Prevalence and Risk Factors of diabetes Mellitus among Medina Population

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Abstract:

Introduction: Diabetes Mellitus (DM) defined as a group of metabolic disorders which threatens to reach pandemic levels by 2030[1]. The most common form is Type 2. Many factors have been found to increase the risk of having type 2 diabetes. Thus, we conducted this study to identify the prevalence and factors that affect the progression of diabetes mellitus among Medina population.

Methods: This study is a cross sectional analytical observational study which conducted during a campaign named "Your Health is Your Life 2". The data collected by interviewing all participants with questionnaire. The questionnaire include socioeconomic data and risk factors of diabetes mellitus. Then, the participants underwent to series of measurements including blood pressure measurement, random blood glucose level, glycosylated hemoglobin measurement, and calculating body mass index.

Results: A total of 929 participants visited the campaign were included in this study. Diabetes was present in 118 (12.7%). prevalence is higher in those above 40 years 73.8% (P<.001). The prevalence of those did not eat fast food is 39% (P<.001). 66.1% of diabetics have at least one of their first degree relatives having DM. 99.2 & 67.8 of diabetics have no history of heart disease or dyslipidemia, respectively.

Conclusion: In our study, we found the prevalence of diabetes mellitus in Medina is equal to 12.7. In our study we studied several risk factors as sex, marital status, residency, occupation, fast food, Body Mass Index, and cardiovascular diseases. These factors could contribute with the prevalence as it showed statistically significant difference.

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Introduction:

Diabetes Mellitus (DM) defined as a group of metabolic disorders which threatens to reach pandemic levels by 2030[1]. Two types are known. The most common form is Type 2 diabetes mellitus. Type 2 diabetes mellitus consists of an array of dysfunctions characterized by hyperglycemia which results from the combination of resistance to insulin action, inadequate insulin secretion, and excessive or inappropriate glucagon secretion [2]. Poorly controlled type 2 diabetes is associated with devastating complications including diabetic nephropathy, a markedly increased risk of end-stage renal failure, retinopathy, cardiovascular disease and premature death [3],[4],[5],[6].

Many factors have been found to increase the risk of having type 2 diabetes including urbanization, sedentary lifestyle (decreased physical activity, diet and smoking) [7],[8],[9],[10],[11],[12].

On international bases, more than 371 million people found to have diabetes and the number of people with diabetes is still increasing in every country. Half of people with diabetes are undiagnosed. Also, 4.8 million people died due to diabetes [1].

In Saudi Arabia, several studies have been conducted to determine the prevalence of DM. One of them, published in 2004, estimates 23,7% of the Saudi population suffering from the disease [8]. Another study in 2009, estimates 30% of the Saudi population suffering from the disease [9].

Our study is a cross sectional analytical observational study aims to identify the prevalence of Diabetes Mellitus among Medina population with studying of some risk factors of Type 2 Diabetes Mellitus.

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Objectives:

Primary objective :

❖ To study the propagation of diabetes mellitus among Madina population.

❖ To study the factors that affect the progression of diabetes mellitus among Medina population

Secondary objectives:

- To estimate the impact of an exercise and fast food on diabetic patients.

- To estimate the effect of smoking on the progress of the disease.

- To estimate the relation between diabetes mellitus and cardivascular diseases.

- To estimate the relation between diabetes mellitus and hypertension.

Methodology

This study is a cross sectional analytical observational study aim to identify the prevalence of Diabetes Mellitus among medina population with studying some risk factors of Diabetes Mellitus. This study conducted during a 10 days campaign named "Your Health is Your Life 2". The study targeted all daily visitor of this campaign from students, client and employee of different governmental departments , it was established in Al-Rashed Mall, at Al Madinah Al Monowarh Holy City. The study will includes all visitors to the campaign from the period of 9 April 2013 to 19 April 2013 with no exclusion criteria.

