Effect of Self-Management Program on Self-efficacy regarding Osteoporosis Risk among Diabetic Patients

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Abstract

Background: Prevalence of osteoporosis is high among diabetes patients. Assessment of self-efficacy regarding osteoporosis risk as well as patient education should be included as part of the self-management of diabetes. **Aim:** To evaluate the effect of a self-management program on self-efficacy regarding osteoporosis risk among diabetic patients. **Methods:** A quasi-experimental (pre-posttest) research design was conducted on 90 diabetic patients who admitted in the internal medicine department at Assiut university hospital. Data were collected via pre-postintervention and at 3-month follow-up. Patient assessment sheet, Demographic and medical data, the new One-Minute osteoporosis risk test, and Diabetes Management Self-Efficacy Scale (DMSES) were used. **Results:** The majority of participants had moderate osteoporosis risk. There was a significant improvement in self-efficacy after self-care management program application. There was a statistically significant difference between diabetes management self-efficacy scores and the new one-minute osteoporosis risk test levels. **Conclusion:** A positive effects of self-care management regarding osteoporosis among studied patients with diabetes on self-efficacy scores. **Recommendations:** Relevant forms and visual information to facilitate educating diabetic patients regarding osteoporosis ought to be accessible and given to each diabetic patient.

Keywords: Self-Management program, Self-efficacy, Osteoporosis and Diabetes mellitus

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Introduction:

Osteoporosis (OP) is a disease that is portrayed by low bone mass and micro-architectural deterioration of bone tissue driving to enhanced fragility and an increase in fracture risk. Bone is ordinarily mineralized but is deficient in quality, quantity and structural integrity. Osteoporosis is the foremost common of all metabolic bone diseases and shows a significant public health problem as it is associated with expanded mortality, morbidity, and health care costs **(Swe et al., 2019).**

The pathogenesis of osteoporosis in diabetes mellitus (DM) involves decreased peak bone mass due to deficiency of insulin and insulin-like growth factors, leading to inhibition of osteoblast growth, and poor collagen synthesis **(Goswami, & Nair, 2019).**

Patients with diabetes mellitus (DM) have a high hazard of secondary OP in light of the fact that abnormalities in the metabolism of sugar, protein, and fat may prompt variations in the metabolism of salt, water, and electrolytes as well bone metabolism and arrangement. Risk factors related to diabetes-osteoporosis incorporate

vascular and perhaps neuropathic systems, poor glycemic control, anomalies of calcium and nutrient vitamin D digestion, and hypercalciuria with auxiliary addition in parathyroid hormone secretion. Vitamin D levels are normal or low. Other factors include a negative affiliation with sex hormones binding globulin, higher free testosterone, and free estrogen levels **(Hough et al., 2016).**

The calcium deficit is moreserious in patients with poor diabetes control due to the renal calcium spill caused byglycosuria-induced osmotic diuresis.The presence of DM confers several deleterious consequences for skeletal health, counting diminished peak height velocity during the pubertal development, reduced grown-up bone thickness, an expanded hazard for osteoporosis and fracture, desperate bone healing and diabetes-induced skeletal complications **(Corbin et al., 2018).**

Clinical studies in DM documented thatto be concentrated on bone density and bone growth in adolescents, the essentialness of insulin control, sustenance, celiac disease, and bone markers. In DM, the impact of body weight, fracture incidence and bone turnover appear to be the prime factors **(Valderrábano& Linares, 2018).**

Self-care management considers the key to living a long and healthy life for diabetics. However,variousresearches show that self-care considersa long way from the model. This has brought aboutendeavors to appreciate the dynamics underlying self-care behavior in the hope of intervening more adequately. Health beliefsand self-efficacy have each been proposed as clarifications for self-care management **(Alrawashdeh, 2017).**

Patients with diabetes are foreseen to perform day by day self-administration exercises to diminishdiabetes-related morbidity and mortality. Self-management foundation of diabetes care and it is acknowledged that improving patient self-efficacy which considers an essential pathway to enhance self-management. The concept of self-efficacy is based on social cognitive theory, which depicts the interaction between behavioral, personal, and environmental factors in the health and chronic disease. The theory of self-efficacy proposes that patients' certainty in their ability to perform health behaviors impacts **(Lambrinou et al., 2019).**

