



Prevalence of Type Two Diabetes Mellitus and Risk Factors in Erbil City among Adult Population

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Abstract

Background: according to the WHO report prevalence of diabetes is increasing, incidence rapidly rising around the world, most significantly in middle-income countries. As reported by the International Diabetes Federation, currently out of ten adults one of them are living with DM. globally. **The aim of the study:** Is to determine the prevalence and risk factors of type two diabetes mellitus in Erbil city. **Method:** A population-based household study was conducted in Erbil city. Data are collected through the cluster sampling method in Erbil city. Erbil city consists of six municipalities, each municipality differs from the other. Depending on the population and number of alleys were divided and from each municipality, twenty-five percent was selected. Data were collected by a personal face-to-face interview with individuals of both sexes, aged over 20 years. The questionnaire consisted of socio-demographic characteristics: age, sex, marital status, (social classes) homeownership, family income, possession of a car, number of household members, number of rooms, education, occupation. The second part of the questionnaire related to risk factors which were consisted of, family history of diabetes mellitus smoking status, alcohol drinking, exercise, hypertension, heart disease, stroke, gestational diabetes, drug history, eating fast food. Patients will be regarded as diabetic if he has a history of diabetes and/or are on treatment. For the aim of evaluating the survey's reliability, a pilot study was carried out on 15 Erbil citizens regardless of diabetic patients for obtaining the reliability (test). The content validity was determined through four experts and all four experts are agreed on the content of the questionnaire with light changes for being more reliable. Statistical Package for the Social Sciences (SPSS) IBM SPSS Statistics 25 software was used for the analysis. Descriptive and inferential statistics were carried out. For univariate analysis, Odds Ratio was calculated using logistic regression. **Result:** The result of the study shows that the prevalence of the study is 15.3 percent. The current study found that the people who were under the age group 60-69 years old were more at risk as compared to those aged less than 29, OR=40.941, 95% CI= 20.182-83.032). Females more at risk as compared to males (OR= 1.35 95% CI= 1.050-1.738). Middle class more at risk as compared to upper class (OR= 1.812, 95% CI= 1.124-2.921). the widow was more at risk as compared to single (OR= 17.987, 95% CI= 6.652-48.640). family histories of diabetes were more at risk as compared to those who did not have family histories (OR= 3.315, 95% CI= 2.569-4.278). EX-smoker more at risk as compared to non-smoker persons (OR=2.062, 95% CI= 1.264-3.364). exercise persons more at risk as comparing sedentary lifestyle (OR= 1.860, 95% CI= 1.322-2.617). Patients who lived with hypertension are more at risk to get type two diabetes mellitus as compared to those who did not have hypertension (OR= 4.168, 95% CI= 3.112-5.581). women who has gestational diabetes was more at risk as compared to those who did not have gestational diabetes (OR= 5.645, 95% CI= 3.411-9.343). This study the result did not show the difference of risk between body mass index (BMI) and eating fast food. The current study shows that the participant who had a history of drugs are more at risk as compared to those who had no history of drugs (OR=3.560, 95% CI= 2.442-5.188) and waist circumference had a direct relation of getting type two diabetes mellitus (OR=1.041, 95% CI= 1.028-1.055). **Conclusion:** The result of the study shows that the prevalence of the study is 15.3 percent. Female, age group between 60-69, family history of diabetes, Ex-smoker, gestational diabetes, hypertension, history of drugs and obesity were founded it we more at risk.

Key Words: Adult Population, Risk Factors Associated, Heart Disease.

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Introduction

Diabetes mellitus (DM) is a chronic condition

characterised by inadequate insulin production and/or action. (1).

