RESEARCH ARTICLE

Self-care Practices of Diabetic Patients toward the Prevention of Osteoporosis in Babylon Governorate, Iraq

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Abstract

Background: Diabetic patients with uncontrolled insulin are exposed to a potential risk of osteoporosis because disorder of osteoblast-osteoclast function and confusion in the metabolism of calcium, phosphorus and vitamin "D". Objectives: The aim of the study to determine self-care practices of diabetics about the prevention of osteoporosis. Patients and methods :A cross-sectional design study had conducted in in Babel Governorate/Iraq in Endocrinology and Diabetes Diseases Center from 3rd November 2018 to 10th March 2019.Samples were collected during systematic random technique using a questionnaire form had constructed and developed by a researcher after extensive review of related books and available literature. SPSS was used for statistical analysis in the present study. Results: 420 diabetic patients of type 1 and type 2 had been participated in the study with response rate (96. 99%). Their ages ranged from 15-75 years with a mean and standard deviation of 51.8 ± 13.5 years, 53.4% were female and 46.7% were male. More than half of diabetics were married and the majority (63.3%) were livening urban areas. 26.9% of diabetics were illiterate and type 2 diabetes was accounted for 81.2%; hypertension was calculated for 36.4% while obesity for 35.7% of them. The majority (66.4%) of diabetic patients had illustrated fair score (62-77) towards self-care practices about the prevention of osteoporosis. There was significant correlation (P. value ≤ 0.05) between good self-practices of diabetics toward the prevention of osteoporosis and relating to their adult age group, living in urban areas, employed group, high educational grade, type 1diabetes and insulin intake, family member with diabetes, diabetics with normal body mass index. Conclusions: The current study had concluded that diabetic patients generally had fair grade of self-care practices about the prevention of osteoporosis. Recommendations: The study has been suggested the enforcement of well-organized ceaseless educational courses supported with modern educational technologies for diabetic patients in diabetic centers and conducting studies on large samples of diabetic patients in other governorates in Iraq to determine self-care practices towards the prevention of osteoporosis and as well as to determine the prevalence of osteoporosis among diabetics.

Keywords: *Diabetic patients, Self-care practices, Prevention, Osteoporosis.*

Introduction

Diabetes mellitus is a chronic common disease; recognized by high blood glucose as a biochemical sign. The major types of diabetes are classified according to those caused by absolute a lack of insulin secretion due to damage to pancreatic beta cells type 1 DM and those that are the result of insulin resistance type 2 DM occurring at the musculoskeletal level and fatty liver tissue, with different degrees of ß cell impairment [1]. DM requires a rigorous and continuous commitment to daily treatment, dietary restrictions, and lifestyle changes that can be difficult to implement by some diabetics[2].Along with poor compliance towards the treatment and dietary behaviors, bad life styles of diabetic patients ;long-period macro vascular and micro vascular complications of DM are occur and knownthat include retinopathy, diabetic foot, nephropathy, acute coronary syndrome, neuropathy, and stroke [3]. Another significant serious, however, overlooked, complication of DM is bone disease or low skeletal safety and strength [4]. Osteoporosis is global disease and refered to reduction in bone mass and alteration of bone structure caused by a change in the microscopic structure of the bones. Diabetic patients with uncontrolled insulin during long period of

time are exposed to a potential risk of osteoporosis because disorder of osteoblast-osteoclast function and confusion in the metabolism of calcium, phosphorus and vitamin "D" [5].Main causes of osteoporosis include low Bone mineral density{BMD} ,low body mass index, increasing age, female sex, hypogonadism, postmenopausal status, or premature ovarian failure, ethnic background, rheumatoid arthritis, vitamin D deficiency, current smoking, low calcium intake, immobilization, hyperkyphosis, alcohol abuse, and long-period use of certain medications [6].T1DM is associated with a low BMD copmared to T2DM that was associated with a natural or increase in BMD [7].

Global literature on osteoporosis has focused primarily on knowledge in females of different age groups [8].Knowledge studies on osteoporosis have been conducted in many diseases including cancer, thalassemia, and HIV patients [9].Diabetes mellitus is a high-risk category for development of osteoporosis, so diabetics self-care behaviors about the prevention of osteoporosis are important and critical for public health [10].In this study; the researcher continued to carry out the study for the first time in Babylon Governorate, Iraq by using a questionnaire form prepared and developed for this purpose by researcher after extensive review of related books and available literature with the conduct of some amendments with aim to determine self-care practices for diabetic patients towards the prevention of osteoporosis.