Becausediabetes self-management incorporates behavioral, personal, and environmental factors into step by step performance of suggested activities, the concept of self-efficacy is significantfor enhancing self-management. Among diabetic patients, self-efficacy has been appeared to be critical for proper self-management for numerous chronic health conditions as osteoporosis**(Young-Hyman et al., 2016).**

Operational definitions:

Self-management: is the individual's ability to manage the symptoms, treatment, physical and psychosocial results, and lifestyle changes characteristic in living with a chronic condition **(Sisson et al., 2019).**

Self-efficacy: is one's conviction in his or her ability to be successful in specific circumstances or accomplish a task in order to deal with life's challenges**(Woodcock et al., 2019).**

Significance of the study:

Globally, diabetes affects around 415 million people, and its prevalence is likely to increase to 640 million by 2040. Egypt considers on of the largest population with DM in theworld, as the

predominance of diabetes mellitus is expandingrapidlyin the population and the number is expected to increase in 2030 **(Sirdah & Reading, 2020).** Studies reported that patients with diabetes mellitus have longer hospital stays, more costly treatment, and a higher risk of infection and mortality from OP-related fractures than do patients without diabetes **(Hejazi et al., 2017).** Self-management programs for diabetic patients regarding osteoporosis risk can lead to a change in their behaviors and self-efficacy. This may influence, in the long term, the progression of diabetes and the prevalence of associated complications asosteoporosis. So this study helped diabetic patients to increase their self-efficacy regarding osteoporosis risk and hence improve their health.

Aim of the study

Aim of the study wasto evaluate the effect of a self-management program on self-efficacy regarding osteoporosis risk among diabetic patients

Research hypothesis:

• The level of self-efficacy regarding osteoporosis will be increased after a self-management program application for diabetic patients.

Subject and Methods:

Design: A quiz- experimental (pre –posttest) research design was utilized in this study. One group pre /test and post/test design involves three steps(1) administrative of a pre/test measuring the dependent variable (2) implementation of the independent variable for nursing teaching guidelines; and (3) administration of a post/ test that measure the dependent variable again. The effects of the independent variable by comparing the pre/ test and post/test scores **(Grol & Wensing, 2020).**

Sample and setting: thisstudywas conducted on (90) adult diabetic patients who admitted in the internal medicine department at Assiut university hospital from the period of October 2019 to March 2020.

Sample size:

Sample size calculated by the following equation according to **Steven**, **(2012)**

N=total patient population size 115 patients (Assiut University hospital records Last year at the same time). By n = 90

Z = confidence level is 0.95 and is equal to 1.96

D= the error ratio is = 0.05

P= the property availability ratio and neutral = 0.50

Ethical consideration:

The study ethical acceptance of this study was obtained from the faculty of nursing's ethics committee, Assiut University. After explaining the research nature and kept the data confidentiality. Informed consent firstly was obtained from the studied subjects. All studied patients were voluntarily participated in the study. Any data that obtained and used confidentially just for the objectives of the study.Every patient has the wright to withdraw from the study at any time. In addition,the research fellow the **Helsinki's declaration (2013)**

Tools of data collection:

Tool I: Patient assessment sheet: it consisted of two parts

Part 1: Demographic characteristics included; age, gender, educational level, household income, marital status.

Part 2: Medical data:included;health insurance, family history of fracture, use of calcium and vitamin D supplements، duration of diabetes diagnosis, use of anti-diabetic medications, and Hg A1c. In addition to assessing BMI according to **Jadayil et al., (2020).**

Standard level of weight (18.5 - 24.9 Kg)
Over weight (24.9 - 29.9 Kg)
Obese   (30 Kg)
Obese grade1(30- 34.9 Kg)
Obese grade 2 (35 -39.9 Kg)

Tool II: The new One-Minute Osteoporosis Risk Test:

The new One-Minute Osteoporosis Risk Test adopted from; **International Osteoporosis Foundation (IOF's), (2012).**

This test aimed to, screen potential participants for OP risk, and thusit aids the detection of early-stage osteoporosis. It was adapted from the original version, which included 10 questions (7 general, 2 for women, and 1 for men)

Scoring system:

This test included 19 questions (15 general, 3 for women, and 1 for men). Any positive answer indicates that an adult has a risk factor that may lead to OP and fractures.

Zero for negative and one for positive.

Classified as (No, moderate and high risks)

High scores (19) indicate a high risk for OP.