Tool Used:

The data collected by filling a Questionnaire by trained health science students who were interviewing the participant. The questionnaire include some socioeconomic data in addition to targeted questions regarding many risk factors of

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Diabetes Mellitus. The questionnaire questioned about age, sex, residency, marital status, financial and educational level, family history, frequency of eating fast food per week, exercising hours per week, smoking habit, and other comorbidity like hypertension, dyslipidemia, and any cardiovascular disease, after completing the questionnaire the participant underwent to series of measurements including Blood pressure measurement, Random Blood Glucose level, Glycosylated Hemoglobin HbA1C, finally measuring the weight and height to calculate Body Mass index - Body Mass Index (BMI) which is an index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m2), BMI values are age-independent and has the same application for both sexes.

The Blood pressure measurements done by using mercury sphygmomanometer to the nearest 2 mm for all subjects. We consider the participant to be hypertensive if his systolic blood pressure is equal to or more than 140 mmHg or diastolic blood pressure equal to or more than 90 mmhg.

Random Blood Glucose level was taken by using Finger prick test analyzed by Blood Glucose Meter (glucometer) brand name Contour product from BAYER company. According to the American Diabetes Association (ADA) guidelines, participant were considered to be diabetic if the random blood glucose level is equal to or more than 200 mg/dl, and normal if RBG level is less than 140 mg/dl. Those from 140 to less than 200 were considered to be prediabetics[13].

We also used finger prick test to measure HbA1C and the sample also was analyzed by using brand from BAYER company. Measuring HbA1C was only done for participants known to have Diabetes Mellitus and those their random blood glucose level was more than 200mg/dl.

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HbA1c reflects average plasma glucose over the previous eight to 12 weeks, it can be performed at any time of the day and dose not require any special preparation such as fasting. More recently its used as a diagnostic test for diabetes and as diagnostic test for person at high risk of diabetes a HbA1c of 6.5% is recommended by WHO the cut off point for diagnosing diabetes is measurement more than or equal 6.5, a value of < 6.5 dose not exclude diabetes.

For weight we use electronics weight measurement device and for height we used the attached roller for height measurement.

For evaluating Body mass index we used WHO criteria were the participant considered to be underweight if their BMI is <18.50, normal if their BMI from 18.50 to 24.99, overweight from >=25.00 to 29.99, and obese if >=30.00[14].

The questionnaire was designed and pilot tested before its application. Data analysis was made by SPSS program version 16. P Values of the study variables. (0.05 is used)

Results:

A total of 929 participants visited the campaign were included in the study. Males accounted for 432 (46.5%) and females for 497 (53.5%). Diabetes Milletus was present in 118 (12.7%) participants (Table 2 & Figure 1). We diagnosed 16 (1.7%) participants with Diabetes as it shown by comparing the prevalence of Diabetes mellitus in Table 1 & Table 2. Among them 33 (28%) was non-Saudis and 85 (72%) was Saudis. Comparing the prevalence by the Demographic variables showed the prevalence is higher in those above 40 years 73.8% (P<.001). Male account for 67.8% (P<.001) of cases. The prevalence was higher among married cases 80.5% (P<.001). Only 8 (6.8%) cases was living in rural area (P .007). Diabetes was higher in those working in Educational section (26.3%) followed by those unemployed (22.9%0 out of 40 workers in health section only 3 (2,5%) cases

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discovered (P<.001). There was no statistical difference in comparing the prevalence with family income (Table 3). The prevalence of those did not eat fast food is 39% while those eating more than 3 times/weak is lesser 12.7% (P<.001). There was no statistical significance between the prevalence and exercise (Table 4). 66.1% of diabetics have at least one of their first degree relatives having DM. 99.2 & 67.8 of diabetics have no history of heart disease or dyslipidemia, respectively. The prevalence is increasing as BMI increasing 35.6 & 41.5 of diabetics are overweight and obese, respectively (P .001) (Table 5). Other factors showed no statistical significant difference.

Table 1: Prevalence of Diabetes Mellitus based on their previous diagnosis of diabetes.