Patients and Methods

Design and Period of the Study

A descriptive design (cross-sectional) study was conducted for the period from 3rd November 2018 to 10th March 2019.

Setting of the Study

This study was conducted in Babel Governorate/Iraq, in Endocrinology and Diabetes Diseases Center in Medical Marjan City

Sample of the Study

420 diabetic patients of both type 1 and type 2 diabetes mellitus had selected during random-systematic sampling technique through the face-to-face interview and informed about the study purposes and objectives and period of interview for the patient from (20-30) minutes.* Estimation of sample size was calculated according to Daniel sample size formula for continuous {infinite} community; which is explained as following formula:

$$n = \frac{z^2 \; p(1-p)}{d^2}$$

; n = number of expected sample units; Z: statistic for a level of confidence (for the level of confidence of 95%, which is conventional, Z value is 1.96), P: expected prevalence or proportion, d: is the desired level of absolute precision. (D is considered 0.05 to produce good precision and smaller error of estimate). ∗ source [11].

This meaning that z = 1.96 ,prevalence of diabetes in Iraq according to study in Iraq about 20% [12], d = 0.05.n = $(1.96)^2$ * (0.20 * 0.80) / $(0.05)^2$ = 3.8416 * 0.16 /.0025 = 245(minimum sample size). So that 420 diabetics were suitable for the study.

Questionnaire Form

The questionnaire was constructed and developed by researcher after a thorough review of a previous literature review and articles related to this subject. It consists of 2 parts {46 items}. (6) Items for demographic and social characteristics which is age, residency, job, marital status, level of education, others. (9) items for health aspect of a sample like type of diabetes mellitus, how old was where you have diabetes, others.(8) items for the dietary practices like eating amount of nuts like almonds, hazelnuts, and walnuts daily, consume a sufficient amount of calcium per day, present in (milk, cheese, spinach, and black beans) equivalent to about 1000-1500 milligrams per day, others(5) items for sport practices like moderate exercise for 30 minutes or more every day, others (6).

Items for follow-up of health and medical services like measurement of blood pressure, check the percentage of calcium, vitamin D and phosphorus in the blood in continuous manner and orderly, others. (5) items for practices about taking medications like taking diabetes medications regularly on time, others.(7) items for other self-care practices like sleeping between (six-ten) hours a day, there is a negative smoking situation in the home, others as explained in a questionnaire. Value of Alpha Cronbach reliability coefficient was 0.85 of self-care

practices (31 sub-items) through (test-retest) method.

Scales and Scoring

Three point Likert scales are used for rating self-care practices of diabetic's patient items as score 3 for {always}, 2 for {sometimes} and score of 1 for {never} for positive items, while for negative items as score 3 for never, 2 for sometimes, [1] for always [13]. Determination of a grades of the patients' self-care practices were divided according the following score; a score below medium (< 50%) was considered as poor, a score from 50-74% was considered as fair, a score ≥ 75% was considered as good [14].

Statistical Analysis of Data

The data of the present study are analyzed through the use of Statistical Package of Social Sciences (SPSS) version 25 like frequency, chi-square test. Where there is frequency of expected cells less than 5 more than 20% for more than 2x2 tables; P. value (Monte Carlo) used instead of P. value (asymptotic) to get accurate results.

Results

The results of this study were based on the analysis of (420) diabetic patients; 224 (53.4%) were female and 196 (46.7%) were male their ages ranged from (15-75) years with a mean of (51.8) years and a standard deviation of (±) 13.5 years. The higher percentages (50.5%) were in the adult age group (55-75). Most of patients (63.6%) were livening in urban area. The higher percentages (39.3%) were in housewife group. Most cases (83.1 %) were in married group and (26.9%) were in illiterate group. High percentages (81.2%) were in T2DM group.

The age mean of onset of DMT1 was 20.5 years while the age mean of onset of DMT2 was 44 years. High percentages (53.3%) were with history of family for DM. Most cases (80.5%) with use of oral hypoglycemic drugs. Chronic hypertension (36.4%), (35.7%) were with obesity. The higher percentages (74.5%) were non-smokers as explained in Table 1.

