THE APPLICATION OF STATISTICAL ANALYSIS METHODS TO STUDY THE MOST IMPORTANT FACTORS THAT LEAD TO DIABETES

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Abstract

Diabetes is a major challenge today for Iraqi health institutions, and it is truly one of the most important factors of psychological frustration. 10.2% constitute more than 3.5 million people with the disease in Iraq, if we know that the above statistics were for the report of the Ministry of Health for the year 2013.

The seriousness of the disease lies in its rapid development to hit several areas of the body, such as damage to nerves and blood vessels in the body, arteriosclerosis, kidney disease, retinopathy, high blood pressure and other diseases that are considered products of diabetes.

Keywords: *Statistical Analysis Methods, International Diabetes Federation, Diabetes,*

Research Problem

The prevalence of diabetes is increasing in recent times, as International Diabetes Federation (IDF) statistics indicate that approximately 415 million people around the world are afflicted with diabetes and that by 2035, there will be about 592 million people with this disease. (1).

Although there is no accurate count of the number of people with diabetes in Iraq, specialists confirm the presence of patients who are unaware of the disease. Estimates indicate that there are about 7 million infected people, 20 percent of whom are children, this is confirmed by doctors who specialize in treating diabetes and endocrine diseases in many studies. Statistics have indicated that the *International Diabetes Federation* said Iraq is ranked fifth among the countries of the world in terms of disease *diabetes*.

Research Hypothesis

There is no statistical significance between the causative factors and the incidence of diabetes, and the significance of each factor is tested separately, in addition to testing the interaction between the factors affecting the disease, as well as testing the variance of the data under study.

Research Objective

The aim of this study is to identify some of the factors affecting diabetes in people in Maysan Governorate.

Research Significance

The importance of this study lies in shedding light on a phenomenon that has become dangerous, represented by an increase in diabetes in Maysan Governorate, in a striking way, to direct the attention of the responsible health institutions directly and put treatments that are either radical or reduce this phenomenon as much as possible. The importance of this study also lies in the fact that it fills the shortage represented by the lack of medical and statistical studies on diabetes in Maysan Governorate in particular or in Iraq in general.

Sample of the Study

The sample of the study consisted of diabetes patients of the first and second types, whose information was taken from the records of the *Diabetes and Endocrine Hospital* in Maysan Governorate, which are (125) patients. This sample was dependent on some factors that directly or indirectly affect diabetes, and these factors are the patient's age, the patient's gender, the patient's weight and length to extract the body mass index, the patient's social condition as well as the patient's blood sugar measured for three consecutive months.

The data of the study sample was analyzed using some descriptive statistics methods in addition to the analysis of variance **ANOVA** through the use of the **SPSS** statistical program, to accomplish this, the study paragraphs were divided according to the following:

First: A brief summary about diabetes.
Second: Statistical analysis.
First: A brief summary about diabetes.

The Medical Concept of Diabetes and Its Types

Diabetes is a chronic medical condition caused mainly by the inability of the pancreas to produce enough insulin, or as a result of the body's inability to use insulin effectively in the body, which is the hormone responsible for regulating blood sugar, and what is indicated is that high Blood sugar is a common side effect caused by losing control of diabetes, and this may over time cause severe damage to some of the body’s systems, particularly in the blood vessels and nerves.

Natural Metabolism

Carbohydrates obtained by the body from eating bread, potatoes, rice, cakes and many other foods, gradually disintegrate and decompose. This disintegration and degradation process begins in the stomach, then continues in the duodenum and in the small intestine. This disintegration and decomposition process results in a group of carbohydrate sugars that are absorbed into the blood circulation.

The internal secretion cells in the pancreas, called beta cells, are very sensitive to high blood sugar levels and secrete the insulin hormone (Insulin).

Insulin is an essential bridge for the entry of sugar molecules, glucose, into the muscles where it is used as an energy source, and to the fat and liver tissue where it is stored. Glucose also reaches the brain, too, but without the help of insulin.

In the pancreas, another type of cell is the alpha cells, which secrete another additional hormone called glucagon. This hormone causes sugar to be excreted from the liver and activates other hormones that block insulin. Balancing these two hormones (insulin and glucagon) keeps the blood glucose level steady and avoids sharp changes.

When the beta cells in the pancreas are damaged, the amount of insulin secreted decreases gradually, and this process continues for many years.

If this condition is accompanied by the presence of "insulin resistance", then this combination of a small amount of insulin and a low level of effectiveness leads to a deviation from the proper level of glucose (sugar) in the blood, in which case the person is defined as having diabetes (Diabetes).

It is known that the proper level of sugar in the blood after an eight-hour fast should be less than 108 mg / dl, while the border level is 126 mg / dl.

If a person’s blood glucose level is 126 mg / dl. and above, in two or more tests, then that person is diagnosed with diabetes.