	Frequency	Percentage (%)
Diabetics	102	11 %
Non Diabetics	827	89 %
Total	929	100 %

Table 2: Prevalence of Diabetes Mellitus based on their previous diagnosis of diabetes mellitus and random blood glucose Measurements.

	Frequency	Percentage (%)
Diabetics	118	12.7 %
Non Diabetics	811	87.3 %
Total	929	100 %

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Figure 1: Prevalence of Diabetes Mellitus based on their previous diagnosis of diabetes mellitus and RBG measurements
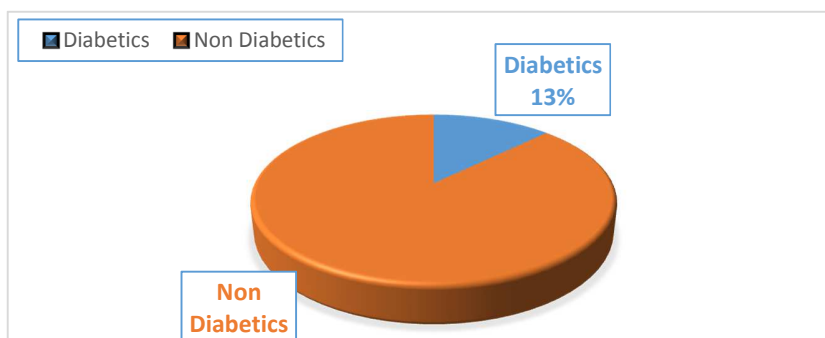

Table 3: Comparison of demographics variables with the prevalence of diabetes

Variables	Categories	Diabetic		Non-Diabetic		P value
		No.	%	No.	%	
Age	9 -19	7	5.9	176	21.7	.000*
	20-29	14	11.9	303	37.4	
	30-39	10	8.5	174	21.5	
	40-49	27	22.9	107	13.2	
	50-59	44	37.3	37	4.6	
	>60	16	13.6	14	1.7	
Gender	Male	80	67.8	352	43.4	.000*
	Female	38	32.2	459	56.6	
Nationality	Saudi	85	72	650	80.1	.043*
	Non-Saudi	33	28	161	19.9	

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Marital status	Single	17	14.4	402	49.6	.000*
	Married	95	80.5	384	47.3	
	Divorced	2	1.7	17	2.1	
	Widow	4	3.4	8	1	
Residence	Urban	110	93.2	792	97.7	.007*
	Rural	8	6.8	19	2.3	
Occupation	Health section	3	2.5	37	4.6	.000*
	Military section	2	1.7	13	1.6	
	Educational section	31	26.3	100	12.3	
	Governmental other than educational section	18	15.3	55	6.8	
	Worker	8	6.8	40	4.9	
	Student	7	5.9	272	33.5	
	Private job	22	18.6	100	12.3	
	Unemployed	27	22.9	194	23.9	
Family Income	< 3000 R.S	17	14.4	126	15.5	.265
	3000-6000 R.S	24	20.3	215	26.5	
	6000-9000 R.S	17	14.4	139	17.1	
	9000-12000 R.S	22	18.6	139	17.1	
	>12000 R.S	38	32.2	192	23.7	

* There is statistical difference

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Table 4: Comparison of life style variables with the prevalence of diabetes

Variables	Categories	Diabetics		Non-Diabetics		P Value
		No.	%	No.	%	
Fast Food /week	None	46	39	121	14.9	.000*
	Once	33	28	260	32.1	
	Twice	19	16.1	173	21.3	
	3 Times	14	11.9	113	13.9	
	>3 times	6	12.7	144	17.8	
Health club	Yes	7	5.9	80	9.9	.171
	No	111	94.1	731	90.1	
Exercise	None	57	48.3	330	40.7	.595
	Once	20	16.9	141	17.4	
	Twice	11	9.3	89	11	
	3 Times	9	7.6	80	9.9	
	>3 times	21	17.8	171	21.1	

* There is statistical difference

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Table 5: Comparison of comorbidity variables with the prevalence of diabetes