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The prevalence of diabetes is increasing continuously throughout the world. The International Diabetes Federation (IDF) predicts that the prevalence of diabetes among people aged 20–79 years has risen to 10.5 % (53.7 million) in 2021, up from 4.6% (15.1 million) in 2000. By 2030, they estimate that 643 million people will have diabetes if nothing is done to alleviate the problem (about 11.3% of the population). If current trends continue, by 2045, the population will have risen to 783 million (12.2%) (2). DM is no longer a disease that just affects wealthy countries; the prevalence of the disease has firmly increased everywhere. DM is increasing more rapidly in developing countries as compared to developed countries(3,4). The problem is that 50% of the patients are unaware of their disease condition(5). According to the IDF report, Iraq has a lower prevalence as compared to neighboring countries and is considered to have a medium prevalence (9.4%) as compared to the Middle East(2). The WHO reported that over a quarter of the population in the eastern Mediterranean has the second-highest prevalence(6). Many studies have shown that DM is a multifactorial aetiology disease including genetics (a strong component), age, physical inactivity, and being overweight (7). The prevalence of diabetes mellitus in Iraq was found to be 19.7%(8). Diabetes has a negative impact on the health care system, and this affects the wider global economy. The cost can be measured through direct and indirect costs. Direct costs like medical costs and indirect costs like loss of work and early retirement (age 21). In 2011, global healthcare spending on diabetes treatment and complications was estimated to reach \$465 billion. This figure is expected to exceed \$595 billion by 2030. Diabetes-related healthcare costs were twenty times higher in high-income countries than in low- or middle-income countries(4,6,9). Many studies show that the major factors that cause the increasing incidence and prevalence of DM globally, are ageing, obesity, sedentary lifestyle, and the urbanization process(10,11). The purpose of this study is to find out how common type 2 DM is and the risk factors associated with it.

Material and Methods

1. Study Design

This household survey was conducted in Erbil city. The sample selection was initially planned to be a multi-stage sample. Face-to-face interviews are used in the study.

2. Sample Size and Data Collection

A household survey was undertaken in Erbil from September 15th, 2021, to January 15th, 2022. Patients were regarded as diabetic if they had a history of diabetes and/or were on treatment. One part of the survey was designed to find the prevalence and its determinants. Interviews with adults aged over 20 years and over were conducted across all six municipalities. A multistage sampling technique was used, with the number of interviews in each area calculated in proportion to its population size. Within each municipality, districts and then local councils were randomly selected. A total of two thousand sampling units were chosen by this method. Households were then selected using a random route method: for each route, the first address was randomly selected, and one further household was identified at set intervals. In one area, where there were insufficient households within the area, the inter-researcher continued to the next house. Within each household, the occupant who was over 20 years old on the date of the visit was chosen for the interview. Demographic characteristics question the variables for "sex" (male or female) and "age," in years, categorised by age range (less than 30 – 30-39; 40-49; 50-59; 60-69; ≥ 70 years) were included. The variable "marital status" was classified into three categories: "single," "married," and "widowed or divorced." The level of "education" was classified into four categories in accordance with the number of years completed of formal schooling (illiterate, primary, secondary, college, and above). And, finally, "economic class was defined according to "SES = Education + Occupation + Wealth/income Classification Criteria."(12). for assessing risk factors, we asked about, physical activity, BMI, family history, hypertension, heart disease, stroke and gestational diabetes. The mentioned information is important to us because of the potential variable patterns that may emerge in the data.

3. Criteria for Inclusion and Exclusion

The researcher included all Erbil citizens and excluded Surya refugees, refugees who come from another part of Iraq, or people who come as refugees or for business; they stay partially in Erbil.

4. Material and Instrument

A steel tape measure, a soft tape measure, and a



portable digital weighing scale were used to measure height, waist circumference and weight, respectively. Patients were weighed while wearing light clothing and without shoes. Patients' heights were assessed without shoes.

5. Statistical Analyses

Data were entered, cleaned and analyzed By using the statistical package for the social sciences windows version 25.0 (IBM, SPSS USA).The data was cleaned using the sort cases (Ascending and descending) Tool, and wherever missing or unusual values were discovered, they were reviewed in the filled hardcopy data collecting questionnaire to remedy data input errors. The BMI of the respondents was calculated using the formula weight (kg)/height (m)².Descriptive statistics and frequencies were used to find the prevalence and To determine which variable had the most significant relationship with diabetes Mellitus in the presence of baseline variables such as demographic variables and risk factors variables as potential confounders, logistic regression odds ratio and 95% confidence interval were used to examine the relationship between diabetes Mellitus and each variable separately. The current study aimed to determine the prevalence and risk factors of type two diabetes mellitus in Erbil city.The Person's 2 test was used with a significance threshold of 5.0 %to determine the presence of a relationship between demographic,lifestyle, and health characteristics and self-reported type 2 DM. Following that, a multivariate logistic regression model was used to compensate for the need to control confounding factors and the usage of a binary event as a response variable. The selection method used was a stepwise reversal. The variables that achieved statistical significance in the univariate analysis (p-value≤0.05) were included in the model, and the variables with p-value≥ 0.05 were excluded following the interactions. Finally, the logistic regression coefficients, odds ratios and their 95% confidence intervals, as well as the probabilities for the outcome for each significant variable in the final model, were calculated. The percentage of accurate classifications from the final model was calculated.