Table 1: Socio-demographic and health characteristics of diabetic patients

Socio- demographic and health characteristics		No.	%
Total No.		**420**	**100.0**
Age (years)	< 35 years	**46**	**11**
	35---44	64	15.2
	45---54	98	23.3
	55---75	212	**50.5**
	Mean± SD (Range)	51.8±13.5 (**15-75**)	
Gender	Male	196	46.7
	Female	224	**53.3**
Residence	Urban	267	**63.6**
	Rural	153	36.4
Occupation	Employee	46	11.0
	Student	20	4.8
	Earner	52	12.4
	Housewife	165	**39.3**
	Retired	76	18.1
	Free work	61	14.5
Marital status	Single	25	6.0
	Married	349	**83.1**
	Separated	1	0.2
	Divorced	23	5.5
	Widow	22	5.2
Educational level	Illiterate	113	**26.9**
	Read & Write	47	11.2

	Primary	79	18.8
	Intermediate	66	15.7
	Secondary	49	11.7
	Institute	37	8.8
	College and Higher	29	6.9
Type of DM	T1DM	79	18.8
	T2DM	341	**81.2**
Age of onset of DMT1	Mean± SD (Range)	20.5±8.4 (8-55)	
Age of onset of DMT2	Mean± SD (Range)	**44±8.2 (15-65)**	
Family member with DM	Yes	224	**53.3**
	No	196	46.7
Medications used for DM	Insulin	82	19.5
	Oral hypoglycemic drugs	338	**80.5**
Chronic hypertension		153	**36.4**
BMI (Kg/m2)	Thin (<18.5)	29	6.9
	Normal (18.5-24.9)	123	29.3
	Overweight (25-29.9)	118	28.1
	Obese (=>30)	150	**35.7**
Smoking	Yes	107	25.5
	No	313	**74.5**
Duration of smoking (years)	Mean± SD (Range)	17.0±10.8 (2-50)	

Table (3) had been demonstrated self-care practices of diabetics toward the prevention of osteoporosis according main domains; where explained that score of dietary practices was fair (57.1%), score of sport practices was fair (55%), score of follow up of health & medical services was poor (73.6%), score of practices about taking medications was fair (58.6%), score of other self-care practices was fair (51.4%).

Table 3: Responses of diabetics about self-care practices towards the prevention of osteoporosis according main domains

Main domains	Scoring	frequency	%
A) Dietary practices (1-8) items	Poor (< 16)	97	23.1
	Fair (16-19)	**240**	**57.1**
	Good (≥ 20)	83	19.8
B) Sport practices (9-13)items	Poor < 10	83	19.8
	Fair (10-12)	**231**	**55**
	Good (≥ 13)	106	25.2
C) follow up of health & medical services (14-19) items	**Poor (< 12)**	**309**	**73.6**
	Fair (12-14)	85	20.2
	Good (≥ 15)	26	6.2
D) Practices about taking medications(20-24)items	Poor (< 10)	18	4.3
	Fair (10-12)	**246**	**58.6**
	Good (≥ 13)	156	37.1
E) Other self-care practices (25-31) items	Poor (< 14)	101	24
	Fair (14-17)	**216**	**51.4**
	Good (≥ 18)	103	24.5

Figure (1): This figure (pie chart) demonstrated that the majority (66.4%) of diabetics had fair self-care practice score and (24.5%) of diabetics had poor self-care practice score, while (9.1%) of diabetics had good self-care practice score towards the prevention of osteoporosis.

Figure 1: Score of self-care practices of diabetics toward the prevention of osteoporosis

Table 4: The associations between the overall self- care practices score of diabetics about the prevention of osteoporosis and socio, demographic, health aspect characteristics

