0%	100.0%		
	Widow	N	0	36		
		%	0.0%	100.0%		
Income	Enough	N	3	131	3.06	0.211
		%	2.2%	97.8%		
	Not	N	0	186		
		%	0.0%	100.0%		
	Enough and more	N	3	27		
		%	10.0%	90.0%		
Smoking	No	N	6	293		
		%	2.0%	98.0%		

	Yes	N	0	51	1.04	0.308
		%	0.0%	100.0%		
Occupation	Employer	N	0	85	5.07	0.078
		%	0.0%	100.0%		
	Manual	N	0	114		
		%	0.0%	100.0%		
	Household	N	6	145		
		%	2.1%	97.9%		
Social class	Low	N	2	112	0.044	0.97
		%	1.8%	98.2%		
	Moderate	N	3	163		
		%	1.8%	98.2%		
	High	N	1	69		
		%	1.4%	98.6%		
Family History	No	N	6	251	2.21	0.13
		%	2.3%	97.7%		
	Yes	N	0	93		
		%	0.0%	100.0%		
Total	N	6	344			
	%	1.7%	98.3%			

Adequate Awareness significant associated with illiterate and high education level.

($P < 0.05$, significant).

4. DISCUSSION

Osteoporosis has been recognized as a major world health problem because it is a silent killer and affects both men and women (Al-Otaibi, 2015). Therefore, Primary prevention of the disease through increasing the awareness about risk factors and educational session is essential. Therefore, the purpose of this study was to assess the level of adults' awareness concerning osteoporosis and their practice of healthy habits by conducting pre-test structural questionnaire; evaluate the outcomes of Nursing Educational Interventions concerning osteoporosis on adults' awareness and their practice of healthy habits through applying post-test evaluation. Three hundred and fifty adults' men and women selected from the outpatient clinic were included in the study and their mean age was 45.95 ± 9.87 years. Nearly, two-thirds of the participants were female. These results were agreement with (El-Sol et al., 2016) who stated that the majority of their study participants were female and their age were ranged from 31 to 60 years old. In addition, (Kahsay et al., 2014) stated that more than half of participants in their study were female at the age of 40 to 50 years old. In addition to (Aboushady et al., 2015) stated that the mean age of two hundred and thirty participants was 32.96 ± 12.2 years old. These results pointed to the females may be at a high risk of osteoporosis because of hormonal changes as reduction of estrogen that result in decrease calcium in bone and thinning of bones and increase risk of fracture.

Regarding education, the present study results revealed that one-third of the participants was primary level of education and the remaining percentages were secondary, university, and illiterate level; this result may help the positive enhancement and interaction among the participants during the education program. These findings agreed with (Daniel & Toft, 2015 & Sobeih & Abd-Elwahed, 2018) they stated that all of the participants in their studies had different levels of education: read and write, diploma, and university level.

As regards the studied participants' medical history, approximately three-quarters of them were have a negative family history of osteoporosis and nearly two-thirds of them were have a negative history of previous fracture. In addition, more than half of them were have not received nutritional supplements. The study carried by (El-sol et al., 2016) revealed that three-quarters of the studied sample had no history of fracture. In addition, the National Institute of Health, 2015 stated that individuals who had past history of fracture likely to osteoporosis disease over the age of 50 years old. This result disagrees with (Schüre et al., 2015 and Sobeih & Abd-Elwahed, 2018) they revealed that the majority of their

studies sample suffered from a history of fracture in the elderly in their family. These differences may be due to changes in sample characteristics and the present study emphasized preventive measures.

As regards specific medical history for females, more than half of the studied females had regular menstruation and still menstruate and two-thirds of them were using contraceptive pills and not receiving hormonal replacement. The study conducted in (2016 by El-Sol et al) illustrated that, female-associated risk factors. Nearly one-third of the sample had irregular menstruation and 4.9 % were taking contraceptive pills. This disagreement may contribute to the difference in the ages of other characteristics.

