Academic International Journal of Medical Update
ISSN: 2984-7761
Aca. Intl. J. Med. U. 2024; 2(1) 15-20
Journal homepage: www.aipublishers.org/aijmu

An Association Between Diabetes Mellitus With Blood Groups, Leukocytes and Serum Bilirubin

Khairy Abdullah Dawood[1], Basma Abd Alkhalq Eidan[2], Hassanain Jwad Abidalhussein [3]

[1,2] Al-Mustaqble University. khairy.abdulla@uomus.edu.iq
[3]Dentistry Collage, Kerbala University, Iraq. hesinen.j@uokerbala.edu.iq

Article Info.
Article history:
Received 7 April 2024
Revised 5 May 2024
Published 10 June 2024
Keywords:
Diabetes Mellitus, Blood Groups, Leukocytes, Serum Bilirubin.
How to cite:
Khairy Abdullah Dawood, Basma Abd Alkhalq Eidan, Hassanain Jwad Abidalhussein. An Association Between Diabetes Mellitus with Blood Groups, Leukocytes and Serum Bilirubin, Aca. Intl. J. Med. U. 2024; 2(1) 15-20. https://doi.org/10.59675/U213

Abstract

Blood groups play an essential role in the incidence of diabetes mellitus type two and are considered predisposing factors. The Center of diabetes mellitus / Marjan Hospital recorded 117 cases of diabetes and followed for other identifications. Blood analysis was done in the Hematology laboratory in Al – Mustaqble University. Blood group A+ was associated with a high incidence of type 2 diabetes (52%), while blood group O+ and O- were the lowest percent (2.5 %) for both of them. Blood groups AB+ and B+ were distributed in diabetic patients (10%) for each. The percentage of Rh+ factor in diabetic patients was 87%, Whereas the Rh- was 13%. Serum bilirubin is inversely associated with insulin resistance in adult people. Bilirubin was increased at the beginning of diabetes but decreased with duration. White blood cells decreased in number in comparison with the control group, and the percentage of lymphocytes in diabetic patients also decreased. These results prove a significant relationship between blood groups and diabetes mellitus.

Introduction

The incidence of diabetes mellitus in humans has increased at a rapid rate. Stocker, R. Glazer, A. N. and Ames, B. N. (1987). Published data on the Antioxidant activity of albumin-bound bilirubin. In 2000, there were an estimated 150 million cases in the world; this number increased to 221 million by 2010. Ninety percent of cases are type 2 diabetes; this occurred due to an increased incidence of obesity [1, 2]. A high level of glucose in blood or sugar (hyperglycemia) in adult people is called Diabetes Mellitus type two, which is a condition not related to lack of insulin or the resistance of cells to insulin effect.

Frederick Banting (1920) discovered with his students the relation of diabetes mellitus with insulin. They produced juice of minis pancreas used as an anti-diabetic. Jur Macleod (1922) worked on purifying insulin. Diabetes mellitus is a chronic disease characterized by high levels of glucose in the blood, and it is very common. Millions of people around the world have diabetes (WHO 2020).

There are two types of diabetes, type 1 and type 2:
Type 1 is an autoimmune disease in which the pancreas does not secrete insulin at all (the immune system attacks the beta cells). It is generally diagnosed below the age of 30, but it can occur at any age.
Type 2 diabetes is a condition of patients where the pancreas does not secret enough insulin, or their body does not use it [3]—it studied the effects of stress, which activates signal pathways mediators of insulin resistance and beta-cell dysfunction. At the same time, [4] Recorded the causal role of reactive oxygen species on multiple forms of insulin resistance. Insulin properly (known as insulin resistance) is the most common type of diabetes; it can occur at any age but is usually over 40 years old.
This study aims to investigate the potential association between ABO blood groups with type two diabetes and record the effects on blood cells.
Obesity: As body weight increases, the ability of insulin resistance increases, and then the decreased ability of insulin resistance to move glucose into fat and muscles and shut off glucose release from the liver does not work [5]. Type 2 diabetes is an inflammatory disease leading to beta cell dysfunction and insulin resistance [6].
In a study in healthy males and females, liver enzymes are associated with hepatic insulin resistance, insulin secretion, and glucagon concentration [7].
Type 2 diabetes occurs due to several risk factors: history of the family, age over 45 years old, overweight, no sports exercise, smoking, and unhealthy diet [8]

Genetic, environmental factors and immunological factors play an essential role in the occurrence of diabetes mellitus type 2 [9]. Betta cell dysfunction in type 2 diabetes affects the inability of these cells to adapt themselves to the long-term demands of peripheral insulin secretion. Therefore, hyperglycemia occurs [10]. Genetic, environmental factors and immunological factors play an essential role in the occurrence of diabetes mellitus type 2. Some research on the epidemiology of Diabetes mellitus and its association with blood groups in correlation with other diseases, such as peptic ulcer, was a higher incidence in group O.

In contrast, stomach cancer and salivary gland tumors diabetes were more frequent in blood group A [11]. In response to frequent urination, particularly during the night, the kidneys intensify their function in order to eliminate surplus glucose from the bloodstream. Increased thirst, the body trying to replace the lost fluids, and rapid weight loss due to loss of calories when losing glucose, so there is no energy and protein breakdown from the muscles [8].

