Study the Relation between Obesity and Diabetes Mellitus among Hospital Attendants in Erbil City

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Abstract:

Background and Objectives: Being overweight or obese increases the chances of developing the common type of diabetes**,** type 2 diabetes. In this disease, the body makes enough **insulin** but the cells in the body have become resistant to the salutary action of insulin. Information on such public health issues would provide evidence based data to develop guidelines and policies on this subject. The aim of this study was to study the relation between obesity and diabetes mellitus among patient's attendants in Erbil city during a period of one year starting from the first of April 2017 to the first of April 2018.

Methods: A cross-sectional study included 198 people selected from Erbils outpatient clinics (included two teaching hospitals and two primary health care centers). During a period of one year starting from the first of April 2017 to the first of April 2018. Patient's body mass index ≥ 30 kg/m2 were included in the study. A questionnaire was used to collect the data by face to face interview with the patients.

Results: The total number of the sample was 198 people. Their mean age + SD were 43.49 + 11.61 years. The median was 43 years and the age range was 19 to 65 years, (54.5%) of the samples were females, the male: female ratio was0.83:1. The occurrence of diabetes in the studied sample was (18.7%). It increased from (14.3%), to (20.4%), and to (23.3%) among those with BMI of 30-34, 35-39, and ≥ 40 Kg/m^2 respectively.

Conclusions: There was relation between diabetes and increased body mass index the more the body mass index the more the occurrence of diabetes. The occurrence increased significantly with the age of the studied sample and it is significantly higher among the unemployed and among those who have other medical diseases, it was higher among female. We found non- significant association between diabetes with both exercise and smoking.

Key words: Obesity, Diabetes, Relation, Erbil city.

Introduction:

Diabetes mellitus (DM) is a group of metabolic disorders in which there are high blood sugar levels over a prolonged period [(1)]. There are three main types of diabetes mellitus, type 1 diabetes results from the pancreas's failure to produce enough insulin, type 2 diabetes begins with insulin resistance, a condition in which cells fail to respond to insulin properly, and gestational diabetes is the third main form and occurs when pregnant women without a previous history of diabetes develop high blood sugar levels [(2, 3)]. Prevention and treatment involve maintaining a healthy diet, regular physical exercise, a normal body weight, and quit smoking [(3)]. During the last decade, the medical

community has established that obesity due to over-nutrition and reduced physical activity has become not only the most prevalent nutritional disorder of the developed world, but an alarming threat to public health world-wide [4]. The global epidemic of overweight and obesity is rapidly becoming a major public health problem in many parts of the world [5]. Aim of the study: was to study the relation between obesity and diabetes mellitus among patient's attendants in Erbil city. Objectives of the study were to study the following associations:

1. The relation between Diabetes mellitus and obesity.
2. The relation between Diabetes mellitus and sociodemographic characters.
3. The relation between Diabetes mellitus and exercise.
4. The relation between Diabetes mellitus and presence of any other medical condition (as endocrine diseases, hypertension and cardiovascular disease).

Subjects and methods:

This descriptivecross-sectional study, included 198 people selected from Erbil outpatient clinics included (Rizgary Teaching Hospital, Hawler Teaching Hospital, Brayatti Family Medicine Center and Shadi Primary Health Care Center) during a period of one year starting from the first of April 2017 to the first of April 2018. Inclusion criteria include age group ≥ 18 years whom body mass index ≥ 30 kg/m^2. Exclusion criteria Include pregnant women [6, 7]. Diagnosis of Diabetes mellitus: Diabetes was diagnosed if: (1) A1C ≥ (6.5%) or (2) FPG ≥126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 hour or (3) 2-h PG ≥200 mg/dL (11.1 mmol/L) during an OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water or (4) in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L) [8]. Repeat test was carried out to confirm the diagnosis of diabetes. People were enrolled in the study when they reported to hospital outpatient department and the health center. An informed consent was obtained from the people after explaining the study procedures in detail. During the process of the medical assessment relevant history and physical examination were done, a specially-designed questionnaire was used to obtain information from participants. Information included age, gender, marital status, education, occupation**,** family history of diabetes, drug intake, history of any medical diseases including (endocrine disease, hypertension and cardiovascular disease) history of regular exercise, smoking and alcohol history, presence of diabetes symptoms and if she is female (history of gestational diabetes and history of polycystic ovarian syndrome) and socioeconomic status (were defined according to American psychological association) [9]. All participants were assessed for their weight and height being completed by the researcher using the same scale. Height was measured, without shoes, in centimeters using a wall-mounted measuring tape, and weight was measured, with indoor clothes, in kilograms using a digital scale, both in standing position. Body mass index (BMI) was calculated as $BMI=\frac{\text{weight (kg)}}{\text{hight (m)}2}$ (10).

