https://doi.org/10.15218/ejnm.2020.07 Erbil j. nurs. midwifery, Vol. 3, No. (1), May, 2020
Original Article

Physical Activities among Diabetic Patients Attending Diabetic Centers in Kurdistan Region, Iraq

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ABSTRACT

Background and objective: Physical activity is defined as basic public health for the human body and one of the main treatments for many chronic diseases, especially diabetes mellitus. The aim of this study to assess the level of physical activity among diabetic patients in Kurdistan and determine the association between levels of physical activity and certain variables of socio-demographic and clinical data.

Methods: This cross-sectional study was conducted on 444 diabetes patients in the Kurdistan region of Iraq. The data was collected from 20th June to 10th September 2018 through interviews by using a questionnaire checklist. The data was analyzed by using the statistical package for the social sciences program.

Results: Nearly half of the participants (49.1%) were middle-aged (36 - 55 years). Majority of them were females (65.1%), married (88.1%) and illiterate (42.3%). Nearly half of them (43.9%) were obese, having high blood glucose levels (76.8%) and half of them (50%) had hypertension. Majority (75.5%) of participants were within high levels of physical activity. A highly significant relationship was found between the level of physical activity and sex (P -value < 0.001), presence other chronic diseases, hypertension and heart disease. There were significant relationships between the body mass index and diagnostic duration of diabetes mellitus with the presence of other chronic diseases, presence hypertension, and heart disease.

Conclusion: The majority of diabetic patients had high levels of physical activity, high blood sugar levels, obese, and had many chronic diseases. There was a statistically significant association between the level of physical activity with some variables of socio-demographic and clinical data. There was a highly significant association between body mass index and diagnostic duration of diabetes mellitus with the presence of other chronic disease.

Keywords: Physical Activity; Diabetic Mellitus; Kurdistan Region.

Received: 18/9/2019 *Accepted: 22/12/2019* *Published: 30/5/2020*

INTRODUCTION

Diabetes mellitus is a metabolic disease involving the under production in insulin secretion or action, due to hyperglycemia. When uncontrolled, diabetes mellitus can cause many complications like blindness, renal failure, heart disease, atherosclerosis, and strokes [1]. In addition, exercise and physical activity are the main ways to control blood glucose levels. Exercise can also improve blood circulation, lowers cholesterol and triglyceride levels due to improved muscle tone [2].Nowadays, regular physical activity and exercise enhances body health in a general way and improves quality of life [3]. In type 2 diabetes mellitus, randomized controlled trials illustrated

that physical activity can delay advancement of impaired glucose tolerance if combined with dietary changes [4]. In spite of this evidence, diabetes organizations very strongly advocate incorporating some level of physical activity in the treatment of diabetes mellitus [5]. The American Diabetes Association (ADA) Council on Exercise recommended that patients with type 2 diabetes should perform resistance exercise at least two times per week on the non-consecutive days, but three times a week would be preferred. More ideally, physical activity for patients with type 2 diabetes should incorporate regular aerobic activities [6]. Much of the guidelines about physical activity also applied in patients with type 1 diabetes mellitus. People with type 2 diabetes mellitus should be doing at least 150 min per week of moderate to strong physical activity outside their home at least three days per a week, with no more than two days of consecutive activity [7].Despite groups of diabetes patients (both type 1 and type 2) being afraid that their hyperglycemia would act as a barrier to performing such physical activity, it is still advised that they are physically active as an important component of their diabetes management [8]. Globally, prevalence of diabetes mellitus estimated by World Health Organization (WHO) in 1997 was more than 135 million and expected to increase by the year 2025 by 120% [9]. According to the WHO, prevalence of diabetes mellitus among patients 18 years of age and over was raised; in 1980 it was 4.7% but in 2014 it was 8.5%. According to their estimates, in 2016, diabetes mellitus was considered as the seventh leading cause of death, and estimated 1.6 million persons' deaths were caused by diabetes mellitus directly [10]. Shaw et al found that the world prevalence of diabetes mellitus among adults (aged 20 –79 years) was 285 million adults (6.4%) in 2010, and will be increased to 439 million (7.7%) by 2030 [11].Prevalence of diabetes increased in all the countries and researchers noted the role of physical activity among diabetic patients in controlling glucose levels and decreasing complications. The researchers intended to assess the levels of physical activity and determine the association between levels of physical activity with socio demographical and clinical data. They also seek to determine the, if any, association between the presence of other diseases with the BMI and diagnostic duration of diabetes mellitus.

