RISK FACTORS OF TYPE 2 DIABETES MELLITUS IN SULAIMANI CITY

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ABSTRACT

Background

Diabetes mellitus (DM) is a group of metabolic disorders of carbohydrate, lipid, protein and electrolyte metabolism in which glucose is underutilized, producing hyperglycaemia and changes in lipid profile.

Objectives

The aim of current study was to determine risk factors and demographic characteristics of patients havingT2DM in Sulaimani city.

Methods

Case control study started at December 2014 to March 2016. The cases were interviewed in diabetic and endocrine center in Sulaimani city, the sample size was 500 (200 cases diagnosed and registered in the center and 300 controls matched with age and gender). Interview done by a questionnaire designed for cases and control after taking verbal consent for the collection of relevant socio-demographic information, in addition to classical risk factors, such as smoking, high red meat intake, overweight /obesity, family history of T2DM and physical activity.

Results

Nearly (59%) were female, among cases and controls 86.5% of cases were from urban area compared to 78% in control group. Having history of high cholesterol and triglyceride level, hypertension , smoking , less physical activity, eating processed red meat and fast food, watching TV > 6hr/day, history of 5 time eating rice or more /week , having history of soft drink consumption ,family history of T2DM and history of gestational diabetes and big baby were significantly associated with T2DM. Logistic regression analysis shows that family history (OR=20, P<0.001), obesity (OR=10.5, P<0.001) and sedentary lifestyle (OR=17.9,P<0.001) are good predictors of T2DM.

Conclusion

T2DM has modifiable risk factors which can be prevented or modified by adopting healthy lifestyle and exercise.

Keywords: *Diabetes Mellitus, Sedentary lifestyle, Obesity, Sulaimani City.*

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INTRODUCTION

Type 2 diabetes Mellitus (T2DM) has become a leading health problem throughout the world, not only in Western countries, but also in developing countries. According to the International Diabetes Federation, T2DM ranks as one of the most rapidly increasing non-communicable diseases (NCDs) in the world today. Over 371 million people worldwide were diagnosed with diabetes in 2011, with an expected 7.7% increase by 2030 [1]. Urban populations are considered to be at especially high risk for diabetes due to the nutritional shift from a minimally-processed, rural diet to a more 'Westernized' diet quickly gaining popularity in cities [2-3].

It has also been suggested that ethnic differences in the prevalence of T2DM could be ascribed to genetic differences [4].

Diabetes is a chronic disease that leads to high morbidity and mortality resulting from the complications that develop during its clinical course. Patients with diabetes are twice as likely to develop cardiovascular disease compared to the general population of the same age and sex, and this risk remains the same after adjustments for other traditional cardiovascular risk factors [5-7].

Objectives of this study to determine risk factors and. Socio- demographic characteristics of patient having T2DM in Sulaimani Governorate.

PATIENTS AND METHODS

A case control study was carried out in Sulaimani Centre for Endocrine and Diabetes diseases, which is located in Kurdistan Region. It is receiving patients from all parts of Sulaimani Governorate and seen by internist and diabetologist. The centre was established in 2007 and registered more than 17850 patients that done for them clinical evaluation and investigation needed for their situations. Study started on December/2014 to March 2016. A sample of 500 participants enrolled in the study. Two hundred cases of T2DM were diagnosed and registered in center compared with three hundred apparently healthy controls selected from different PHCCs matched with cases by age and gender.

A well-organized and validated questionnaire was prepared and tested by a pilot study (including 15 cases). The questionnaire include Socio-demographic characteristics, family history of diabetes mellitus, high sugar intake, BMI, diet history and some question about life style of patient.

Direct interview was done with all 500 participants by the researcher after explaining the objectives of the study a verbal consent was taken from cases and controls.