BMI classified into: (Normal < 25 Kg/m2), (Overweight 25-29.9 Kg/m2), and (Obesity ≥ 30 Kg/m2) accord to AACE/ACE Guidelines [11]. People with BMI ≥ 30 kg/m2 were included in the study. The data were collected and results were analyzed. Statistical analysis: All data were analyzed using the Statistical Package for Social Sciences (SPSS, version 22). Chi square test of association was used to compare proportions. Fisher's exact test was used when the expected count of more than (20%) of the cells of the table was less than 5. A p value of ≤ 0.05 was considered statistically significant.

Results:

The total number of the sample was 198. Their mean age + SD were 43.49 + 11.61 years. The median was 43 years and the age range was 19 to 65 years.

In table (1). More than one third (35.4%) aged ≥ 50 years as presented. More than half (54.5%) of the sample were females and male: female ratio was 0.83:1. Regarding educational level, the majority was of low educational level and only (3%) were college graduates. More than half of the studied sample (59.1%) was unemployed or housewives and (93.9%) were married. Table (1) shows that more than two thirds (69.2%) were of medium socio-economic status (SES), and only (2%) were of high SES.

Table (2), shows that the more the BMI, the more the occurrence of diabetes. It increased from (14.3%), to (20.4%), and to (23.3%) among those with BMI of 30-34, 35-39, and ≥ 40 Kg/m^2 respectively; but the difference was not significant (p = 0.470).

Table (3), shows that the more the age, the more the occurrence of diabetes reaching (38.6%) in the age ≥ 50 years. No significant association was detected between gender (p = 0.162), marital status (p = 0.128) and education (p = 0.055) with the presence of diabetes. The occurrence of diabetes was significantly high (25.6%) among the unemployed (p = 0.007). The occurrence was high (26.3%) among those of low socio-economic status, but the difference was not significant (p = 0.136).

Table (4), no significant association was detected between occurrence of diabetes with history of gestational diabetes (p = 0.222) exercise (p = 0.691), and smoking (p = 0.064). The association could not be tested between the occurrence and two conditions: polycystic ovary syndrome and alcohol drinking as no patient had these conditions.

Table (5), shows that the only significant association was between history of medical conditions (as hypertension, cardiovascular disease, endocrinal diseases) and occurrence of diabetes where the occurrence was (43.4%) among those with history of medical conditions compared with (3.3%) among those with no such a history (p < 0.001).

Table (1): Socio-demographic characteristics of the studied sample.

	No.	(%)
Age		
< 30	26	13.1
30-39	55	27.8
40-49	47	23.7
≥ 50	70	35.4
Gender		
Male	90	45.5
Female	108	54.5
Education		
Illiterate	46	23.2
Primary school	81	40.9
Secondary school	65	32.8
Higher education	6	3.0
Occupation		
Unemployed/housewives	117	59.1
Governmental employee	42	21.2
Non-governmental employee	39	19.7
Marital		
Single	12	6.1
Married	186	93.9
SES		F
Low	57	28.8
Medium	137	69.2
High	4	2.0
Total	198	100.0

Table (2): Frequency distribution of study sample according to the relation between diabetes and obesity.

	No.		Yes		Total		
BMI (Kg/m^2)	No.	%	No.	%	No.	%	P
30-34.9	60	85.7	10	14.3	70	100.0	
35-39.9	78	79.6	20	20.4	98	100.0	0.470
≥ 40	23	76.7	7	23.3	30	100.0	
Total	161	81.3	37	18.7	198	100	

*Pearson Chi- Square

Table (3): Distribution of study sample according to socio- demographic characters.