METHODS

A cross-sectional study was carried out in the three Diabetes Centers that are available in the Iraqi Kurdistan Region, namely Layla Qasm Diabetes Center in Erbil City, Diabetes & Endocrine Center in Sulaimania City and Duhok Diabetes Center in Duhok City. Among 88,442 of diabetic patients who were registered in the registrations department of these diabetic centers, 62,767 of them were adults (Erbil 36,325, Sulaimania 3,098 and Duhok 23,344), 444 nonprobability (purposive) adult diabetes patients participated in this study (Erbil 176, Sulaimania 140 and Duhok 128). These diabetic patients were visiting the diabetic centers monthly for their medical checkups. The proportionate of sample size became approximately 400 participants for all three Centers; Erbil, Sulaimani and Duhok were 158, 136 and 106 participants respectively. The sample size was increased to account for a potentially higher prevalence of diabetes related to undiagnosed cases in the population. The sample size was estimated and calculated by using the formula for calculating the minimum sample size for cross-sectional studies. A sample size of 113 participants was estimated based on having a prevalence of diabetes of 0.08 with a degree of precision of 5% [12]. The inclusion criteria included

all diabetic patients who attend the diabetic center in those Centers that mentioned above. Patients who refused to participate and with limited communication wereexcluded. The investigators used the International Physical Activity Questionnaire (IPAQ), short form in the survey and data was collected through using the interview technique. Part 1: The socio-demographic part, which included data about age, sex, marital status, location of the home, occupational status, and educational level. Part 2: The clinical information part, which included the body mass index (BMI), diagnostic duration of diabetes mellitus, presence of other chronic diseases and type of chronic disease. Part 3: The questions of IPAQ short form were about specific types of physical activities during the seven days, under the following four domains: leisure time; domestic and gardening; work-related; and transport-related physical activities. Three levels of physical activity were assessed which included; walking; moderate-intensity activities (e.g., gardening, washing the car or clothes by hand, or bicycling at normal speed); and vigorous-intensity activities (e.g., heavy weightlifting, running or swimming). Total physical activity of Metabolic Equivalent Task (MET)-minutes/week = Walking + Moderate + Vigorous MET minutes/week scores. Note: MET scores of 3.3, 4.0 and 8.0 for walking, moderate and vigorous intensity activity, did not reported days per week in which any of walking, moderate and vigorous intensity activity was reported. In regards to these three categories of physical activity, they were defined by IPAQ as Category 1 being low physical activity level, Category 2 being moderate physical activity level including at least 20 minutes of vigorous intensity level activities done per day for 3 or more days per week, or at least 30 minutes of moderate intensity activity per day for five or more days weekly, or 5 or more days of any combination of walking, moderate-intensity or vigorous intensity level activities reaching a minimal total physical activity of at least 600 MET minutes/week, and Category 3; high physical activity level conceived as vigorous-intensity activity, at least 3 days reaching a minimal total physical activity of at least 1500 MET-minutes/week, or 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities reaching a minimal total physical activity of at least 3000 MET-minutes/week. All of the activities were set apart as IPAQ scoring protocol [13, 14]. The study was carried out from May 1st, 2018 to August 1st, 2019. The data was collected from June 20th to September 10th, 2018. Official permission was obtained from the directorates of health from Erbil, Suleimania and Duhok. During the survey, the researchers briefly explained the purpose of the survey, obtained verbal consent from each participant, and completed the questionnaire by direct interview. Data was analyzed by the Statistical Package for the Social Sciences (SPSS, version 20). Descriptive and inferential statistics were used in this study with descriptive statistics used for calculating frequencies and percentages of participants. The association between levels of physical activity with the different socio-demographic and clinical characteristics of the participants was assessed by using inferential statistics and Chi-Square test. A P value of ≤ 0.05 was considered statistically significant.