While occupation classified according to International Standard Classification of Occupation [8] into 3 classes as follows: (1) High professional jobs as medical doctors, dentists, pharmacist, engineers, university teaching staff, lawyers, large business directors and/or owners, company directors, managers…. etc. (2) Non-manual skilled or semi-skilled occupations as teachers, clerical workers, health care workers(other than doctors, dentists and pharmacist), small business owners, military and policemen. (3) Manual partly skilled or unskilled occupations as labor workers, casual workers, unemployed and retired. Also took family history of diabetes mellitus and a positive family history classified into 1st degree (parents, offspring, and siblings) [9], and 2nd degree relative. Physical exercise was asked as any active sport for ≥ three hours every week.

Dyslipidaemia defined as abnormal lipid profile consists of the following abnormalities either singly or in combination according to National Cholesterol Educational program for patient with diabetes & standard medical care, these include TG levels ≥ 150 mg/dl and elevated total cholesterol level ≥ 200 mg [10]. Fasting plasma glucose (FPG): Good control<126 mg/dl ,Bad control ≥126 mg/dl ,Poor glycaemic control refers to glycosylated haemoglobin (HbA1c) levels of ≥ 7% & good control referred to <7 % [11].

Data were coded, entered to Microsoft Excel sheet, cleaned and analysed using Statistical Package for the Social Science (SPSS) version 21.0 software program. The data described by calculating of frequencies, percentages, and means; cases & control group compared using Chi square test & logistic regression. A (p-value) ≤ 0.05 was considered significant.

RESULTS

The mean age (±SD) for T2DM group was (53.6± 11.9) years, and for the control group (52.1± 12.7) years. The mean of fasting plasma glucose (±SD) for T2DM group was (252±118), mean of HbA1c (±SD) was (9.5±1.7), mean of cholesterol (205.8±70.2), and mean of triglyceride was (212.1±185.6).

Most prevalent age groups in both cases and controls were 30-60 years and 59.5% of cases were female

compared to 58.7% in controls group. There was no statistically significant association between both age and gender and T2 DM. (P>0.05).

Married people proportion among control was (88%) compared to (85%) in cases (P=0.01). Illiterates were most common among cases (33%) compare to (16.7%) in control group while proportion of those with college qualifications were more common in control group 8.3% compared to cases (3.0%) and the difference was Statistically significant (P<0.001). Most of cases were obese about 40% compared to 11% in control group (P<0.001). Around 41% of controls spent 3-5hr/day watching TV compared to 59% among cases with statistically significant difference (P<0.001).

High cholesterol level was found in (26%) of cases compared with only (8 %) of controls (P<0.001) with an OR=4.04, 95% CI (2.39-6.81) and 40(20%) of cases have history of high triglyceride level compared to 8% in control group (P<0.001) with an OR=2.87, 95% CI (1.67-4.94). The association between T2DM & history of hypertension was also statistically significant (P<0.001) with an OR=10.68, 95% CI (6.42-17.74). Around half of cases had no family history of T2DM compare to 261(87%) of control group (P<0.001) with an OR=18.09, 95% CI (11.43-28.63). It was found that 159 (53%) of control practice exercise compared to 18 (9%) of cases (P<0.001) with an OR=0.08, 95% CI (0.05-0.15).

Forty three (21.5%) of cases had history of smoking compared to 38(12.7%) in control group (P=0.009) with an OR=1.88, 95% CI (1.17-3.04). Consumption of red meat on daily basis was reported by 17% compared to only 2% by controls (P<0.001)and 29% of control group consumed fish 4-6 times/week compared to only 2% in cases (P<0.001). Vegetabile fat consumption was reported among 70% compared to 10% in cases, while no one of control group used animal oil only & those used both type of oil was triple in cases (P<0.001).

Regarding history of fast food, 83% of cases eat fast food 0-2 times/week and about 5% of them used fast food > 6 times/week compared to 84.4% & 1% respectively in control group (P=0.01) and 155 (77.5%) of cases ate rice 5 or more serving/week compared to only 4 (1.3%) in control group (P<0.001). History of fuzzy drink consumption> 5 time /week was found in(69%) of (0.3%) in control group (P<0.001).

