



FALL PREVENTION PROGRAM EFFECTS OLD AGE PERFORMANCE WITH OSTEOPOROSIS

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Abstract:

Objectives: The aim of this study is to assess the effectiveness of fall prevention program on osteoporosis old age performance.

Methods: A quantitative approach using a quasi-experimental design was used in the present study with the application of a pre-tests/ post-tests approach for the study group and control group. Non-probability (purposive) sample of (100) osteoporotic patients were selected from senior homes. The study sample in this research was divided into two groups; (50) osteoporotic patients for the study, which were exposed to the health instructional program, and (50) osteoporotic patients for the control group.

Results: This study reveals that the level of total performance among participants towards the prevention of falls reveals that most osteoporotic patients had a low performance level in preventing falls (96%) at pre-test results. The post-test results indicate that all osteoporotic patients in the study group had a high level of performance in preventing falls (100%), while the osteoporotic patients in the control group had a low level of performance in preventing falls for the pretest and post-test. The effectiveness of instructional program on fall prevention performance, the results refer to highly significant difference among osteoporotic patients' performance in the study group at p-value= 0.00 respectively, and there is no significant difference among osteoporotic patients' performance in the control group at p-value= 0.05 respectively, Also the effectiveness of instructional program on fall prevention performance.

Conclusion: The instructional program is effective in improving performance levels. This study suggests further research on a larger sample should be carried out to

estimate the incidence of osteoporosis and osteoporotic fractures related to falls in Iraq and induce the practical application of the instructions, precautions, management methods, preventive measurements, and monitoring its impact on the long-term lifestyle of the seniors with osteoporosis.

Key words: Effects, Fall Prevention Program, Old Age Performance, Osteoporosis.

Introduction & Background

Osteoporosis is a disease of the skeleton, characterized by microarchitectural deterioration of bone tissue and loss of bone mass. Osteoporosis (meaning ‘porous bone’) increases bone fragility and susceptibility to fracture. However, due to significant advances in osteoporosis management over the last 50 years including the widespread availability of various effective pharmacological therapies, it is no longer considered an inevitable consequence of aging. Clinical diagnosis of osteoporosis is challenging: fracture-based criteria may exclude populations at risk who would benefit from treatment, whilst the original 1994 World Health Organization (WHO) definition by bone mineral density (BMD) alone (2.5 standard deviations below the young adult female mean) may not take account of other risk factors. More recently, risk calculators such as the web-based Fracture Risk Assessment Tool (FRAX) algorithm have enabled assessment of an individual’s fracture risk using clinical risk factors such as age and alcohol consumption, with only partial consideration of bone mineral density (BMD)¹.

Osteoporosis is a metabolic bone disease that, on a cellular level, results from osteoclastic bone resorption not compensated by osteoblastic bone formation. This causes bones to become weak and fragile, thus increasing the risk of fractures. Traditional pathophysiological concepts of osteoporosis focused on endocrine mechanisms such as estrogen or vitamin D deficiency as well as secondary hyperparathyroidism. However, research over the last decades provided exiting new insights

into mechanisms contributing to the onset of osteoporosis, which go far beyond this. Selected mechanisms such as interactions between bone and the immune system, the gut microbiome, and cellular senescence are reviewed in this article. Furthermore, an overview on currently available osteoporosis medications including antiresorptive and bone forming drugs is provided and an outlook on potential future treatment options is given².

Osteoporosis is initiated by an imbalance between bone resorption and formation. Research studies point to a number of risk factors for osteoporosis that are modifiable, including diet and lifestyle factors, while some factors are non-modifiable³.

The primary goal of osteoporosis therapy is to reduce the risk of fracture. Treatment and prevention strategies of osteoporosis and osteoporotic fractures include fall avoidance by correcting decreased visual acuity, reducing consumption of medication that alters alertness and balance, reducing fall hazards in the home (slippery floors, obstacles, insufficient light), practicing physical activity to improve muscle strength, balance, and maintaining bone mass, the avoidance of cigarette smoking and excessive alcohol intake, and adequate dietary intake of protein, calcium, and vitamin D. In women, the recommended daily allowance (RDA) for calcium is 1,000 mg/d for age range of 19 to 50 years and increases to 1,200 mg/d for older than 50 years; in men, the RDA of calcium is 1,000 mg/d for age range of 19 to 70 years and increases to 1,200 mg/d for older than 70 years. The RDA for vitamin D is 600 IU/d for men and women aged 19 to 70 years

and increases to 800 IU/d for those older than 70 years. All postmenopausal women, regardless of their bone density or clinical risk factors for osteoporosis should observe these recommendations⁴.