Tool III: Diabetes Management Self-Efficacy Scale (DMSES).

Using the English version of (DMSES UK) was developed by **Prof. Jackie Sturt,(2010)**the researchers measured diabetes self-management self-efficacy at pre- and posttest and 3-month follow-up.

This self-administered scale included 20 items.

This scale aimed to assesses the extent to which respondents are confident that they can manage their blood sugar، diet, and exercise.

Scoring system:

Items are scored on a 0–10 point numerical scale, with higher scores indicating higher self-efficacy levels. From 0-2 means low confidence, 3-6 means intermediate confidence, and 7-10 means high confidence.

Items are summed to give a total score ranging from 0 to 200, with higher scores representing more confidence.

Tool IV: Self-care management program regarding osteoporosis risk among diabetic patients.

This programdesigned by the researchers based on the review of the relevant national and international literature **(Qasim et al., 2020), (Parizad et al., 2020) and (Kawae et al., 2020).** In

addition to the research results to provide knowledge about OP risk among diabetic patients particularly regarding preventive strategies related to calcium and exercise and nutrition. Nursing instructions for controlling diabetes mellitus regarding osteoporosis risk: patient education highlighted that weight-bearing exercise and consuming calcium-rich foods not only prevent osteoporosis but also can decrease BMI, reduce blood pressure, and improve lipid and diabetic control.

The researcher applied this program on the studied sample in the form of a flayer given to them after explaining it.

Validity and Reliability:

The tools were tested for content validity by 5 experts (2 academic internal Medicine staff and 3 nursing staff from Faculty of Nursing) at Assiut University who reviewed the tools for clarity, relevance, comprehensiveness, and understanding. No modifications were required.

The final form of the tool was designed and tested for reliability by using internal consistency for the tools measured using Cronbach's alpha (tau-equivalent reliability) coefficient for tools (I, II, and III,) (r= 0.817, 0.794, and 0.894 respectively).

Procedure:

• Official permission to conduct the proposed study was obtained from the faculty of nursing to the director of the main Assiut University Hospital

• The researchers developed an Arabic language educationalself-management program regarding osteoporosis risk among diabetic patients.

• A pilot study was conducted on 10% (9 patients) of the studied sample in a selected setting to evaluate the applicability and clarity of the developed tools. There was no modification needed.

• Assiut University hospital has a large meeting room for healtheducation and health promotion activities.

• At the initial interview, the researchers introduced themselves to initiate a line of communication and explain the nature and purpose of the study.

• Each patient was individually interviewed and data were collected from patients using tools(I, II & III).

• The data about demographic data, medical data and risk factors. The time consumed to answer each questionnaire sheet ranged from 10 to 15 minutes.

• The self-care management program regarding osteoporosis risk among diabetic patients (tool IV) in form of flayers was administered to the patients in one session; the duration was about 45 minutes, including 15 minutes in the end with a summary of its content and feedback from the patients. Many patients were cooperative and interested in a given topic and asked to continue.

• The study was carried out in the morning and afternoon shifts.

• The fieldwork was performed over a period of six months. The data was collected during the period from October 2019 to March 2020.

• The researchers contact the patient to re-evaluate the effect of self-care management program regarding osteoporosis risk on patient's confidence

that they can manage their blood sugar, diet, and exercise using tools (II and III) posttest and three months after implementing the program. The data were collected during actual visits to the diabetic health education centerdaily.

• While the communication with the patients for follow up done during the days of strict lockdown to implement social distancing to avoid the spread of COVID 19 pandemic. As it was not feasible to conduct a population-based study in this critical condition.

• As a retention strategy, the researchers made biweekly phone calls to participants in the interventiongroup during the 3-month study period, so that each participantreceived a total of six phone calls.

• The calls lasted an average of15 min and primarily involved and focuses on the patient's condition at home and answering any questions raised by the patient in addition, reinforcing the educational content of the intervention (A self-care management program regarding osteoporosis risk among diabetic patientstool IV).

Statistical design:

Data obtained had reviewed, prepared for computer entry, coded, analyzed and tabulated. Descriptive statistics (frequencies and percentages, mean and standard deviation, i.e.) were done using computer program (SPSS) version (21) (Statistical package for social science) used for statistical analysis of data, Chi-square tests used in the relationship between pre and post program, n.s P > 0.05 no significance,** P < 0.01 moderate significance and *** P < 0.001 highly significance.