Logistic regression revealed that the following are good predictors of T2DM; family history of T2DM (P<0.001) with an OR=20 & 95% CI (10.4-38.2), obesity (P<0.001) with an OR=10.5 & 95% CI (4.9-22.3), Sedentary life (P<0.001) with an OR=17.9 & 95% CI (8.1-39.7), Smoking (P 0.02) with an OR=2.4 & 95% CI (1.1-5.1), Soft drink consumption (P 0.002) with an OR=2.4 & 95% CI (1.3-4.4).

Table 1 Socio-demographic characteristic of cases and control

Variables	Cases		Controls		Total	P-value
	No.	%	No.	%		
Age/year						
<30	5.0	2.5	5.0	1.7	10	
30-60	135	67.5	212	70.7	347	0.66
>60	60	30	85	27.7	145	
Gender						
Male	81	40.5	124	41.3	205	.853
female	119	59.5	176	58.7	295	
Marital status						
Single	4.0	2.0	16	5.3	20	
Married	169	84.5	265	88.4	434	0.018
Widowed	27	13.5	19	6.3	46	
Level of education						
Illiterate	66	33	50	16.7	116	
Elementary grades (1st-6th)	58	29	64	21.3	122	
Grades (7-12)	48	24	91	30.3	139	<0.001
Institute	22	11	70	23.3	92	
College & higher	6.0	3.0	25	8.3	31	
Current occupation						
- High professional jobs	1.0	0.5	9.0	3.0	10	
-Non-manual skilled	36	18	141	47	177	
-Manual skilled	163	81.5	150	50	313	<0.001
Body mass Index(BMI)						
-Normal weight	42	21	205	68.3	247	
-Over weight	78	39	62	20.7	140	<0.001
-Obese	80	40	33	11	113	
Watching T.V						
-0-2 hrs	49	24.5	174	58	223	
- 3-5 hrs	118	59	124	41.3	242	<0.001
- ≥6 hrs	33	16.5	2.0	0.7	35	

Table 2. Medical history and life style characteristics among cases & control

Medical history and Life style	Cases		Controls		OR	95% CI	P-value
	No.	%	No.	%			
High cholesterol level							
Yes	52	26	24	8.0	4.04	2.39-6.81	<0.001
No	148	74	276	92			
High triglyceride level							
Yes	40	20	24	8.0	2.87	1.67-4.94	<0.001
No	160	80	276	92			
Hypertension							
Yes	94	47	23	7.7	10.68	6.42-17.7	<0.001
No	106	53	277	92.3			
Family history of T2DM							
No	54	27	261	87	18.09	11.43-28.63	<0.001
Yes	146	73	39	13			
Degree of relativity							
1st	132	90.4	36	92.3	0.78	0.21-2.88	0.71
2nd	14	9.6	3.0	7.7			
Practicing exercise							
Yes	18	9.0	159	53	0.08	0.05-0.15	<0.001
No	182	91	141	47			
History of smoking							
Yes	43	21.5	38	12.7	1.88	1.17-3.04	0.009
No	157	78.5	262	87.3			
Gestational diabetes							
Yes	15	12	1.0	0.6	23.45	3.05-180.06	<0.001
No	110	88	172	99.4			
History of big Baby							
Yes	69	55.2	6.0	3.5	34.29	14.12-83.29	<0.001
No	56	44.8	167	96.5			

Table 3. Food consumption among cases & control

variables	Cases		Controls		Total	P-value
	No.	%	No.	%		
Frequency of eating red meat						
Daily	34	17	6	2	40	
2-6 times/week	106	53	50	16.6	156	<0.001
1/week	37	18.5	44	14.7	81	
1-3 times/month	14	7	101	33.7	115	
Never or <1/month	9	4.5	99	33	108	
Frequency of eating fish						
4-6 times/ week	4	2	87	29	91	
1-3 times/week	5	2.5	13	4.3	18	
1-3 times/month	78	39	158	52.6	236	<0.001
Never or <1time/month	113	56.5	42	14	155	
Type of fat used in cooking						
Vegetable oil	20	10	210	70	230	
Animal fat	2	1	0	0	2	
Both of them	178	89	90	30	268	<0.001
History of fast food eating						
0-2 times/week	166	83	253	84.4	419	
3-5 times/week	24	12	44	14.6	68	
≥ 6 times/week	10	5	3	1	13	0.01
History of rice consumption						
≥ 5 serving/week	155	77.5	4	1.3	159	
3-4 serving/week	36	18	100	33.3	136	<0.001
2 or less/week	9	4.8	196	65.3	205	
Soft drink consumption						
>5 time/week	15	7.5	1	0.3	16	
< 5 time/week	185	92.5	299	99.7	484	
						<0.001