6. Ethical Consideration

The study followed the Declaration of Haweler Medical University's ethical standards and was approved by the Ethical Review Committee at the

ethics committee of the College of Medicine, Hawler Medical University. It was deemed sufficient for the human population. There are no potential conflicts of interest. A verbal and written informed consent was obtained from Prior to being included in the study, each participant was interviewed. In addition, the researcher told each participant that they are free to answer research questions or not and that they can ask to stop at any time, even if the data collection process has not been finished.

Results

A total of 2006 adults aged over 20 years were selected to participate in the study, and 306 of them had type 2 DM. The prevalence of diabetes in Erbil city was 15.3 % as shown in table 1. Females (63.7%), those aged 60 to 69 years (35%), married women (82%), those with a middle income (62.7%), those unemployed or housewives (58.8%), and those with a family history of diabetes (65%) have a higher prevalence. a high prevalence of type 2 DM (49.3).

As indicated in Table 1, females are at a higher risk of acquiring type 2DM than males. (OR=1.351, 95%CI=1.050-1.738). The study's findings reveal that the chance of developing diabetes increases with increasing age (OR= 1.066, 95% CI= 1.059-1.077).married and widow or divorced were more at risk of developing the type 2 DM(OR= 24.07995% CI=7.667-75.622) and (OR= 57.670 95% CI= 17.656-188.368). The risk of having type 2 DM increases with decreasing educational levels. Illiteracy was 4.945 times higher, the primary was 3.348 times higher, and the secondary was 1.592 times higher. However, this was not statistically significant. The disease more prevalent among low and middle socio-economic class (OR= 2.715 95% CI= 1.624-4.537) and (OR= 1.909 95% CI= 1.471-2.478). As indicated in Table 2,People Physical inactivity raises a person's risk of developing diabetes. (OR = 1.860, 95% CI = 1.322-2.617). The chance of developing type 2 DM is increased by 1.739 times with overweight people and 2.658 with obese people. People having a family history of DM are 3.31 times more likely to develop type 2 DM (OR = 3.315, 95%CI = 2.569-4.278). type 2 DM is 4.502 times more probable in those who have hypertension. (OR = 4.502, 95%CI = 3.430-5.910). For a person suffering from a heart illness, the risk of contracting the condition is 3.35 times greater. (OR = 3.352, 95%CI = 2.199-5.111). Another risk factor for developing type 2 DM is stroke. (OR = 2.542, 95%CI = 1.147-5.637). Women who have



had past gestational diabetes are 6.22 times more (3.806-10.185).
 likely to develop type 2DM (OR=6.226, 95%CI=

Table 1.Bivariate analysis of socio-demography factors with type 2 DM.

Characteristic	Presence of DM			P-value	OR (95%CI)
	Diabetic No. (%)	No diabetic N (%)	Total No. (%)		
Gender					
Male	111 (13.1)	739 (86.9)	850 (42.4)	.019	1.351 (1.050-1.738)
Female	195 (16.9)	961 (83.1)	1156 (57.6)		
Total	306 (15.3)	1700 (84.7)	2006 (100)		
Age groups					
< 30	9 (1.9)	458 (98.1)	467 (100)		
30-39	13 (2.7)	476 (97.3)	489 (100)	.453	1.390 (0.588-3.283)
40-49	49 (13.2)	323 (86.8)	372 (100)	.001	7.720 (3.739-15.938)
50-59	89 (30.1)	207 (69.9)	296(100)	.001	21.880 (10.812-44.279)
60-69	107 (44.6)	133 (55.4)	240 (100)	.001	40.941 (20.187-83.032)
≥70	39 (27.5)	103 (72.5)	142 (100)	.001	19.269 (9.051-41.023)
Marital status					
Single	3 (0.8)	356 (99.2)	359 (100)		
Married	251 (16.9)	1237(83.1)	1488 (100)	.001	24.079 (7.667-75.622)
Widow & divorce	52 (32.7)	107 (67.3)	159 (100)	.001	57.670 (17.656-188.368)
Education					
Illiterate	151 (25)	454 (75)	605 (100)	.001	4.945 (4.945-7.473)
Primary	75 (18.4)	333 (81.6)	408 (100)	.001	3.348 (3.348-5.233)
Secondary	50 (9.7)	467 (90.3)	517 (100)	.053	1.592 (1.592-2.549)
College and above	30 (6.3)	446 (93.3)	476 (100)		
Socioeconomic class					
Low	23 (24.7)	70 (75.3)	93 (100)	.001	2.715 (1.624-4.537)
Middle	180 (18.8)	779 (81.2)	959 (100)	.001	1.909 (1.471-2.478)
High	103 (10.8)	851 (89.2)	954 (100)		