Results:

Table (1); shows that, the highest percentage of the studied patients (70.0%) in the age of 51-65 years old. More than half of them were females, most of them (80.0%) were married, and less than halfof them (46.7%) with secondary education. According to occupation, the highest percentage of patients was employed.

Table (2); founds that the mean duration of diabetes mellitus was (12.26 ± 8.68), the highest percentage (26.7) were both overweight (24.9 - 29.9 Kg) and obese grade I (30- 34.9 Kg), half of them their blood glucose level were from 6 to 8 mg/dl9 and the others were from 9 to 11 mg/dl with a mean (8.36±1.54), more than half of them (56.7%) were under the health insurance, majority of them (83.3%) received Calcium supplements, most of them (96.7%) received Anti-diabetic medications, and more than half of them (63.3%) suffered from HTN**.**

Figure (1); reflects that majority (66.7%) of the studied patients had a moderate risk for osteoporosis.

Figure (2); illustrates that: there was a significant statistical difference between Pre, Post & after 3 months after a self-care management program application Diabetes Management Self-Efficacy Scale (DMSES), also the table showed an increase of high confidence level post and after 3 months of self-care management program application.

Table (3); reflects that there was no significant statistical difference between diabetes management self-efficacy scale scores & demographic data of the studied patients except their ages, level of education and occupation

Table (4); shows that there was as statistically significant difference between DMSES &Medical data for the studied

patients after application of self-care management program except regarding Calcium supplements, Anti-diabetic medications and complications of DM except (HTN)

Table (5); mentions that there was a significant statistical difference between Diabetes Management Self-Efficacy Scale scores and the new One-Minute Osteoporosis Risk Test levels Post self-care management program application. In addition, it showed that the moderate risk group had a high confidence level of self-efficacy.

Discussion:

Diabetes mellitus is a significant and emerging clinical and public health problem in Egypt. Populations that lived in the Middle East, have developed a proficient metabolism in order better to survive **(Cerin et al., 2019).** This former advantage demonstrates negative once a modern lifestyle, characterized by inactivity and a high-energy diet, is adopted **(Caldwell, 2019).**

The aim of our study was to evaluate the effect of a self-management program on self-efficacy regarding osteoporosis risk among diabetic patients.

The current study demonstrated that the highest percentage of the studied patients in the age group of 51-65 years old with a mean (53.90±10.69 years), this match with **Schumacher et al., (2020)** who found the mean age among diabetic patients was 65.2 years. This not matched with **Sadarangani et al., (2019)** who found more than a quarter of adults aged over 65 years in North America have Type 2 diabetes mellitus(DM).

Additionally, this organized with **Pinchevsky et al., (2020)** who found another outcome that, at current rates, the number of people beneath the age of 20

with type 2 diabetes could increment by up to 49 percent by 2050. If the rates of incidence increase, the number of type 2 cases in youth may fourfold.

The present study discovered more than half of them were females. In specific, overweight and obesity, the main drivers of the T2DM epidemic, are increasing worldwide and particularly so in women **(Kyrou et al., 2020).** Females have estrogen hormone, which is defensive for developing diabetes, estrogen makes the body cells more responsive or sensitive to insulin. Estrogen appears to contribute to glucose homeostasis in women **(Schalkwijk et al., 2020) and (Tramunt et al., 2020).**

The correlation analysis carried out in another study "Greater social jetlag associates with higher HbA1c in adults with type 2 diabetes" recommended that variables like sex, age at onset of disease, duration of diabetes and age of patients impact glycemia directly and HbA1c indirectly **(Kelly et al., 2020).**

The existing study revealed that most of them were married. Marriage, since ancient times, has continuously been a fundamental social institution and played an imperative part in the lives of most people.

Additionally, the present study showed that less than half of the studied patients with secondary education and the highest percentage of patients were employed. The researcher opinion that if the workplace environment could reduce weight and increase physical activity among employees in these occupations, significant health gain (especially DM) may be made.

This match with **van Zonet al., (2017)** who found in the study "The interaction of socioeconomic position and type 2 diabetes mellitus family

history"that 30–40% increased incidence of diabetes mellitus is watched in those with a low socioeconomic position as indicated by income, education or occupation. Also, **Carlsson et al., (2020)**added that individuals with low socioeconomic status form a large and heterogeneous group that may encompass occupational groups with a major chance of diabetes risk as well as individuals who are unemployed.