RESULTS

Table 1 shows the socio-demographic characteristics of diabetic patients. 39.6% of the study participants were in Erbil city. Nearly half of the participants (49.1%) were middle-aged (36 - 55 years old). Majority of the study participants were

female (65.1%). Most of them were married (88.1%) and from urban areas (83.8%). Finally, 60.6% of them were unemployed and 42.3% of them were illiterate. Table 2 demonstrates the clinical information of the diabetic patients. Around 44% of the diabetic patients were obese and 54.5% were diagnosed between 1 and 9 years duration. Regarding the blood glucose level, majority of the participants (76.8%) had a high blood glucose level. Regarding presence of other diseases, half of them (50%) had hypertension. Table 3 explores the levels of physical activity of diabetic patients with the majority (75.5%) of them being at a high level of physical activity, 15.3% of them were at moderate level of physical activity and 9.2% were at low level of physical activity. Table 4 focuses on the association between socio-demographic data and levels of physical activity of diabetic patients. There was a very high significant association between the sex of patients and the level of physical activity (P-value < 0.001) and another significant association was found between age groups and levels of physical activity with (P-value = 0.032). Table 5 displays the association between some of the clinical information variables with the levels of physical activity. A highly significant relationship was found between levels of physical activities with the presence of other chronic diseases, such as hypertension and heart disease (P-value <0.001). Another significant relationship was found with the presence of retinopathy (P-value = 0.009). Table 6 shows the association between BMI groups with the presence of some chronic disease and complication of diabetes mellitus. There was a highly significant relationship between BMI with the presence other chronic diseases (P-value =0.002) and presence of hypertension (P-value =0.001).Table 7 shows the relationships between duration of diagnoses of diabetes mellitus with some chronic disease and complication of diabetes mellitus. There was a highly significant relationship found between groups diagnostic duration with the presence of heart disease (P-value < 0.001), and high significant relationship found between presence other chronic diseases (P-value = 0.001), presence hypertension (P-value = 0.007), presence kidney disease (P-value = 0.003), finally, a significant association was also found with the presence of anemia (P-value = 0.024).

Table 1: Socio-demographic characteristics of diabetic patients

Socio-demographic Variables		N= 444 F	(%)
Residential area	Erbil	176	(39.7)
	Sulaimania	140	(31.5)
	Dahuk	128	(28.8)
Age Groups	18 - 35 Years Old (Young Adult)	20	(4.5)
	36 - 55 Years Old (Middle-Aged Adults)	218	(49.1)
	56 Years Old and above (Older Adult)	206	(46.4)
Sex of Participants	Male	155	(34.9)
	Female	289	(65.1)
Marital Status	Married	391	(88.1)
	Widowed	35	(7.9)
Location of Home	Urban	372	(83.8)
	Sub – Urban	53	(11.9)
	Rural	19	(4.3)
Occupational Status of Participants	Self Employed	44	(9.9)
	Retired	60	(13.5)
	Governmental Employee	71	(16)
	Unemployed	269	(60.6)
Educational Status of participants	Illiterate	188	(42.3)
	Can read and write	85	(19.1)
	Primary School	90	(20.3)
	Secondary School	36	(8.1)
	Institute or College	45	(10.1)
	Total	**444**	**(100)**

Table 2: Medical information of diabetic patients

Clinical Information Variables		N= 444 F	(%)
BMI Groups of Participants	Under Weight	3	(0.7)
	Normal Weight	81	(18.2)
	Over Weight	165	(37.2)
	Obese	195	(43.9)
Diagnostic duration of Diabetes Mellitus	1 - 9 Years	242	(54.5)
	10 - 19 Years	154	(34.7)
	20 - 29 Years	34	(7.7)
	30 - 40 Years	14	(3.2)
Level of Blood Glucose	Normal level of blood glucose	28	(6.3)
	Above normal level of blood glucose	75	(16.9)
	High level of blood glucose	341	(76.8)
Presence of other chronic diseases	Yes	279	(62.8)
	No	165	(37.2)
	Total	**444**	**(100)**
Type of chronic disease (*N=279)	Hypertension	222	(50)
	Heart disease	109	(24.5)
	Kidney Disease	45	(10.1)
	Retinopathy	60	(13.5)
	Anemia	30	(6.8)
	Stroke	3	(0.7)
	Asthma	8	(1.8)
	Neuropathy	48	(10.8)