	No diabetes N= 161		Diabetes N= 37		Total N= 198		
	No.	(%)	No.	(%)	No.	%)	P
Age (years)							
< 30	26	(100.0)	0	(0.0)	26	(100.0)	< 0.001
30-39	51	(92.7)	4	(7.3)	55	(100.0)	
40-49	41	(87.2)	6	(12.8)	47	(100.0)	
≥ 50	43	(61.4)	27	(38.6)	70	(100.0)	
Gender							
Male	77	(85.6)	13	(14.4)	90	(100.0)	0.162
Female	84	(77.8)	24	(22.2)	108	(100.0)	
Marital							
Single	12	(100.0)	0	(0.0)	12	(100.0)	0.128*
Married	149	(80.1)	37	(19.9)	186	(100.0)	
Education							
Illiterate	33	(71.7)	13	(28.3)	46	(100.0)	0.055*
Primary school	64	(79.0)	17	(21.0)	81	(100.0)	
Secondary school	59	(90.8)	6	(9.2)	65	(100.0)	
Higher education	5	(83.3)	1	(16.7)	6	(100.0)	
Occupation							
Unemployed	87	(74.4)	30	(25.6)	117	(100.0)	0.007
Governmental employee	40	(95.2)	2	(4.8)	42	(100.0)	
Non-Governmental employee	34	(87.2)	5	(12.8)	39	(100.0)	
SES							
Low	42	(73.7)	15	(26.3)	57	(100.0)	0.136*
Medium	116	(84.7)	21	(15.3)	137	(100.0)	
High	3	(75.0)	1	(25.0)	4	(100.0)	
Total	161	(81.3)	37	(18.7)	198	(100.0)	

*By Fisher's exact test.

Table (4): Distribution of female study sample according to gestational diabetes and presence of poly cystic syndrome.

	No diabetes		Diabetes		Total		
	No.	(%)	No.	(%)	No.	(%)	P
Gestational diabetes							
Yes	0	(0.0)	1	(100.0)	1	(100.0)	0.222*
No	84	(78.5)	23	(21.5)	107	(100.0)	
Polycystic ovary syndrome							
No†	84	(77.8)	24	(22.2)	108	(100.0)	NA

*By Fisher's exact test.

Table (5): Distribution of study sample according to the presences of medical conditions, exercise, smoking and alcohol.

	No diabetes		Diabetes		Total		
	No.	(%)	No.	(%)	No.	(%)	P
History of medical conditions							
Yes	43	(56.6)	33	(43.4)	76	(100.0)	< 0.001
No	118	(96.7)	4	(3.3)	122	(100.0)	
Exercise							
Yes	9	(90.0)	1	(10.0)	10	(100.0)	0.691*
No	152	(80.9)	36	(19.1)	188	(100.0)	
Smoking							
Yes	121	(78.6)	33	(21.4)	154	(100.0)	0.064
No	40	(90.9)	4	(9.1)	44	(100.0)	
Alcohol							
No†	161	(81.3)	37	(18.7)	198	(100.0)	NA
Total	161	(81.3)	37	(18.7)	198	(100)	

*By Fisher's exact test.

†No patient with history of polycystic ovary syndrome and history of alcohol drinking

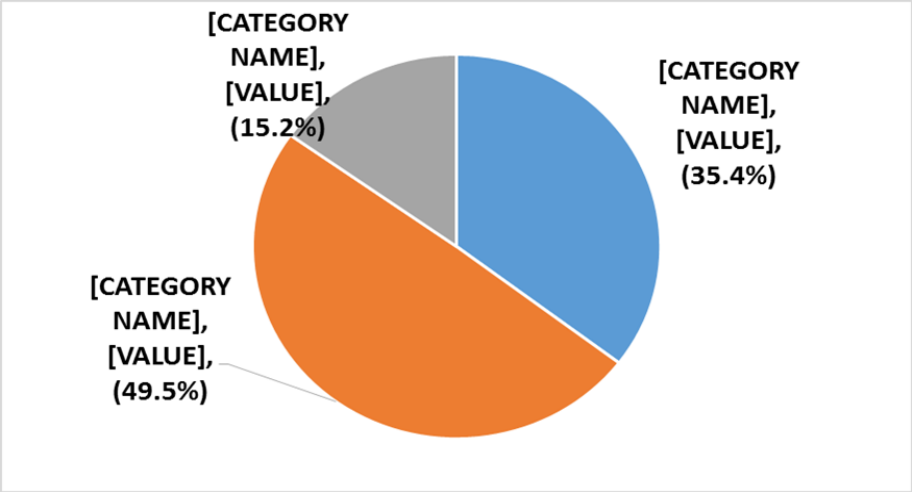

Figure (1): Categories of obesity.