The data of the present study revealed that: duration of diabetes mellitus from one year to ten years with the mean (12.26 ± 8.68). the researcher point of view, diabetes mellitus is a life-long disease, which makes patients under stress around the quality and longevity of their life after being diagnosed with it. The complications of diabetes are affected not only by the duration of diabetes but also by the average level of chronic glycaemia. This match with **Mair et al., (2019),** who found the mean diabetic duration was more than 4 years old.

Correspondingly, the present study indicated that more than half of the sample their blood glucose level (hgA1c) was more than 8mg/dl and the others were from 9 to 11 mg/dl with the mean (8.36±1.54). **Hwang et al., (2019)** research found abnormal hyperglycemia through assessing A1Hc which was more than 11mg/ dl.

A study directed by **Ahmed et al., (2019)**of diabetic patients has concluded that a significant positive correlation between HbA1c and age as well as the duration of diabetes.

The present study demonstrated that the highest percentage were both overweight (24.9 - 29.9 Kg) and obese grade I (30- 34.9 Kg), half of them their blood glucose level were from 6 to 8 mg/dl.The researchers assumption that, sedentary lifestyle was defined on the basis of occupation and activity outside the job including transportation to and from work, sports activities and other leisure-time physical activity all lead to increase the body weight that the main cause of glucose level disturbance.

This match with **Golden et al., (2019)**who found that; quarter of the studied diabetics were overweight, recommending the role of factors other than obesity in racial/ethnic disparities in diabetes and pre-diabetes risk and featuring the requirement for custom fitted screening and prevention strategies.

This finding not in the same line with **Haneda et al., (2016)** in study entitled "Japanese clinical practice guidelines for diabetes" found the examined diabetic patients were obese grad II this may due to deference and change in their life circumstances.

The data of the present study discovered that majority of the studied patients take Calcium supplementsand most of them received Anti-diabetic medications. The main function of vitamin D is to preserve calcium and phosphorus homeostasis and advance bone mineralization. Also important for a different of non-skeletal outcomes including neuromuscular function and falls, psoriasis, multiple sclerosis, colorectal and prostate cancer.

Vitamin D deficiency has been linked to the onset and progression of DM. Although in patients with DM the relationship between vitamin D and insulin secretion, insulin resistance, and β-cell dysfunction are pointed out. Vitamin D is believed to help improve the body's sensitivity to insulin – the hormone responsible for regulating blood sugar levels – and thus reduce the risk of insulin resistance (**Christakos et al., 2019).**

Currently, there are no separate guidelines for the initiation of anti-osteoporosis medications in diabetes **(Wang et al., 2020).**

More than half of the studied patients suffered from HTN. Diabetes mellitus and hypertension are common diseases that coexist at a greater frequency than chance alone would anticipate. Hypertension in the diabetic individual particularly increments the risk and accelerates the course of cardiac disease, peripheral vascular disease, stroke, retinopathy, and nephropathy **(Saxton et al., 2019).**

This study reflected that majority of the studied patients had a moderate risk for osteoporosis. The researchers' opinion, that this moderate risk level was the main reason that helped our self-management program to effect on the studied diabetic patients' self-efficacy regarding osteoporosis and enhance it.

This not matched with **Pérez-Sayáns et al., (2020)** who found that diabetic patients had a high-risk level for osteoporosis. Moreover, **Stumpf et al., (2020)** reported that patients with DM ought to be regarded as high-risk individuals to develop osteoporotic fractures. In this respect, **Drudge-Coates et al., (2020)** concluded that nurses must be aware of the risk of OP and fracture among patients with diabetes to avoid complications.

This study represented that; there was a between pre, post & after 3 months after self-care management program application statistically significant difference regarding the diabetes management self-Efficacy scale (DMSES).that, also showed that the level of high confidence of self-efficacy

increased post and after 3 months of application the program.

This mean that, utilizing strategies for knowledge fortification, skills development, confidence improvement, problem-solving, and physiological and psychological input can improve OP knowledge, self-efficacy, dietary calcium intake, diabetes self-care practice, diabetes management efficacy, and glycemic level among adults with DM.

This match with **ElGerges, (2020)** who revealed that the studied diabetic patients had low confidence in diabetes management self-efficacy scale (DMSES), adding that DMSES will empower the identification of self-management activities in diabetic patients. Assessment of the self-efficacy of patients ought to be a fundamental part of the nursing practice.

