

Original article

Frequency of Blood Groups in Patients with Diabetes Mellitus

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ABSTRACT

Diabetes Mellitus (DM) is a metabolic disorder which is characterized by a defect in insulin secretion leading to disturbances of carbohydrate and fat metabolism and resulting in hyperglycemia. It is classified as insulin dependent DM (type 1 DM) and non-insulin dependent DM (type-2 DM). The relationship between DM and ABO/Rhesus blood groups is still controversial. The aim of this study was to determine the relationship between ABO/Rhesus blood groups with type-1 and type-2 DM. The study included cases visiting of the specialized center for the regulation and treatment of diabetes and endocrine diseases Misrata, during two years, from the beginning of 1 January 2021 to 31 December 2022, with type 1 and type 2 diabetes of both sexes, with the exclusion of patients who did not meet the data. Among the data collected were age, sex, type of diabetes, blood groups. The study included 893 diabetic patients during the aforementioned period, where the percentage of men was 56%, while females were 44%, and the percentage of type 1 diabetes was 10.6%, while type 2 was 89.4%, and the ages ranged between 16-85 years, and there was no association between diabetes and type blood group with no significant differences were p -value = 0.258. There was no association between diabetes and blood type blood with no significant differences.

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INTRODUCTION

Diabetes mellitus is a disorder of the metabolism of carbohydrates, fats, and proteins characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both [1,2]. There are many factors in the development of diabetes, represented by the autoimmune destruction of pancreatic cells affected by insulin deficiency to abnormalities that lead to insulin resistance, as well as weight gain and advanced age from the causes of the disease, in addition to family history, high blood pressure, triglycerides, cholesterol, lethargy and an unhealthy system [3]. There are three types of diabetes, the first type depends on insulin in treatment, the second type does not depend on insulin, and the third is gestational diabetes [4].

Irregular blood sugar is the main factor for the development of complications of diabetes, including kidney disease, as it was noted that diabetic kidney disease, type 2 diabetes, is more likely to be 72%, while the risk of developing type 1 is 25%, in addition to motor and sensory neuropathy and retinopathy. And complications of the heart and blood vessels. Diabetes can be observed with several symptoms, including thirst, fatigue, frequent urination, blurred vision, weight loss, and slow wound healing [5].

The global number of diabetes cases is 382 million and the number is likely to increase to 592 million by 2035. Moreover, there are about 183 million people who are not aware that they have diabetes. Diabetes has been linked to many factors such as genetics, environmental factors, diet, obesity, and lack of exercise [6].

As for the current studies, linking diabetes to the blood group, as the disease constitutes a public health condition, and it is one of the main causes of ill health and premature mortality worldwide [7], Blood type is represented by the

phenotype is an inherited polymorphic antigen is an inherited polymorphic antigen present on the surface of red blood cells as well as other tissues. In 1900 Karl Landsteiner discovered the ABO blood group system and succeeded in identifying four types of blood groups A, B, O, AB, each of which is responsible About producing its own glycoprotein, which is the gene responsible for determining blood type and is located on chromosome No. 9 and is called Glycosyltransferase [8]. Blood group is associated with some diseases, including stomach and duodenal ulcers, hepatitis B, vascular diseases, and cancers. Many studies have shown the extent of the association between blood type and the risk of developing diabetes [9,10].

The clinical importance of the blood type is not limited to blood transfusion and organ transplantation, but also to verify its association with various systemic diseases among the main risk factors for cardiovascular disease and atherosclerosis, and many studies have revealed that the blood type is associated with cardiovascular disease [11,12].

Over the past years, researchers have discovered the relationship between blood groups and increased susceptibility to certain diseases. Peptic ulcers appear in people with blood group O, while stomach cancer often appears in blood group A. Diabetes is one of the diseases that have been examined for such a correlation [13]. Therefore, the current study targeted diabetic patients to study the relationship between the disease and blood groups.

METHODS

Place of study

The study conducted in the Dept. of the specialized center for the regulation and treatment of diabetes and endocrine diseases, Misrata.

Study population

Patients suffering from Type-2 and Type-1 DM.

Study periods

the beginning of 1 January 2021 to 31 December 2022.

Ethical approval

After approval from the ethical research committee of the specialized center for the regulation and treatment of diabetes and endocrine diseases, Misrata, the data were taken from the statistics and documentation office at the center.