Socio- demographic &health characteristics		The overall self-care practice score					
		Poor (<62)		Fair (62-77)		Good (=>78)	
		No.	%	No.	%	No.	%
Age (years)	< 35 y.	7	15.2	35	76.1	4	8.7
	35---44	13	20.3	36	56.3	**15**	**23.4**
	45---54	25	25.5	65	66.3	8	8.2
	55---75 y.	58	27.4	143	67.5	11	5.1
	$X^2 = 22.726$	P value = 0.001*				df =12	
Gender	Male	41	20.9	138	70.4	17	8.7
	Female	62	27.7	141	62.9	21	9.4
	$X^2 = 2.881$	P value = 0.237				df =2	
Residence	Urban	55	20.6	187	70	**25**	**9.4**
	Rural	48	31.4	92	60.1	13	8.5
	$X^2 = 6.121$	P value = 0.047 *				df =2	
Occupation	Employee	7	15.2	32	69.6	7	**15.2**
	Student	3	15	16	80	1	5
	Earner	16	30.8	35	67.3	1	1.9
	Housewife	48	29.1	103	62.4	14	8.5
	Retired	7	9.2	59	77.6	10	13.2
	Free work	22	36.1	34	55.7	5	8.2
	$X^2 = 25.428$	P value (Monte Carlo) = 0.002 *				df =10	
Marital status	Single	5	20	20	80	0	0
	Married	84	24.1	232	66.5	33	9.5
	Divorced	8	34.8	10	43.5	5	21.7
	Widow	6	27.3	16	72.7	0	0
	$X^2 = 12.858$	P value (Monte Carlo) = 0.155				df =8	
Educational level	Illiterate	53	46.9	60	53.1	0	0
	Read & write	20	42.6	27	57.4	0	0
	Primary	12	15.2	63	79.7	4	5.1
	Intermediate	6	9.1	57	86.4	4.5	6.1
	Secondary	8	16.3	36	73.5	5	10.2
	Institute	3	8.1	19	51.4	**15**	**40.5**
	College /Higher	1	3.4	17	58.6	**11**	**38**
	$X^2 = 145.446$	P value = 0.0001 *				df =12	
Type of DM	T1DM	13	16.5	53	67	**13**	**16.5**
	T2DM	90	26.4	226	66.3	25	7.3
	$X^2 = 8.491$	P value = 0.014*				df =2	
Family member with DM	Yes	49	21.9	145	64.7	**30**	**13.4**
	No	54	27.6	134	68.4	8	4.1
	$X^2 = 11.598$	P value = 0 .003*				df =2	
Medications used for diabetes	Insulin	16	19.5	51	62.2	**15**	**18.3**
	Oral hypoglycemic	87	25.7	228	67.5	25	6.8
	$X^2 = 10.944$	P value = 0.004 * df =2					

Table 3 (continue …)

Chronic hypertension	Yes	41	26.8	100	65.4	12	7.8
	No	62	23.2	179	67.1	26	9.7
	X^2 = 0.935	P value = 0.627				df =2	
BMI (Kg/m2)	Thin (<18.5)	4	13.8	16	55.2	9	31
	Normal (18.5-24.9)	22	17.7	86	69.4	**16**	**12.9**
	Overweight (25-29.9)	35	29.9	77	65.8	5	5.3
	Obese (=>30)	42	28	100	66.7	8	5.3
	X^2 = 29.301	P value = 0.0001*				df =2	
Smoking	Yes	32	29.9	68	63.6	7	6.5
	No	71	22.7	212	67.4	31	9.9
	X^2 = 2.871	P value = 0.238				df =2	
*Significant difference between proportions using Pearson Chi-square test ≤ 0.05 level.							

The finding of the present study had explained that there was significant association (P. value ≤ 0.05) between good score of overall self- care practices of diabetics and relating their adult age group (35-44) years, residence in urban areas, employed group, high education educational level group, type of DM1, family member with DM, medications (injected insulin) used for diabetes, normal body mass index. On another aspect; there was not statistically significant differences (P. value > 0.05) regarding the gender, marital status, smoking, and as noted in Table 3

Discussion

Screening of systematic for complications and prevention of fall efforts, along with repletion of calcium and vitamin D and adequate physical activity, compliance with (good dietary practices and follow up of medical, diagnosis services), avoiding risk factors such as smoking and other factors represent the basis in the prevention of osteoporosis & fractures in diabetics[15].So that the aim of the current study to determine self-care care practices of diabetics toward the prevention of osteoporosis among a sample of diabetics related to Endocrinology and Diabetes Diseases Center for the first time in Babylon governorate, Iraq. Overall level of self-care practices of diabetics about the prevention of osteoporosis were fair (66.3%); this explaining moderate self-care behavior of diabetics towards the compliance of the prevention of osteoporosis.