Furthermore, **Copeling, (2019)** reported that DMSES higher scores compare with higher personal expectations of his/her ability to start and conform to diabetic self-management.

Likewise, **Massey et al., (2019)** passed on four weekly diabetes education sessions focusing on target setting, strengthening, role modeling, and peer support and discovered improved diabetes self-care activities and self-efficacy in the intervention group at the 3and 6month follow-ups. People with a high degree of self-efficacy, subsequently, would be more likely to perform healthy behaviors. **Chen et al., (2019)** administered a month-long self-efficacy intervention in which they provided education on diabetes skill mastery, role modeling, and group discussion in weekly sessions.

The existing study reflected that; there was no significant statistical difference between diabetes management self-efficacy scale scores & demographic

data of the studied patients except their ages, level of education and occupation.

The researchers' opinion that the age of the patient and their occupation effect the level of activities that they performed daily and that significantly effect on their self-efficacy level.

In this respect, **Hardman, (2020)**found that self-efficacy is associated to illness duration, gender and age, including that higher levels of self-efficacy for the way of life the board was found in patients diagnosed for at least 1 year up to 15 years and aged > 65 years and the poorest self-efficacy was found in males < 65 years.

The results of **Pesantes et al., (2019)** study suggested that efforts to promote patient education to self-efficacy should be especially focused on younger man, and to patients with a long-standing encounter of disease.

The present study showed that there was a statistically significant difference between DMSES & medical data for the studied patients after application of self-care management program except regarding Calcium supplements, Anti-diabetic medications and complications of DM except (HTN).

This match with **Aminuddin et al., (2019)** who discovered interventions seem to have the useful impacts on self-efficacy, self-care activities and health-relevant

results for patients with type 2 diabetes mellitus and the effects on BMI, BP and calcium supplements received were not statistically significant.

Shahrokhabadi et al., (2019) consumed inadequate amounts of dietary calcium (434 mg/day, on average), which, once more, is similar to the findings of previous studies.

This study pronounced that; there was a statistically significant between diabetes management self-efficacy scale scores and the osteoporosis risk levels after self-care management program application and the moderate risk group had a high confidence level of self-efficacy.

This mean that the more level of diabetic patient self-care the less OP risk occur mainly after receiving self-management program.

Such programs should feature the advantages for anticipating OP and controlling diabetes of consuming a low-calorie, calcium-rich diet, routinely performing diabetes self-care practices and physical activities that lead to improve bone health and decrease the risk of osteoporosis.

In this aspect, **Précoma et al., (2019)** portrayed that it is important for nurses, as both health educators and health care providers, to deliver OP educational programs for the high risk diabetic group.

**Part 1: Related to the demographic characteristics of patients:**

Table (1): Distribution of studied patientsaccording to demographic data of the studied patients (n=90):

Items	Group n= 90	
	N.	**%**
Age in years:		
• 18--35.	6	6.7
• 36-50.	21	23.3
• **51-65**	63	**70.0**
Mean±SD	**53.90±10.69 years old**	
Gender:		
• Male.	33	36.7
• **Female.**	57	**63.3**
Marital status:		
• Single	6	6.7
• **Married**	72	**80.0**
• Divorced	6	6.7
• Widow	6	6.7
Level of education:		
• Illiterate	21	23.3
• Primary	6	6.7
• **Secondary**	42	**46.7**
• University	18	20.0
• High education	3	3.3
Occupation:		
• Retired	18	20.0
• **Employee**	36	**40.0**
• Housewife	24	26.7
• Literal	9	10.0
• Doesn't work	3	3.3

Table (2): Medical data ofthe studied patients (n=90):

Items	Group(n=90)	
	N.	**%**
Duration of diabetes in years:		
1 –10	57	**63.3**
11 – 20	15	16.6
21- 34	18	20.0
Mean ± SD	**12.26 ± 8.68**	**years old**
BMI		
Standard level of weight (18.5 - 24.9 Kg)	12	13.3
Over weight (24.9 - 29.9 Kg)	24	26.7
Obese (30 Kg)	9	10.0
Obese grade1(30- 34.9 Kg)	24	26.7
Obese grade 2 (35 -39.9 Kg)	21	23.3
HAc1		
6- 8 mg/dl	45	50.0
9- 11 mg/dl	45	50.0
Mean ± SD	**8.36±1.54 mg/dl**	
Frequency of fracture:		
Yes	30	33.3
No	69	66.7
Health insurance		
Yes	51	56.7
No	39	43.3
Calcium supplements		
Yes	75	83.3
No	15	16.7
Anti-diabetic medications		
Yes	87	96.7
No	3	3.3
Complications of DM:		
CKD	6	6.7
HTN	57	63.3
CAD	27	30.0
Stroke	18	20.0
Other	42	46.7