Data collection

Data on each patient were collected from personal files while maintaining confidentiality of information, including age, gender, type of diabetes, and blood type.

Statistical analysis

The obtained data were statistically analyzed via Statistical Package of Social Sciences (SPSS, version 25.0) software. A descriptive analysis of sample results was presented. Utilizing the Chi-square goodness-of-fit test, the association between research variables was assessed. The agreed significance level has been set below ($p < 0.05$).

RESULTS AND DISCUSSION

Patients who visited the specialized center for diabetes and endocrinology in Misurata during the period from 1 January 2021 to 31 December 2022 were identified from the patients' personal files after approval from the specialized authorities in the center, where the total number reached 893 patients, including 95(10.6%) patients with type 1 diabetes, while 798(89.4%) patients with type 2 diabetes, this shows that most of the patients had type 2 diabetes, which is consistent with several studies, including studies in Ethiopia, Iraq and Turkey [13-15], it is not similar to two studies in Egypt and Saudi Arabia, in which the number of patients with type 1 diabetes most than that of type 2 [16,17], among them were 447 men and 351 female, and most of the patients were men, whether with type 1 or type 2 diabetes, while it is not similar to the study in Iraq, in which the percentage of female most than that of men, amounting to 54% for female and 46% of male [18], as show in table (1).

Table 1. The number of patients with type 1 and type 2 diabetes.

Patients			Sex		Total
			Female	Male	
Diabetes	Type 1 diabetes	Count	42	53	95
		% within sex	10.7%	10.6%	10.6%
	Type 2 diabetes	Count	351	447	798
		% within sex	89.3%	89.4%	89.4%
Total		Count	393	500	893
		% within sex	100.0%	100.0%	100.0%

The ages of the cases ranged from 16 to 85 years, and the patients were distributed into 4 age groups. The age groups (16-33) (70-85) represented the least patients, while the age groups (34-51) (52-69) represented the most patients with diabetes, especially the age group (52-69) years. This is similar to a study in Libya [19], and this is not similar to a study in race that targeted patients of a younger age [17], as show in figure 1.

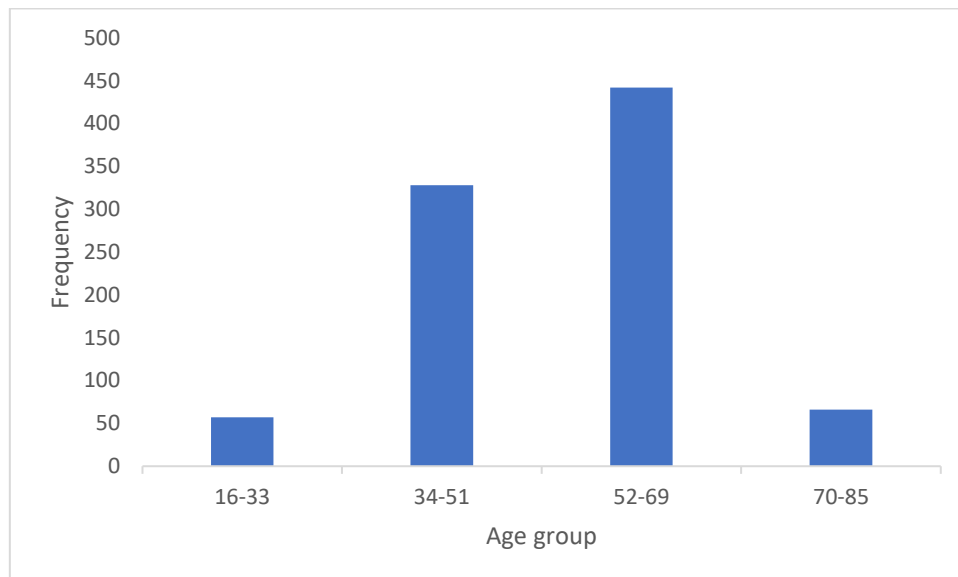


Figure 1. Age group of patients

We also obtained in the current study blood group the most prevalent species in women are O, while men are A, and this is not similar to the study in Turkey and Libya [13,20], With the presence of statistically significant differences, where the significance value was less than 0.002 as show in table 2.