Table (1) Natural Diabetes Levels

The person's age stage	Blood sugar measured (mg / dL)	Blood sugar measured (mmol / L)
Premature babies	65-40	3,6 – 2,2
Children from (0 - 2 years)	110-60	6،1-3,3
Age (2-18) years	100-60	5،6-3،3
Age 18 and older	110	6,1

Types of Diabetes

Type 1 diabetes (juvenile diabetes / juvenile diabetes) occurs when the pancreas does not secrete insulin or a small, insufficient amount is produced. This type of diabetes occurs in about 5 to 10% of patients.

During the immune system, it destroys the beta cells in the pancreas, for unknown reasons and so far it has not been determined. Type 1 diabetes may affect a person at any age, but it appears most often in childhood or adolescence.

Diabetes Causes

Type 1 diabetes occurs because of the immune system that destroys the cells of the pancreas that make insulin, and this causes diabetes by leaving the body without enough insulin to function normally, so it is a reaction to self-immunity, because the body attacks itself.

There are no specific causes for type 1 diabetes, but risk factors include:

- Viral or bacterial infection.
- Chemical toxins in food.
- A non-specific component that causes an autoimmune reaction.
- The genetic factor may also be a cause of type 1 diabetes.

Type 2 Diabetes

Type 2 diabetes (or: type 2 diabetes / adult diabetes) is a disease in which beta cells in the pancreas are destroyed and destroyed for genetic reasons, most likely, supported by external factors, this process is very slow and will continue for decades. The second type is the most prevalent among diabetics, and affects about 90 to 95% of diabetics over the age of twenty. This type of diabetes was previously called the type that affects adults (and these patients often do not use insulin). But now this concept has changed because there are people under 20 years old who have this type (and also because some of these patients need to use insulin). This type of sugar occurs when the pancreas produces an insufficient amount of insulin, or when cells begin to fight insulin.

Statistics indicate that the number of people with type 2 diabetes in the world has recorded a very large increase in recent decades, reaching about 150 million people, and it is expected to increase to 330 million people with diabetes, until the year 2025.

Type 2 Debates Reasons

The causes of type 2 diabetes are many, but the most common factor is family history, and there are a variety of risk factors for type 2 diabetes that include:

- **Obesity.**
- **Growing Old.**
- **Bad Diet Eating.**

Gestational Diabetes

This type appears in some pregnant women - often in the second or third trimester (the right pregnancy). This type affects pregnant women by 2 to 5%, and it occurs when the hormone secreted by the placenta interferes with the effect of insulin in the body.

Gestational diabetes disappears once the baby is born. But about half of the women who suffer from gestational diabetes will develop type 2 diabetes after that. In rare cases, the woman develops the first type of diabetes during pregnancy, which leads to high blood sugar after birth, and this requires treatment by insulin.

Gestational Diabetes Reasons

The causes of diabetes during pregnancy, known as gestational diabetes, are still unknown, however, there are a number of risk factors that increase infection and include:

- Family history of gestational diabetes.
- Being overweight or obese.
- If she suffers from polycystic ovary syndrome.

- If the weight of the fetus is large

Second: Statistical Analysis

SPSS was used to statistically analyze data using descriptive statistics methods in addition to the ANOVA table:

The independent variables are:

1- Patient gender (Xi):

$$X_i = \begin{cases} 0 & \text{Male} \\ 1 \quad xi = 1,2 & \text{Female} \end{cases}$$

2- Patient age (X k)

k= 1,2,3,4,5

Table (2) Age Groups

Code	Age	Category
1	10-14 Years	First
2	15-29 Years	Second
3	30-40 Years	Third
4	45-59 Years	Fourth
5	Years Onward 60	Fifth

3- Body Mass (Xj) (BMI)

$$BMI = \frac{mass(kg)}{height(m)}$$

Whereas:
mass= Body weight measured in kg.
height = Square length in meters.

The cluster index can be classified according to the World Health Organization as in Table 3

Table (3) Body Mass Indicator

Body Mass Indicator	Feature
Less than 2o	Thin
24.9-20	natural
29.9-25	Increase in weight
30 and above	obesity

The body mass index (after extracting it according to relationship (1)) has been classified into the following categories:
The first category: less than 20 = 1
The second category: 20 24.9- = 2
The third category: 25 = 29.9 -3
Fourth category: 30 and above = 4

After analyzing the data, the results are given in Table (4) to facilitate their analysis and discussion.

Variables	No cases of.	Percentage	Mean	Standard Deviation
Classes of age=x_i			3.9456	0.8234
Group =1	4	3.2		
Group= 2	5	4		
Group=3	38	30.4		
Group=4	59	47.2		
Group=5	19	15.2		
Total	125	100.0		
Gender =X2			0.143	0.4315
Male:1	42	33.6		
Female :2	83	66.4		
Total	125	100.0		
Body Mass Indicator = x3			3.8751	0.9152
Group =1	5	4		
Group= 2	21	16.8		
Group=3	34	27.2		
Group=4	65	52		
Total	125	100.0		
Social Status= x4			0.9528	0.2743
Married =1	108	86.4		
Single =2	17	13.6		
Total	125	100.0		

Source: SPSS Results, Based on Sample Data

Table (4) indicates the statistical indicators of the independent variables (age, gender, body mass index, and marital status) and shows that most of the injured from the study sample are within the fourth age group 59-45 (47.2%).