Causes of fall There are many factors that influence the prevalence of fall among elderly people. With advancing age, the health complications (mental, physical and cognitive) accompanying old age also gets common. These reasons can however be subdivided into factors such as biological and behavioural, environmental and social factors⁵.

Osteoporosis is a metabolic bone disease featuring low bone mass and microstructural deterioration of bone tissue, leading to an increased risk of fragile fractures that have high rates of fatality and disability and severely affect a patient's quality of life. Falls are one of the most common direct causes of fractures. An osteoporosis patient is exposed to the risk of falling associated with such internal factors as age, and balance problems and underlying diseases caused by osteoporosis, as well as many external factors, like slippery footwear, a dangerous living environment, and intense exercise. Multifaceted podiatric interventions, which include appropriate footwear and importantly patient education, may have the capacity to reduce falls in older adults⁶.

Although the elderly perceived that fall could be avoided, they did not know how to prevent it. The intervention that focuses on environmental modification, balancing enchantment, and education on fall prevention is highly required. This justifies the need to provide osteoporosis patients with fall prevention education along with medication. Clinical attention is paid to the treatment of anti-osteoporosis drugs, while the education of preventing falls is often ignored⁷.

Materials and Methods

A quantitative approach using a quasi-experimental design was used in the present study with the application of a pre-tests/ post-tests approach for the study group and control group. Non-probability (purposive) sample of

(100) osteoporotic patients were selected from senior homes. The study sample in this research was divided into two groups; (50) osteoporotic patients for the study, which were exposed to the health instructional program, and (50) osteoporotic patients for the control group.

The preliminary considerations before starting the study aim to assess seniors' performance toward fall prevention. Assessment need was applied before the beginning of the study on (10) seniors with osteoporosis. The observational checklist which was related to the senior's needs assessment composed of (20) items scored on (do it) and (not do it). Result of assessment needs demonstrated (9%) of participants were(do it). According to the results of the preliminary assessment, the researcher constructed the program in order to apply it.

The Instructional Program is constructed according to the results of the assessment of patients' needs and from reviewing the relevant scientific literature and previous studies to achieve the following objectives: To increase osteoporotic patients' performance towards prevention of fall, they must know the following:

General Osteoporosis Knowledge Domain:

- a. Bone health.
- b. How does osteoporosis occur.
- c. Osteoporosis.
- d. Pathophysiology.
- e. Types and risk factors.
- f. Signs and symptoms.
- g. Diagnosis.

Falls Domain:

- a. Introduction to Falling
- b. Physiological changes in the elderly, which can lead to falls
- c. Fear from falling
- d. Causes and risk factors for falls

- e. Symptoms
- f. Diagnosis
- g. Prevention
- h. Treatment
- i. Correct steps to prevent falls
- j. Appropriate measures in the event of a fall
- k. A list of things to check to prevent falls at home

Fractures Domain

- a. Osteoporotic fractures.
- b. Incidence of fractures
- c. Fractures effect on life quality.
- d. Signs and symptoms of osteoporotic fractures.
- e. Fractures risk factors.
- f. Osteoporotic fractures risk assessment.

Treatments and Prevention Domain:

- a. Prevention of fall and its fractures.
- b. Pharmacological treatment of fall and osteoporosis.
- c. Non-pharmacological treatment of fall.
- d. Instructions for prevention falls related fractures.

Results

Prior to the implementation of the health instructional program pre and post-test observational checklist was constructed and used to observe performance of seniors toward prevention falls. Through review of the related literature and studies, the observational checklist is constructed as a mean of data collection. It consisted of (3) major parts; the first part is concerned with patient's socio-demographic characteristics. The second part is concerned with clinical features. The third part is concerned with performance level checklist towards prevention of fall that include 18 items.