Table 3: Levels of Physical Activity

Physical Activity	N= 444 F	(%)
Low Level of Physical Activity	41	(9.2)
Moderate Level of Physical Activity	68	(15.3)
High Level of Physical Activity	335	(75.5)
Total	**444**	**(100)**

Table 4: Association between socio-demographic variables and levels of physical activity

Clinical Information Variables	Sub-groups	Levels of physical activity			P-value
		Low Level of Physical Activity (%)	Moderate Level of Physical Activity (%)	High Level of Physical Activity (%)	
Age Groups	18 - 35 Years Old (Young Adult)	(0.5)	(0.5)	(3.6)	**0.032**
	36 - 55 Years Old (Middle-Aged Adults)	(2.5)	(7.2)	(39.4)	
	56 Years Old and above (Older Adult)	(6.3)	(7.7)	(32.4)	
Sex of Participants	Male	(4.1)	(8.3)	(22.5)	**<0.001**
	Female	(5.2)	(7.0)	(52.9)	
	Widowed	(1.4)	(1.4)	(5.2)	
Occupational Status of Participants	Self Employed	(0.2)	(2.3)	(7.4)	**0.395**
	Retired	(1.4)	(2.7)	(9.5)	
	Governmental Employee	(1.6)	(2.5)	(11.9)	
	Unemployed	(6.1)	(7.9)	(46.6)	
Educational Status of participants	Illiterate	(4.5)	(4.5)	(33.3)	**0.484**
	Can read and write	(1.1)	(3.4)	(14.6)	
	Primary	(1.8)	(3.6)	(14.9)	
	Secondary	(0.9)	(1.6)	(5.6)	
	Institute or College	(0.9)	(2.3)	(7.0)	
	Total	(**9.2**)	(**15.3**)	(**75.5**)	

Table 5: Association between clinical information and levels of physical activity

		Levels of physical activity			
Clinical Information Variables	**Sub-groups**	**Low Level of Physical Activity (%)**	**Moderate Level of Physical Activity (%)**	**High Level of Physical Activity (%)**	**P-value**
BMI Groups of Participants	Under Weight	(0)	(0)	(0.7)	**0.753**
	Normal Weight	(1.4)	(2.3)	(14.6)	
	Over Weight	(3.6)	(5.2)	(28.4)	
	Obese	(4.3)	(7.9)	(31.8)	
Diagnostic Duration of Participants	1 - 9 Years	(3.8)	(8.6)	(42.1)	**0.610**
	10 - 19 Years	(4.3)	(4.7)	(25.7)	
	20 - 29 Years	(0.7)	(1.6)	(5.4)	
	30 - 40 Years	(0.5)	(0.5)	(2.3)	
Did you have Any Other Chronic Diseases	Yes	(7.9)	(11.3)	(43.7)	**<0.001**
	No	(1.4)	(4.1)	(31.8)	
Did you have Hypertension	No	(2.3)	(6.1)	(41.7)	**<0.001**
	Yes	(7.0)	(9.2)	(33.8)	
Did you have Heart disease	No	(5.4)	(9.7)	(60.4)	**<0.001**
	Yes	(3.8)	(5.6)	(15.1)	
Did you have Kidney Disease	No	(8.1)	(14.4)	(67.3)	**0.432**
	Yes	(1.1)	(0.9)	(8.1)	
Did you have Retinopathy	No	(7.9)	(11.5)	(67.1)	**0.009**
	Yes	(1.4)	(3.8)	(8.3)	
Did you have Anemia	No	(8.3)	(14.2)	(70.7)	**0.687**
	Yes	(0.9)	(1.1)	(4.7)	
Did you have Stroke	No	(9.2)	(15.1)	(75.0)	**0.622**
	Yes	(0)	(0.2)	(0.5)	
Did you have Neuropathy	No	(8.1)	(13.3)	(67.8)	**0.723**
	Yes	(1.1)	(2.0)	(7.7)	
Normality and abnormality of Blood Sugar	Normal level of blood sugar	(0.7)	(0.7)	(3.4)	**0.570**
	Above normal level of blood sugar	(0.3)	(1.0)	(12.9)	
	High level of blood sugar	(6.8)	(15.0)	(59.2)	
	Total	**(7.8)**	**(16.7)**	**(75.5)**	