Variables	Categories	Diabetics		Non-Diabetics		P Value
		N0.	%	No.	%	
Smoking	Yes, currently	18	15.3	95	84.1	.349
	No	96	81.4	699	86.2	
	Ex-smoker	4	3.4	17	2.1	
Other types of smoking	No	109	92.4	676	83.4	.009*
	Al-shisha	7	5.9	41	5.1	
	Al-mo'asel	1	.8	84	10.4	
	Both of them	1	.8	10	1.2	
History of HTN**	Yes	45	38.1	48	5.9	.000*
	No	73	61.9	763	94.1	
History of Heart disease	Yes	1	.8	4	.5	.623
	No	117	99.2	807	99.5	
Diagnosis of Dyslipidemia	Yes	38	32.2	58	7.2	.000*
	No	80	67.8	753	92.8	
Family history of DM**	Yes	78	66.1	402	49.6	.001*
	No	40	33.9	409	50.4	
Family history of HTN**	Yes	53	44.9	412	50.8	.232
	No	65	55.1	399	49.2	
Family history of heart disease	Yes	25	21.2	151	18.6	.506
	NO	93	78,8	660	81.4	

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BMI**	Underweight	2	1.7	48	5.9	.001*
	Normal	25	21.2	292	30.6	
	Overweight	42	35.6	242	29.8	
	Obese	49	41.5	229	28.2	

* There is statistical difference.

** HTN: Hypertension, DM: Diabetes Mellitus, BMI: Body Mass Index

DISCUSSION

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia Resulting from impairment of insulin secretion or Insulin action, or both,, it is a multi-factorial disease of considerable heterogeneity. Within the last few decades, the prevalence of DM has continued to increase dramatically among Saudi population. Several previous studies in Saudi Arabia have reported this increased prevalence of DM. In our study we found that the the prevalence of diabetes mellitus in Madina is equal to 12.7%. Similar figure in previous studies found the prevalence of diabetes mellitus is 30% in Saudi Arabia[8].

In our study we studied several risk factors as exercises, weight, smoking, HTN and cardiovascular diseases. These factors could contribute with the prevalence of Diabetes Mellitus.

Regarding exercises, previous studies have shown that physical activity decreases the prevalence of diabetes mellitus, which was not observed in our study [9].

Regarding weight, BMI is a significant independent tool for diabetes mellitus. We have found the prevalence is increasing as the BMI increase, the same finding was found in a previous studies [9],[15]. In our study only 21.2% of patients were found to

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have average ideal weight (BMI, <25 kg/m2), while 35.6% overweight (BMI, 25-29.9 kg/m2), 41.5% were obese (BMI, 30-40 kg/m2).

Studying the relation between DM and HTN, our results showed that 38.1% of diabetic patients are hypertensive confirming the fact that diabetes prevalence increases with HTN, which is consistent with the findings in a previous study[9]. In our study we found that 99.2 % of diabetic patients have no history of heart diseases, which is inconsistent with a previous study that study that patients with CVD are at higher risk for DM[15].

Furthermore, the data obtained from our study indicate no statistical significant difference among smoker also other study did not find statistically significant differences regarding smoking [16].

our study has several strengths as well as several limitations. The strengths included broader age groups. Each participant was between 9 and 65 years and results were applicable to general population of Medina. Although we focused on major sociodemographic characteristics and lifestyle factors, Potential limitations should be considered. Data on fasting glucose levels and Lipid profile were not available and we did not use HgA1c for all participants to assess their blood sugar control thus risk of diabetes and according to this criteria, diabetes incidence might be misclassified. Our findings relied on one time random plasma glucose only and this could partly affect associations between lifestyle factors and diabetes according to laboratory criteria. Another limitation in our survey was the relatively small sample size.

Our findings suggest that the majority of diabetic cases are related to lifestyle factors. The need of lifestyle modifications was supported by our results and prevention of the disease should include various aspects of an individual's life,

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such as daily eating habits, physical activity, frequent laboratory monitoring, and screening for DM. Our study were found to have strong evidences that control of hypertension and weight loss are necessary for reducing the risk of DM

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