The validity of an instrument's contents is its ability to gather the data intended to be gathered. Content validity for the early-developed instrument is determined through of expert panel to investigate the clarity, relevancy, and adequacy of the questionnaire to measure the concept of interest.

For this study, data are analyzed through the application of statistical procedures and by using (SPSS) version (23) which may assist to determine the study results.

Table 1. Distribution of participants' socio-demographic characteristics of the sample

List	Gender	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
1	Male	22	44	19	38
	Female	28	56	31	62
	Total	50	100	50	100
2	Age	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
	60-70	15	30	20	40
	70-80	26	52	21	42
	80-90	7	14	8	16
	90-100	2	4	1	2
	Total	50	100	50	100
3	Education level	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent

	Not read and write	3	6	3	6
	Read and write	16	32	16	32
	Primary school	11	22	15	30
	Secondary school	16	32	11	22
	Graduated	2	4	3	6
	Post graduated	2	4	2	4
	Total	50	100	50	100
4	Marital Status	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
	Single	3	6	6	12
	Married	3	6	10	20
	Divorce	7	14	5	10
	Separate	10	20	6	12
	Widow	27	54	23	46
	Total	50	100	50	100
5	Occupation	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
	Unemployed	37	74	40	80
	Retired	13	26	10	20
	Total	50	100	50	100
6	BMI	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
	Under weight	15	30	17	34
	Healthy weight	12	24	13	26
	Overweight	17	34	18	36
	Obese	6	12	2	4
	Total	50	100	50	100
7	Go On Diet	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
	No	28	56	30	60
	Yes	22	44	20	40
	Total	50	100	50	100
8	Take C and D Supplement	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
	No	26	52	33	66
	Yes	24	48	17	34
	Total	50	100	50	100
9	How many years you have osteoporosis	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
	1-3	10	20	9	18
	3-6	21	42	23	46
	6-9	11	22	12	24
	9 and more	8	16	6	12
	Total	50	100	50	100

10	Smoking	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
	No	32	64	38	76
	Yes	18	36	12	24
	Total	50	100	50	100
11	Drinking Alcohol	Study Group		Control Group	
		Frequency	Percent	Frequency	Percent
	No	40	80	43	86
	Yes	10	20	7	14
	Total	50	100	50	100

F: Frequency, %: Percentage

Table 2. Level of performance pre and post-test scores for study and control groups

Level of performance						
Group	Pre-Test			Post-Test		
	Low	Moderate	High	Low	Moderate	High
	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
Study	48 (96%)	2 (4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	50 (100%)
	M.S 1.04	S.D. .19795		M.S 3.00	S.D. 0.00	
Control	43 (86%)	7 (14%)	0 (0.0%)	43 (86%)	7 (14%)	0 (0.0%)
	M.S 1.1	S.D. .187		M.S 1.12	S.D. .17	

F: Frequency, %: Percentage, MS: Mean of score, SD Standard deviation

Table 3. Significant Differences in osteoporotic patients' performance towards prevention of falls Pre & Post- Test for Study and Control Groups

Performance level	Study Group (N=20)					Control Group (N=20)				
Pre-test	M.	t	df	P-value	Sig.	M.	t	df	P-value	Sig.
Post-test	1.04 3	70.015	49	.00	HS	1.1 1.12	.531	49	.598	NS

Table 4. Comparison of significance between the periods of post-tests related to patients' performance of the study and control groups

Performance level	Mean	T	df	P-value	sig
Post-test (Study group)	3	44.33	98	.000	HS
Post-test (Control group)	1.1				

The descriptive analysis of the sample for both groups shows that more than half of the sample

were females with (56%) of study group and (62%) of control group, while (52%) of the

patients were in age (70-80) followed by those who are aged (60-70) with (30%) on the other hand the (42%) of control group aged (70-80) followed by (40%) for those between (60-70). Regarding educational level, (32%) of the patients for both groups were just read to and write, also that equal to secondary school graduates of study group followed by (22%) secondary school graduates of control group.