Table 6: Association between clinical information and BMI groups

Some variable		BMI Groups of Participants: Under Weight (%)	Normal Weight (%)	Over Weight (%)	Obese (%)	P-value
Did you have Any Other Chronic Diseases	Yes	(0)	(49.4)	(63.0)	(69.2)	**0.002**
	No	(100)	(50.6)	(37.0)	(30.8)	
Did you have Hypertension	No	(100)	(64.2)	(52.7)	(41.0)	**0.001**
	Yes	(0)	(35.8)	(47.3)	(59.0)	
Did you have Heart disease	No	(100)	(82.7)	(77.6)	(70.3)	**0.089**
	Yes	(0)	(17.3)	(22.4)	(29.7)	
Did you have Kidney Disease	No	(100)	(90.1)	(88.5)	(90.8)	**0.834**
	Yes	(0)	(9.9)	(11.5)	(9.2)	
Did you have Retinopathy	No	(100)	(88.9)	(87.3)	(84.6)	**0.673**
	Yes	(0)	(11.1)	(12.7)	(15.4)	
Did you have Anemia	No	(100)	(98.8)	(92.1)	(91.8)	**0.163**
	Yes	(0)	(1.2)	(7.9)	(8.2)	
Did you have Stroke	No	(100)	(100)	(98.8)	(99.5)	**0.716**
	Yes	(0)	(0)	(1.2)	(0.5)	
Did you have Neuropathy	No	(100)	(88.9)	(88.5)	(89.7)	**0.081**
	Yes	(0)	(11.1)	(11.5)	(10.3)	

Table 7: Association between clinical information and group's diagnostic duration

Some variable		Diagnostic Duration of Participants: 1 - 9 Years (%)	10 - 19 Years (%)	20 - 29 Years (%)	30 - 40 Years (%)	P-value
Did you have Any Other Chronic	Yes	(54.5)	(71.4)	(76.5)	(78.6)	**0.001**
Diseases	No	(45.5)	(28.6)	(23.5)	(21.4)	
Did you have Hypertension	No	(57.0)	(44.2)	(32.4)	(35.7)	**0.007**
	Yes	(43.0)	(55.8)	(67.6)	(64.3)	
Did you have Heart disease	No	(83.9)	(68.2)	(55.9)	(57.1)	**<0.001**
	Yes	(16.1)	(31.8)	(44.1)	(42.9)	
Did you have Kidney Disease	No	(92.6)	(90.3)	(76.5)	(71.4)	**0.003**
	Yes	(7.4)	(9.7)	(23.5)	(28.6)	
Did you have Retinopathy	No	(88.8)	(85.7)	(76.5)	(78.6)	**0.179**
	Yes	(11.2)	(14.3)	(23.5)	(21.4)	
Did you have Anemia	No	(95.9)	(91.6)	(88.2)	(78.6)	**0.024**
	Yes	(4.1)	(8.4)	(11.8)	(21.4)	
Did you have Stroke	No	(99.2)	(99.4)	(100)	(100)	**0.938**
	Yes	(0.8)	(0.6)	(0)	(0)	
Did you have Neoropathy	No	(92.6)	(85.1)	(85.3)	(85.7)	**0.099**
	Yes	(7.4)	(14.9)	(14.7)	(14.3)	

DISCUSSION

Physical inactivity could be a global health problem as most studies focused and discussed leisure time physical activity, while physical activity at work, domestic and amid transport has not been assessed [15]. Physical activity in adults with type 2 diabetes significantly increases by interventions of their behavioral [16]. Such activity is linked to improving personal fitness and therefore could reduce the complications of chronic diseases and disabilities preventing an unhealthy weight [3].