Table 2.Bivariate analysis of risk factors with DM2T

Risk factors	Diabetic N (%)	No diabetic N (%)	Total N (%)	P-value	OR (95%CI)
Physical activity					
Yes	43 (9.8)	398 (90.2)	441 (100)		
No	263 (16.8)	1302 (83.2)	1565 (100)	.001	1.870 (1.329-2.630)
BMI					
Normal	49 (9)	493 (91)	542 (100)		
Over weight	117 (14.7)	677 (85.3)	794 (100)	.002	1.739 (1.221-2.475)
Obese	140 (20.9)	530 (79.1)	670 (100)	.001	2.658 (1.877-3.763)
Family history of DM					
Yes	199 (24.6)	611 (75.4)	810 (100)	.001	3.315 (2.569-4.278)
No	107 (8.9)	1089 (91.1)	1196 (100)		
Hypertension					
Yes	118 (36.2)	208 (63.8)	326 (100)	.001	4.502 (3.430-5.910)
No	118 (11.2)	1492 (88.8)	1680 (100)		
Heart disease					
Yes	37 (35.6)	67 (64.4)	104 (100)	.001	3.352 (2.199-5.111)
No	269(14.1)	1633 (85.9)	1902 (100)		
Stroke					
Yes	9 (31)	20 (69)	29 (100)	0.021	2.545 (1.148-5.644)
No	297 (15)	1680 (85)	1977 (100)		
Gestational DM					
Yes	40 (54.8)	33 (45.2)	73 (100)	.001	6.226 (3.806-10.185)



No	154 (16.3)	791 (83.7)	945 (100)		
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Discussion

The current study shows that the prevalence of type 2 DM in Erbil city was 15.3 %. DM was found to be more prevalent in this survey than in the previous report of the IDF Atlas, 10th edition, which reported 9.4 % (2). However, the prevalence of diabetes is lower than in another local survey of 5400 people in the Iraqi city of Basrah, where it was 19.7 % (7). In terms of gender and age, more than half of the sample was female and older ages. This outcome is comparable to the study that took place in three cities in the Kurdistan region, Erbil, Duhok, and Suleimania, (11) as well as the findings from the Ovbiagele et al. study (12). This conclusion is consistent with the findings in Basra (7). Type 2 DM has the greatest impact on sex. In this research, females were shown to be more impacted by type 2 DM than males. Males and females in the Kurdistan region share the same culture, but men are more active than women, which makes females more likely to get type 2 DM. The authors [13, 14] found that males were more likely than females to have type 2 DM, which runs counter to our findings. According to the study, type 2 DM was more common in people who were married, divorced, or widowed than in people who were not married. These results agree with those of Al Mansour 2020 and Murad et al. After marriage, couples' lifestyles might change; they may eat more and exercise less, increasing their weight and their risk of disease(15). Levels of education have a strong association with type 2 DM. Illeterate, primary, and secondary students are more vulnerable than college and above students, in accordance with the findings of Dendup *et al*(16). The result of the study shows a significant relationship between type 2 DM and socio-economic class. This disagrees with the study byFlor and Campos, 2017(5).Type 2 DM is more prevalent in people who have been inactive physically. This was reported in another study(17). However, in the other study, physical activity played no role(6). Overweight and obesity have a high prevalence and more at risk. This is somewhat consistent with the results in Kuwait and the Kanungu District (9, 13). Type 2 DM shows significant association with family history of DM and this is to some extent in agreement with findingsbyHarrigan, 2007(18) People with high blood pressure were found to be 4.502 times more likely to get diabetes than people who didn't have these conditions. This has been reported in other

research as well. (11, 14) participants with heart disease and stroke were more likely to develop type 2 DM. Women who had been privous to gestational DM were more likely to get DM2T. This is to some extent in agreement with reported byNoctor, 2015(19).

Conclusion

It is considered that diabetes mellitus is a serious health concern that is linked to socioeconomic and demographic variables as well as other medical conditions. The prevalence of type 2 DM was relatively lower to that reported in other developing countries. Age, female gender, illiteratephysical inactivity, overweight and obese,family history of diabetes, hypertension, heart disease, stroke, and gestational diabeteswere more at risk.Some of the indicators found are amenable to intervention, stressing the need for more incisive and successful public policies, particularly those aimed at changing people's lifestyles. Controlling diabetes-related risk factors through health promotion strategies may help cut down on the disease's chances and long-term effects.

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