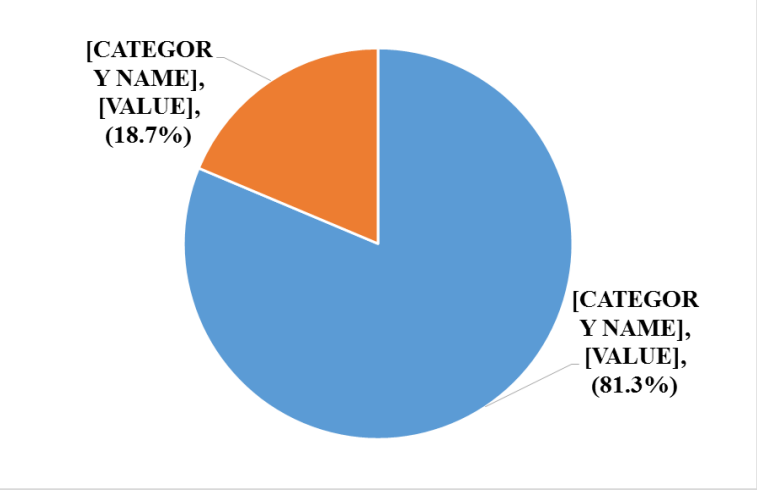

Figure (2): The occurrence of diabetes mellitus among study sample.

Discussion:

The occurrence of diabetes among the studied sample was (18.7%). It increased with increasing body mass index this indicate that there is relation between diabetes and the weight of the individual, this is in agreement with the results were reported in India during April 2009 to March 2011 by Abhijit Mandal [12] estimated the prevalence rate of diabetes among overweight and among obese people and found that the prevalence rate was higher among the obese group. While Alireza Esteghamati et al [13] reported the prevalence rate of diabetes mellitus among general population in Iran was conducted in January and February 2005and found that it was (7.7%), similar result reported by Alhazmi RS et al [14] from Saudi Arabia during the period from May 01 to May 31, 2017 found that the total prevalence of diabetes among the studied population was (4.5%).The rates found in our study differs from other similar studies conducted, the occurrence of diabetes were relatively high because of obese study population. There were studies estimated the prevalence rate of obesity among diabetes patients as a study done by Butheinah A. Al-Sharafi et al [15] from Yemen over a 4-year period from May 2007 to May 2011 found that the prevalence of obesity in patients with type 2 diabetes mellitus was high.

In our study we also estimated the relation between diabetes and sociodemographic factors and we found that the occurrence of diabetes was higher among female which was (22.2%), this is in agreement with the results by Alotaibi A et al [16] from Saudi Arabia from (1990 to 2015) reported that diabetes was higher in female. While different studies have documented that more than (80%) of type 2 diabetics are obese, and adult males with type diabetes are more likely to be obese than females [17]. The presence of diabetes in our study increased with age and it reaching (38.6%) in the age ≥ 50 years ($p < 0.001$), similar results reported by the National Diabetes Statistics Report 2017found that the percentage of adults with diabetes increased with age, reaching a high of (25.2%) among those aged 65 years or older [18]. We found significant association between diabetes mellitus and presence of other medical diseases (as endocrine disease, hypertension, and cardiovascular diseases), as a study done by Pei-Jung Lin et al [19] record data supplied by United state providers in the 2008 to 2012 founded that Patients with diabetes have substantial co morbidities, but the patterns vary considerably across patients and by age [19]. In our study we found non -significant association between the diabetes with history of doing regular exercise ($p = 0.691$) while in a study done in United states by Sheri R. Colberg et al [20] conducted at 2010 found significant association between exercise and decrease incidence of diabetes mellitus. Also we found non- significant association between the diabetes and smoking ($p = 0.064$), compared with meta -analysis study done by Carole Willi et al [21] from Switzerland during 2007 found that active smoking is associated with an increased risk of type 2 diabetes. Our results might be due to the small number of cases reported who were doing regular exerciser who were smoking among the studied sample.

Conclusions:

The presence of diabetes mellitus among the studied sample increased with increasing body mass index. It increased significantly with the age of studied sample and it was significantly higher among the unemployed and among those who have other medical diseases (as endocrine disease, hypertension, and cardiovascular disease), it was also higher among

females compared with males. Non-significant association founded between diabetes with both exercise and smoking.

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