Most of the participants in the study group are widows (54 %), and a smaller proportion of the widow participants in the control group (46%). The majority of participants are unemployed (74%) in the study group and (80 %) of participants in the control group.

This table show that the participants in the study (34%) and (36%) of control groups are overweight according to body mass index indicators. More than half of participants in the study group dose not go on diet (56%) and the same in the control group (60 %).

Additionally, more than a half of participants in the study group reported that the they have not taken Ca and vitamin D supplements (52 %). The control group is reported (66%) of participants does not take Ca and vitamin D supplements. Exactly (42%) of the study group suffer from osteoporosis for a period of (3-6) years so and a higher proportion of the participants in the control group (46%) for the same period.

Ultimately, (36%) of participants in the study group who reported that they are smokers and (24%) for control group. The both groups less than quarter of sample of participants who were drinking alcohol.

The levels of total performance among participants towards prevention of falls which reveals that most of osteoporotic patients had low performance level about preventing of falls (96%) at pre-test results. The post-test results indicates that all osteoporotic patients in the study group were having high level of performance about preventing of falls (100%), while the osteoporotic patients in control group were holding low level of performance about preventing of fall for pretest and posttest.

The effectiveness of instructional program on fall prevention performance, the results refer to highly significant difference among osteoporotic patients' performance in the study group at p-value= 0.00 respectively, and there is no significant difference among osteoporotic patients' performance in the control group at p-value= 0.05 respectively.

There is a significant difference between the study and control groups regarding the results of the post-test at p-value = 0.00.

There is a significant difference between the study and control groups regarding the results of the post-test at p-value = 0.00.

Discussion

The result of this study represents the effectiveness of instructional programs on fall prevention performance, the results refer to a highly significant difference among osteoporotic patients' performance in the study group at p-value= 0.00 respectively, and there is no significant difference among osteoporotic patients' performance in the control group at p-value= 0.05 respectively. These results agree with Ahn et al, (2021) who find that the health belief model (HBM)-based osteoporosis- and fall-prevention program effectiveness in promoting osteoporosis and fall prevention among participants. The intervention improved knowledge of osteoporosis and fall prevention strategies, exercise-related preventing fall. A pretest-posttest study design that included an untreated control group was used to examine effects of an HBM-based osteoporosis- and fall-prevention program⁸.

The findings reveals that there are no significant relationships between performance level and Sociodemographic Data for study group at p-value= 0.05.

Such results are consistent with the study of Abdul-Hameed, & Mohammed, (2012). who found that the effectiveness of the program is not affected by demographic characteristics and daily life behaviors, which means the program can be implemented for all female students and achieve the objectives of the program.

To our knowledge, this was the first study that assessed performance level among seniors with osteoporosis in Babylon City /Iraq. This study focuses on the elderly community and helps them to be more active and independent.

Limitations

There are no previous national studies or references about fall prevention performance. The sample size was very small; which limits the generalization of the findings to other settings. Also, Longitudinal studies are therefore recommended.

Recommendations

This study suggests further research on a larger sample should be carried out to estimate the incidence of osteoporosis and osteoporotic fractures related to falls in Iraq and induce the practical application of the instructions, precautions, management methods, preventive measurements, and monitoring its impact on the long-term lifestyle of the seniors with osteoporosis.

Conclusion

The evaluation of fall prevention performance levels among seniors is very important to improve their physical health by constructing instructional programs to help them improve their performance.

The instructional program helps them improve their performance level in the prevention of fall which mean that the program is suitable for enhancing performance and minimizing fall risk. The information presented was simple and clear and could be understood by all seniors.

Such programs are not only helpful in improving performance but also, helpful in identifying risks and hazards that may lead to osteoporosis fractures caused by falling.

Ethical Consideration

Before conducting the study, the researcher obtaining the approval for the ethical committee in collage of nursing agreement to conduct the present study. Permission was obtained from the Ministry of Labour and

Social Affairs / Directorate of Labour and Social Affairs when the research protocol was approved and granted from the Seniors Homes in Babylon. The last permission was obtain from participants in verbal and written.

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Conflicts of Interest Disclosures

There is no conflict of interest.

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