Also, more than half of the injured are female (66.4), and the rest are male, and half of the injured are within the high body mass index, that is, obesity (by 52%), and most of the infected are married with (86.4%). xi), which represents the age of the patient, is for the fourth category, which is the ages between (45-59) years, and this is explained by the concentration of patients 'ages within the fourth category, as is the case with the variable X3.

The average of the bilateral factors is represented as the percentage of the occurrence of that variable, so we find that the average factor X2, which represents the patient's sex, is equal to (0.143), and this indicates that the patient's sex is centered within being a female, and we note that the social position of the patient is within the fact that he is married.

Table (5) Statistical Indicators of the Dependent Variables

Diabetes Level Independent Variable	Frequencies	Percentages	mean	Standard Deviation
Y			7.9453	1.5647
6.20	2	1.6		
6.30	4	3.2		
6.40	5	4		
6.50	8	6.4		
6.60	2	1.6		
6.70	4	3.2		
6.80	5	4		
6.90	9	7.2		
7.20	8	6.4		
7.30	4	3.2		
7.40	6	4.8		
7.50	8	6.4		
7.70	7	5.6		
7.80	9	7.2		
7.90	3	2.4		
8.00	2	1.6		
8.20	5	4		
8.30	6	4.8		
8.40	5	4		
8.50	6	4.8		
8.60	6	4.8		
8.70	5	4		
8.80	6	4.8		

The table (4) shows the number of cases that the dependent variable (blood sugar level) and the percentages of these cases, as well as the mean and standard deviation of the variable.

Table 6 results for the Levine variance homogeneity test

F	df1	df2	Sig .
1.564	30	95	0.17

We observe in Table 6, which is a test to know the extent of homogeneity of variance, where there must be homogeneity to apply the analysis of variance (ANOVA). Have been achieved.

Table (7) Analysis of variance for search variables

Source	Type III Sum of Squares	Df	Mean squares	F	Sig.
Corrected Model	130.170	30	4.784	1.972	.021
Intercept	1891.754	1	1891.754	798.898	.000
X1	21.076	4	5.642	2.436	.072
X2	.646	1	.646	.413	.586
X3	25.632	3	8.673	3.535	.025
X4	8.926	4	8.926	3.756	.032
X1 * X2	2.461	2	1.378	.537	.588
X1 * X3	18.965	6	3.241	1.378	.254
X2 * X3	4.821	5	1.684	.575	.597
X1 * X4	10.233	1	10.233	4.459	.031
X1 * X2 * X3	34.316	4	7.934	3.743	.007
Error	210.722	95	2.464		
Total	9857.500	125			
Corrected Total	349.972	126			

Table 7 includes the main test of analysis of variance (ANOVA), in which we notice that the value of F for the independent variable (age of the injured x1 =) has reached (2.436) for the level of significance also (p = .072) which is a value greater than (0.05) so we accept the zero hypothesis which states that There is no effect on the age of the person with diabetes, that is, the age of the patient has no significant effect on the disease.

Also, we note that the value of F for the independent variable (the patient's sex x2 =) has reached (.413) and that the value of the significance level was (p = .586) which is a value greater than (0.05) so we accept the null hypothesis, meaning that the patient's sex has no significant effect on injury get sick.

We also note that the value of the independent variable (body mass index x3 =) has reached (3.535) for the level of significance also (p = .025) which is a value less than (0.05) so we reject the zero hypothesis which states that there is no effect of the body mass index in the incidence of the disease i.e. This factor has a significant effect on injury, and this result is consistent with the medical opinion. The more a person’s weight exceeds the acceptable limit, the greater the chance of developing diabetes.

We also note that the value of the independent variable (marital status) has reached 3.756) for the significance level (.032) which is a value less than (0.05) so we reject the zero hypothesis, i.e. meaning that there is an effect of marital status on the disease, and here the reason is due to the possibility that the female in the study sample, most of them have diabetes during pregnancy.

The result of the interaction between any two independent variables in the sample is insignificant, except for the interaction between the two variables (patient's age and marital status) between the patient's age and marital status.

The result of the interaction between the independent variables (age, gender, and index of the injured mass) was significant, as the value of (p = .007) is a value less than (0.05). This means that there is an interaction between the patient's age, gender, and mass index, and accordingly we reject the hypothesis. Zero, meaning that these factors have a significant effect on diabetes.

Conclusions

Based on the previous results, the current research reached several conclusions:

1- There is a clear effect of the independent variable (body mass), which means that most people with diabetes are people who are overweight.
2- Most of the cases were those who exceeded the age of childhood and adolescence and were female, which means that during pregnancy, they become pregnant.
3- The results of the interaction between the independent variables (age - gender - mass index of the affected person) showed significant, meaning that these factors had a significant effect on diabetes.

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