Tool (II): The new One-Minute Osteoporosis Risk Test.
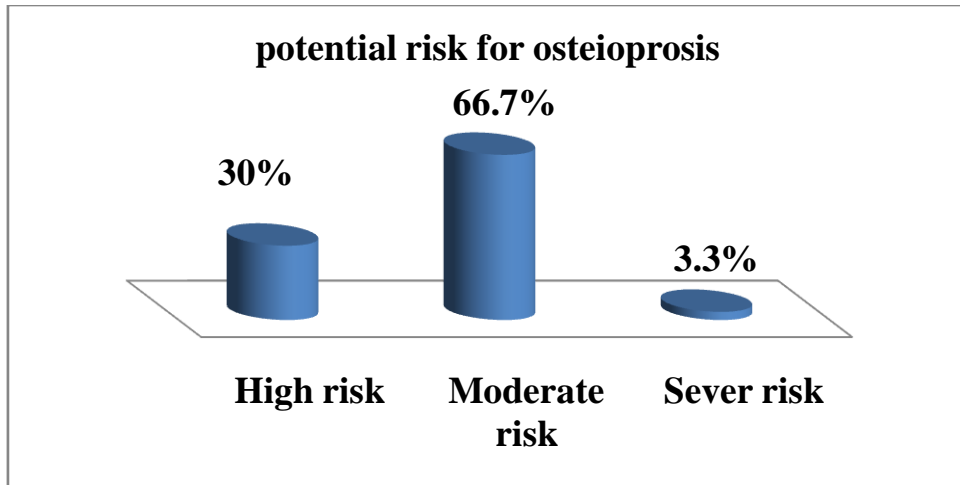
Figure (1): Frequency distribution of studied patients regarding level of potential risks for osteoporosis (n=90).
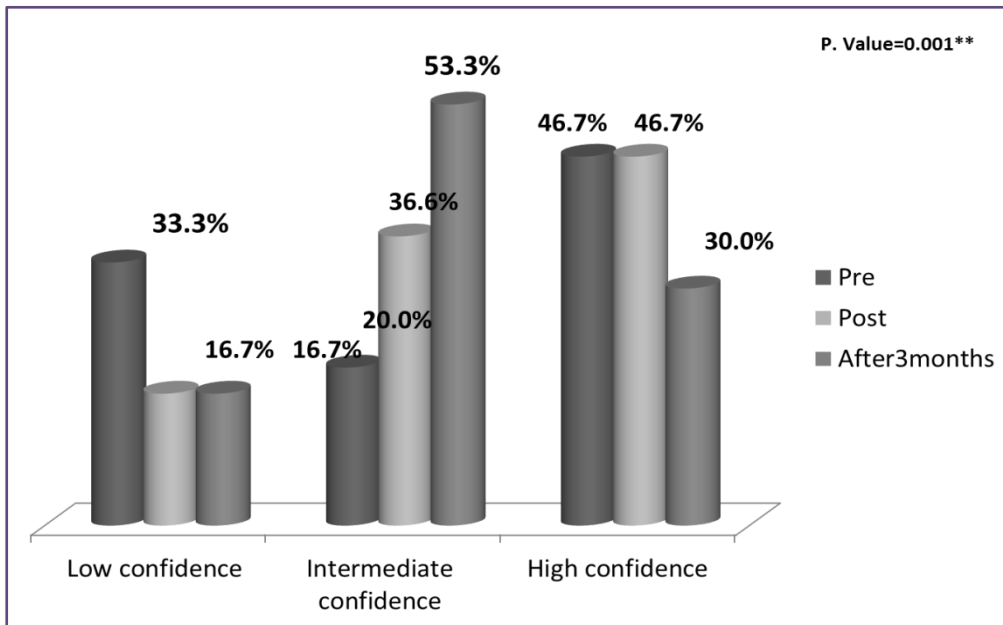
Figure (2): Comparison between Pre, Post & after 3 monthsof self-care management program application regarding Diabetes Management Self-Efficacy Scale (DMSES)