Slightly findings of the study were in similar line with the study by Raithatha et al., 2014 in An and, India indicated that overall mean percentage score of self- care activities was 54.41%[16]; but were disagreement by the study in West Ethiopia by Dedefo et al., 2019 had explained that the majority of diabetics (60.7%) had good self-care[17];these the differences in self-care practices between countries could be due to higher ratio of diabetics with literate level in Ethiopia and easier access to health-associated activities .Adult diabetic patients had showed significant association with good self-care practices; this might be demonstrated that advance in age increasing expert of diabetics about self-care towards the prevention of osteoporosis, the finding was accepted by the study in Erbil, Iraq of Othman and Khurshid, 2014 that had been observed that adult group of diabetics were with better self-care

practices about the prevention of diabetes complications[18].Diabetics were living in urban areas had observed significant correlation with self-care practices; this might be attributed to better educational grade of diabetics that living in urban areas and also development in cultural, socio-economic conditions that contributing to best self-care practices about the prevention of osteoporosis. The finding was agreed by the study of Abbas et al., 2016 in Baghdad ,Iraq [19].Employed diabetics had been indicated significant correlation with good self-care practices; this might be showed impact of good socio-economic degree of employed diabetics that contributing in better self-care about the prevention of complications. This result was in accordance with the study in Western Ethiopia by Chali et al., 2018 had interpreted that high self-care of diabetics were associated with governmental occupation[20].

Diabetics with high educational level had explained good self-care practices towards the prevention of osteoporosis; this might be to the fact attributed to stronger-educational level of diabetics and hence had better motivation towards exploring and understanding self-care practices of diabetes and its future complication prevention, the result of the study was agreed by the study of Othman and Khurshid, 2014 in Baghdad, Iraq and the study in Addis Ababa, Ethiopia by Bonger et al.,2018 had indicated that there was significant relationship between good self-care behaviors of diabetic patients and high grade of education[18,21].Diabetics with type 1 had been injected insulin showed significant association with good self-care practices; this had demonstrated that diabetics with type 1 that inject insulin for treatment were more tending towards basic self-care aspects because of severity of type 1

and hence more active participation in educational counselling by health care workers and therefore have a good motivational level regarding their practices towards prevention of many complications; this finding was slightly nearest with the study in Jordan by Gharaibeh and Tawalbeh, 2018 had observed that there was significant association between good self-care behaviors of diabetics and type 1 diabetes and type of medication (insulin) compared to type 2 that taking oral tablets towards management of diabetes complications[22].Diabetics with a family member with DM had been elucidated also significant correlation with good self-care practices; the possible reason might be matched to family members with diabetes had more perception about general aspects about diabetes management and therefore had important role in better motivation of members with diabetes about self-care management of diabetes and the prevention of osteoporosis. Slightly; the finding of the current study was accepted by the study of Tol *et al* 2012.

In isfahan, Iran had explained relatively significant differences between dietary practices of diabetics and history of diabetes towards the prevention of complications of diabetes[23].Diabetics with normal body mass index had been explained significant correlation with good self-care practices; this had revealed that Iraqi diabetic patients with normal weight (low fat among body) had best self-care activities such as sport practices, following practices of health services, others that contributing in the prevention of osteoporosis. This finding was with similar line with another study of Compeán Ortiz *et al.*,2010 in Nuevo Leon, Mexico had reported that there was significant correlation between better self- care behaviors of diabetics and normal body index towards control on complications of diabetes[24].

Conclusion

Diabetic patients generally had fair level of self-care practices about the prevention of osteoporosis. There was a significant relationship between good self-care practices of diabetics and relating their adult age group, living in urban areas, employed group, high educational grade, type 1 diabetes and insulin intake, family member with diabetes, diabetics with normal weight. The study had suggested enforcement of ceaseless education programs supported with modern educational technologies in diabetic's centers and other health institutions for diabetics to increase self-care about the prevention of osteoporosis and studies to determine prevalence of osteoporosis among diabetics.

Recommendations

The study has been suggested the enforcement of well-organized ceaseless educational courses supported with modern educational technologies for diabetic patients in diabetic centers and conducting studies on large samples of diabetic patients in other governorates in Iraq to determine self-care practices towards the prevention of osteoporosis and as well as to determine the prevalence of osteoporosis among diabetics.

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