As regards the sources of information about osteoporosis, nearly half of the studied sample were receiving their information from friends followed by their family. Their source of information from doctors was the third source. This result may be related to their level of education and reflect the need to empower the role of doctors, nurses and health care professionals to increase the awareness among the population through media and conducting educational programs. This result is in agreement with (El-sayed & Abdel Megeid, 2013), they revealed that mass media as television, radio, the newspaper was the main source of information among more than half of their studied participants while physicians were ranked as the second source of information.

As regards the effect of educational intervention toward the participants' awareness and life habits, there were statistically significant differences before and after educational intervention as regards life habits and adults' awareness toward general knowledge score about osteoporosis, prevention knowledge, nutrition knowledge. This result approved the study hypothesis. This is in agreement with (Sobeih and Abd Elwahed, 2019) their study revealed significant differences before and after education. Which included definition, prevention, predisposing factors, complication, and diet. Similarly, Edmond et al., 2012; Jeihooni et al., 2015) reported that the mean scores of nutrition and exercise performances in the intervention group significantly increased compared with those of the controls both immediately and 6 months after the intervention. All the above studies support the importance of primary prevention of osteoporosis through increasing awareness about risk factors and educational program. Finally, health care providers should play a major role in providing accurate information about osteoporosis, correct the misconception and explain several strategies to minimize the occurrence of osteoporosis.

Our present study highlighted that there were statistically significant differences as regards the adequacy of the participants' awareness of pre-post intervention in items of general knowledge, prevention knowledge, nutrition knowledge, and habits. This is in agreement with (El-Sol et al., 2016) who found 100 % of participants had inadequate knowledge while post-intervention three-quarter of them had adequate knowledge. In addition to (Tahir et al., 2016) stated that the mean knowledge score was improved post-intervention. In addition, (Sanaeinasab, 2013) revealed that the mean knowledge score was significantly improved after educational intervention.

The present study revealed that adequate participants' awareness in pre-intervention was significantly associated with female sex, high educational level, enough and more income, employer and positive family history. While post educational intervention there was a statistically significant association between total adequate awareness of the participants and their educational level especially illiterate and high education. This is in agreement with (El-Sol et al., 2016) who found that the most of participant at the age of 45 years old and more had adequate knowledge post-intervention, no significant difference between women and men regarding knowledge, there was significant difference related to level of education and knowledge of osteoporosis, married participant had higher adequate knowledge than other. In addition (Etemadifar, 2013) who presented those women with a higher education level have significantly better knowledge about osteoporosis than women with a lower educational level do. In addition, (Zakai, 2015) presented that married subjects were more knowledgeable about osteoporosis than single, participants included in the study that fall in the low economic level have a better knowledge about osteoporosis. In the opposite direction, the previous results were in contrast with (Werner, 2005) who stated that women had adequate knowledge than men. This may be due to one-third of the participants of the present study was men. In addition, (May et al., 2010) found that there was no significant correlation between education level and osteoporosis knowledge. This is probably due to the nearly half of the participants were secondary and university education, that led to the understanding and the acquisition of information.

5. CONCLUSION

In light of our present study outcomes, it can be concluded that the application of nursing educational intervention accepted the study hypothesis by significantly improving the level of the studied adults' men's and women's awareness about osteoporosis and their practice of healthy habits as nutrition and preventive measures. More ever, total adequacy awareness score of the study participants significantly associated with their level of education. In addition, health care providers (Doctors, Nurses) came in the third source of information for the participants. **Recommendations:**

The researchers recommended that:

1. Continuous applying of health nursing education sessions about osteoporosis and using lectures, handouts, educational pictures, and videos.
2. Empowering the role of health care providers in improving awareness about osteoporosis, modifying life habits through mass media and scientific programs.
3. National public survey for early detection of Vit D deficiency and osteoporosis risk factors.
4. Reproduction the study with large sample size and allover hospitals' outpatient clinics.

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