Table 2. The association of blood group and sex

The association of blood group and sex	P(Value)
Pearson Chi-Square	.002 ^a
Likelihood Ratio	.002
N of Valid Cases	893

*P value < 0.05 is considered statistically significant and less than 0.01 is highly statistically significant. *Indicates statistically significant difference*

Among the results included in the current study in terms of the distribution of blood types compared to the healthy group, we found that blood type O was the most common among patients, followed by A, followed by B, and finally blood type AB, while in the healthy group we found that A was the most common, followed by O, followed by B, and finally AB, while the Rhesus factor was mostly positive, varying between patients with type 1 diabetes (80) and type 2 diabetes (706), while the Rhesus factor negative were in type 1 diabetes (15) and type 2 diabetes (92). These results

were similar to Libyan studies and Iraq [14,20,21], While in a study in Ethiopia, the most common blood group among patients was O, followed by A [22], as show in table 3&4.

Table 3. Distribution of ABO blood groups in diabetic patient compared to control.

Blood group	Diabetics	Control	Total
O	346	54	400
A	331	59	390
B	160	24	184
AB	56	13	69
Total	893	150	

Table 4. Distribution of Rh type in diabetic patient compared to control.

Rh type	Type1 Diabetes	Type2 Diabetes	Control	Total
Rh+	80	706	133	786
Rh -	15	92	17	107

When studying the relationship between diabetes patients of both types and the healthy group, we did not find any relationship and no significant differences, and the statistical significance was 0.258, it was similar to several studies that did not find any link between diabetes and blood types (17, 20, 23-28), While studies have confirmed the existence of a link between diabetes and blood type B [29-33], other study have linked its relationship to blood type A [34], While a study linked its relationship with blood type AB [35], as show in table 5.

Table 5. Distribution of ABO and Rh blood groups among study subjects

Diabetes	Blood group								P value
	A-	A+	AB-	AB+	B-	B+	O-	O+	
Type 1 diabetes	8	34	1	4	2	8	4	34	0.258
Type 2 diabetes	42	247	2	49	17	133	31	277	
Total	50	281	3	53	19	141	35	311	

*P value < 0.05 is considered statistically significant and less than 0.01 is highly statistically significant. *Indicates statistically significant difference.*

CONCLUSION

Type 2 diabetes is more prevalent than type 1 diabetes patients and that the percentage of men among patients is greater than women. We did not find any clear results linking diabetes to blood type, and this may be due to the inaccuracy of the data. Future studies are warrant to exhibit such relation.

Acknowledgment

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تردد فصائل الدم لدى مرضى السكري

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المستخلص

داء السكري هو اضطراب أيضي يتميز بخلل في إفراز الأنسولين يؤدي إلى اضطرابات في التمثيل الغذائي للكربوهيدرات والدهون وينتج عنه ارتفاع سكر الدم. يصنف على أنه داء السكري المعتمد على الأنسولين (داء السكري من النوع الأول) وداء السكري غير المعتمد على الأنسولين (داء السكري من النوع الثاني). لا تزال العلاقة بين داء السكري وفصائل الدم ABO / Rhesus مثيرة للجدل. كان الهدف من هذه الدراسة تحديد العلاقة بين فصائل الدم ABO / Rhesus مع داء السكري من النوع الأول والثاني. شملت الدراسة حالات زارت المركز المتخصص لتنظيم وعلاج مرض السكري وأمراض الغدد الصماء مصراتة، خلال عامين، من بداية 1 يناير 2021 إلى 31 ديسمبر 2022، مع مرضى السكري من النوع الأول والنوع الثاني من كلا الجنسين، مع استبعاد المرضى الذين لم تنطبق عليهم البيانات. ومن بين البيانات التي تم جمعها العمر والجنس ونوع السكري وفصائل الدم. شملت الدراسة 893 مريض سكري خلال الفترة المذكورة، حيث بلغت نسبة الذكور 56%، بينما كانت نسبة الإناث 44%، وكانت نسبة مرضى السكري من النوع الأول 10.6%، بينما كان النوع الثاني 89.4%، وتراوحت الأعمار بين 16-85 سنة، ولم يكن هناك ارتباط بين مرض السكري وفصيلة الدم مع عدم وجود فروق ذات دلالة إحصائية حيث كانت قيمة الاحتمال = 0.258. لم يكن هناك ارتباط بين مرض السكري وفصيلة الدم مع عدم وجود فروق ذات دلالة إحصائية.

الكلمات المفتاحية: داء السكري. النوع الثاني. النوع الأول. داء السكري المعتمد على الأنسولين. داء السكري غير المعتمد على الأنسولين. فصائل الدم. ABO.