The study was assessed by using IPAQ, a suitable instrument and simple measurement to assess overall physical activity for diabetic patients. IPAQ also provides information for the best way for control of blood glucose without using prescription drugs. The study determined that most of the study sample had a high level of physical activity. However, the majority of them had other chronic illnesses which further complicated their diabetes symptoms. Moreover, nearly half of them were obese. The reason may be that the majority of them neglected to manage and control their blood glucose because as their blood glucose was high and may have neglected taking their medications. This study did not agree with that of Acheampong in 2011 which was conducted on 350 diabetic patients in Kumasi, Ghana with more than half of their study sample having not received formal education at all, and a greater number of these patients not performing any physical exercise [17].

A very high significant relationship was shown between the sex of patients and the level of physical activity as well as between the age groups and the levels of physical activity. This may be due to nearly half the study population being middle aged and the highest level of physical activity is typically found within this age group. The result agreed with the cross-sectional study conducted on 320 patients with type two diabetes in Hamadan, Iran; there was a significant ($P<0.05$) relationship between physical activity level and age group [18], The study was also agreed with a cross-sectional nation-wide study conducted by Sibai et al., 2013 on 2,195 haphazardly chosen adults aged 25 years and older in Lebanese governorates. They found in their study that physical activity was significantly higher among the middle-age group [19].A very high significant association was found between levels of physical activity and the presence of other chronic diseases, especially with the presence of hypertension and heart disease, as well as with the presence of retinopathy. A high significant association was found between BMI with the presence of other chronic disease, especially with the presence of hypertension. The reason behind this could be that diabetes could lead to various complications in the arteries and arterioles making them more susceptible to developing atherosclerosis. Also, the participants in this study majority of them were obese and high level of blood glucose. The result is similar to the findings of the previous cross-sectional study conducted by Ali et al in determining the prevalence of diabetes mellitus complications among patients in Duhok, Erbil and Suleimania cities of Iraq. Their study showed a significant association between some diabetes mellitus complications with demographic variables and showed highly significant differences in diabetic laboratory tests with BMI [9]. In addition, the results of our study were supported by the cross-sectional study conducted in 2009–2010 in Spain by Brugnara et al. In this study, low physical activity especially among women is associated with several cardiovascular risk factors and could

be responsible with an increasing prevalence of obesity and diabetes [20]. There was a highly significant association found between group's diagnostic duration with presence of other disease, especially with the presence of heart disease and a high significant association with presence of other chronic diseases, like hypertension, kidney disease, anemia and normality and abnormality of blood sugar. For similar reasons, nearly half of the study group had been diagnosed for diabetes Mellitus between one to nine years ago, but the majority of them had other chronic diseases that indicated diabetes mellitus complications. Nearly half of them were obese and most of them had high blood glucose levels. Petrie et al., 2018 reported that diabetes and hypertension are closely related together and diabetes is related to an increased risk of cardiovascular disease, which is overstated with coexistent hypertension [21]. The study was in agreement with the non-experimental, cross-sectional study of Gutierrez et al., (2018) conducted in Tabuk city in Saudi Arabia. In this study, researchers studied 432 participants and the results in their study showed a positive correlation between BMI with hypertension and diabetes mellitus (P <0.001); whereas the relationship between hypertension and diabetes mellitus was (P <0.001). Thus, this relationship was the strongest correlation observed among those variables [22].In general, the study revealed that the majority of the study group was at a high level of physical activity, while the majority of diabetes patients were overweight and obese, had other chronic diseases, high levels of blood glucose, and were illiterate. Not having statistically relationships between the levels of physical activity with the majority of the variables may be due to the limitations of the study such as lack of information about factors that controlling blood sugar such as; family history, illness, side effects of steroids or anti-psychotic medication, overconsumption of foods, stress, menstrual periods, pain and dehydration. Also, our study only included asking about and not observing the exercise. Patients might not have answered the question correctly or honestly.

CONCLUSION

The study concluded that the physical activity among diabetic patients was high, but because of negligence of other parts of treating diabetes mellitus disease by the patients such as diet and medication, blood sugar remained high, patients remained obese and other side effects were present as well. There was a very high significant association between the levels of physical activity and BMI and some side effects, as well as an association between of level of physical activity with the patients' sex and age.

CONFLICTS OF INTEREST

The authors report no conflicts of interest and any sources of financial support.

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