Table (3): Relation between Diabetes Management Self-Efficacy Scale & demographic data for the studied patients after 3 months follow up after application of self-care management program (n.=90)

Item	n. =90 DMSES after 3 months follow up			P.value
	Low confidence	Intermediate confidence	High confidence	
Age in years:				
• 18--35.	3	3	0	0.001**
• 36-50.	5	**16**	0	
• 51-65	7	29	27	
Gender:				
• Male.	4	16	**13**	. 0.008ns
• Female.	11	32	**14**	
Marital status:				
• Single	1	5	0	
• Married	14	**32**	26	0.043 ns
• Divorced	0	5	1	
• Widow	0	6	0	
Level of education:				
• Illiterate	6	15	0	
• Primary	3	3	0	
• Secondary	6	**25**	11	0.0001***
• University	0	5	13	
• High education	0	0	3	
Occupation:				
• Retired	1	11	6	
• Employee	5	19	12	
• House wife	3	15	6	
• Literal	3	3	3	0.0001***
• does not work	3	0	0	

Table (4): Relation between DMSES &Medical data for the studied patients after application of a self-care management program (n.=90)

Medical Data	Group(n=90) DMES Posttest			P. value
	Low	Intermediate	High	
Duration of disease:				0.0001***
1 –10	27	6	24	
11 – 20	0	6	9	
21- 34	3	6	9	
BMI				
Standard level of weight (18.5 - 24.9 Kg)	6	0	6	0.0001***
Over weight (24.9 - 29.9 Kg)	12	6	6	
Obese (30 Kg)	9	0	0	
Obese grade1(30- 34.9 Kg)	0	6	18	
Obese grade 2 (35 -39.9 Kg)	3	6	12	
HA1c				
6- 8 mg/dl	6	6	33	0.0001***
9- 11 mg/dl	24	12	9	
Family history of fracture:				0.0001***
Yes	3	12	15	
No	27	6	27	
Health insurance				
Yes	12	3	36	0.0001***
No	18	15	6	
Calcium supplements				
Yes	24	15	36	0.814ns
No	6	3	6	
Anti-diabetic medications				
Yes	27	18	42	0.045ns
No	3	0	0	
Complications of DM:				
CKD	0	3	3	0.080ns
HTN	12	18	27	0.0001***
CAD	3	6	18	0.010ns
Stroke	3	3	12	0.140ns
Other	12	12	18	0.159ns

Table (5): Relationship between Diabetes Management Self-Efficacy Scale scores and the new One-Minute Osteoporosis Risk Test levels Post a self-care management program application (n.=90)

ORTlevel	DMSESscore Post			P. value
	Low confidence	Intermediate confidence	High confidence	
No risk	10	12	12	0.0001**
Moderate risk	20	6	27	0.0001**
High risk	0	0	3	0.0001**
Total	**30**	**18**	**42**	

Conclusion:

The majority of them received Calcium supplements andthe majority of the studied patients had a moderate risk for osteoporosis.There was a statistically significant difference regarding self-efficacy scale (DMSES) scores between Pre, Post & after 3 monthsafter self-care management program application, also the result showed an increase of high confidence level post and after 3 monthsof a self-care management program application. There was no statistically significant difference between diabetes management self-efficacy scale scores & demographic data of the studied patients except their ages, level of education and occupation. There was a statistically significant difference between diabetes management self-efficacy scale scores and the new One-Minute osteoporosis risk test levels post self-care management program application. Also, the moderate-risk group had a high confidence level of self-efficacy.

Recommendations:

Relevant forms and visual information to facilitate educating diabetic patients regarding osteoporosisought to be accessible and given to each diabetic patient.Using strategiesfor knowledge reinforcement, skills advancement, confidenceimprovement, problemsolving, and physiological and psychological feedback can improve OP knowledge, self-efficacy, dietary calcium intake, diabetes self-care practice, diabetesmanagement efficacy, and glycemic level control in diabetic patients.Further studies are required to explore the impacts of nurse-ledmoderate-to-vigorous exercise interventions and education onthe long-term utilization of calcium-rich diets on OP prevention and diabetes control for diabetic patients.

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The authors declare that there is no conflict of interest.

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