Table 4. Logistic regression analysis between diabetes (as a dependent variable) and several covariates.

Variables	B	p	OR	95% C.I. for OR	
				Lower	Upper
Family history of diabetes	2.997	< 0.001	20.019	10.489	38.204
Obesity		< 0.001			
Normal weight (reference)					
Over-weight	1.413	< 0.001	4.110	2.114	7.989
Obese	2.354	< 0.001	10.523	4.951	22.368
Sedentary life	2.889	< 0.001	17.981	8.133	39.751
Smoking	.889	.020	2.432	1.149	5.146
Residence (urban)	-.429	.268	.651	.305	1.391
Semiurban and rural (reference)					
Soft drinks	.909	.002	2.482	1.392	4.423
Constant	-5.034	< 0.001	.007		

DISCUSSION

Illiteracy showed an association with DM in this study, which is consistent with other studies done in USA 2008 [12].

Obesity is a powerful independent contributor to the onset of diabetes mellitus and the risk is related to the degree of adiposity. All types of obesity are associated with an increase of blood glucose levels and with deterioration in glucose tolerance [13-14]. Obesity in current study had a significant association with DM and findings are consistent with previous studies in Singapore 2007 [15] and Turkey 2007 [16].

It was found that a highly significant association existed between the T2DM and history of exercise and finding was consistent with study done in Finland 2005 [17-18].

Our modern day society encompasses an ecological niche in which sedentary behavior, labor-saving devices and energy dense foods have become the new reference of living. It has recently been confirmed that the consequences of our modern chair dependency are substantial and a direct contributing factor to the ever increasing epidemic of chronic diseases witnessed within industrialized environments, so in our study history of watching TV > 6 hr. /day was experienced by 0.7% of control group compared to 16.5% of cases of T2DM, this result was in agreement with a study done in UK 2016 [19].

Current smokers had an increased risk of developing T2DM compared with non-smokers and many other studies revealed same findings [20-21] .The relationship between red meat intake and the risk of T2DM remains unclear, in our study About 17% of cases eats meat daily compare to 2% which is similar to the finding in study done in japan [22] and in USA[23-24].

Higher consumption of sugar-sweetened beverages was associated with both greater weight gain and risk of T2DM. In our study there was great association between the T2DM and history of soft drink consumption/week which is consistent with study's done in USA 2008 [25].

In our study the mean FPG values of the cases was 252.2 ±118 mg/dl above the ADA criteria of diabetes, similar result seen in study done in Bahrain [26] which shows mean FPG of 254.5 mg/dl.

Lipid disorder are a common problem in current study as shown by increase mean of both cholesterol(205 ±70) and triglyceride(212±185) and regarded as a source of co-morbidity in diabetic patients and treating such disorder is important as cardiovascular diseases

are currently among the main causes of morbidity and mortality. Glycated hemoglobin A1c is done to monitor the control of blood glucose in DM. Alteration in blood glucose occurs from day to day average blood glucose level of preceding 2-3 months. Various studies have shown that amount of glucose attached to HbA1c increases with increase duration of DM. HbA1c is used both as an index of mean glycaemia and as a measure of risk for the development of diabetes complications .The mean of HbA1c was (9.5±1.7) in T2DM patients of current study which is consistent to a study done in 2012 in India (9.1) [27] and study in Brazil (8.8) [28] .

Conclusion

T2DM has modifiable risk factors which can be prevented or modified by adopting healthy lifestyle and exercise

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