Many researchers worked on the relation of diabetes mellitus type two with blood groups (ABO/RH), and others examined 233 patients with gestational diabetes mellitus and determined their blood groups A, B, AB, and O using the Rh factor (+/-) [12].

Some researchers investigated the correlation between serum bilirubin and mortality and aging [13], whereas others examined the impact of serum bilirubin on the development of diabetes in healthy Korean males [14].

Materials and Methods
From the diabetes center at Marjan Hospital, 117 non-pregnant patients (males and females) were enrolled in the study—the patients presented with clinically confirmed elevated blood glucose levels at the center. The blood sample is collected using aseptic precautions while ensuring that the individual is fasting or has waited for two hours after a meal (postprandial). The collection is done through vein puncture using a disposable syringe. A specimen of blood was separated into two sections. The initial phase involved the utilization of an automated analyzer and the glucose oxidase method to ascertain the concentration of glucose. The residual blood was utilized for cellular

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enumeration, including the total leukocytic count (TLC) and differential leukocytic count (DLC), as well as blood group determination.

The patients were suspected of positive or high levels of sugar in the blood, followed their diagnosis at the center of diabetes in Marjan Hospital to confirm the level of glucose, then advised on a healthy diet, management, and treatment. Determinations of blood groups (ABO), Rh + or Rh - ad blood cell count (Tota and Differential leukocytic count) were done in the Laboratory of Hematology at Al-Mustaqble University

Results and Discussion

Results of diabetic patients compared with non–diabetic healthy persons as a control group. Blood samples were collected (150 samples) from suspected patients with diabetes mellitus type 2, but 117 cases were positive. These positive samples were identified for their blood groups, Rh factor, and bile level. Group A+ had the highest percentage, 52 %, while O+ and O—had the lowest percentages, 2.5%, for both of them. AB + and B+ had the lowest percentages, 10 %, Table [1].

Collection of blood from suspected patients of more than 150 persons; therefore, 117 were cheerful for diabetes mellitus type 2. These positive samples were identified for their blood groups; Group A+ was the highest percentage, 52%, while O+ and O- had the lowest percent 2.5% both of them, AB+ and B+ were 10% for both (table 1)

Table (1): Show the results of the blood group and Rh:

/	A+	B+	AB+	O+	B-	O-	TOT AL
Number	60	27	12	3	12	3	117
%	52	23	10	2.5	10	2.5	100

Table (2): Result of total white blood cells (WBC) and percent of lymphocytes:

No	WBC	Control	Lymphocytes	Control
	10^3X	10^3X	%	%
1	7.5	13	12.5	30
2	9.4	15	25	35
3	10.8	13	17	29
4	7.9	10	20.5	30
5	11.3	11	30.2	25
6	9.2	12	16.3	35
7	6	12	28	36
8	7.6	10	28	34
9	7.6	11	15	28
10	5.9	13	28	36
Mean	7.7	12	19.9	32

Table 2 shows the results of total leukocytic count and percent of Lymphocytes. The mean total leukocytic count of patients decreased to 7.7 × 103, compared with the mean of the control group, which was 12 × 103.

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The percentage of lymphocytes in patients also decreased by 19.9% compared with the control group, which was 32%. This means that diabetes inhibits the total leukocytic count and the percentage of lymphocytes, so the immune responses of diabetic patients become weak.

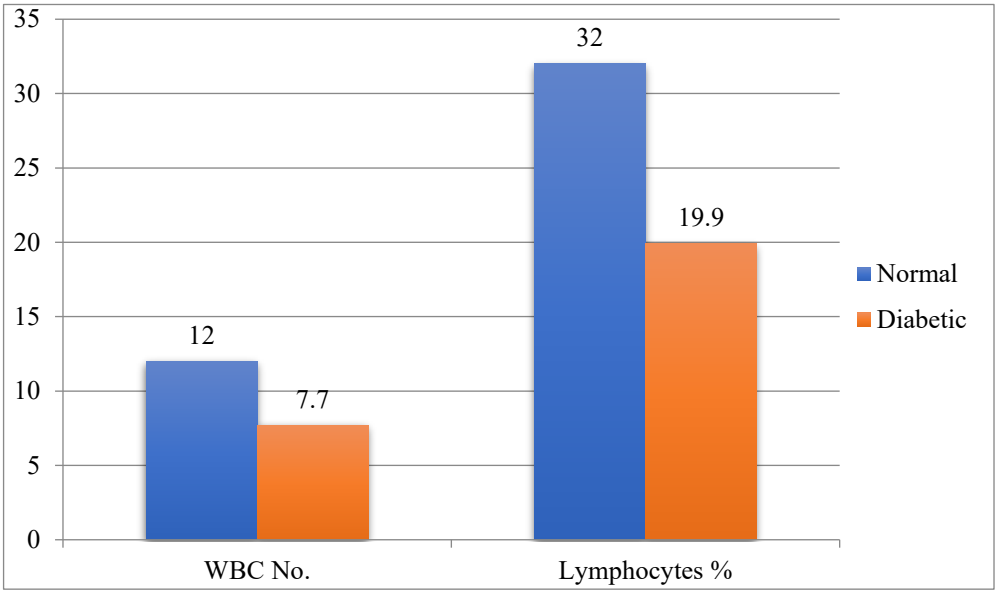

Fig: 1- show the total leukocytic count and percent of lymphocytes.

The distribution of Diabetic patients depends on blood groups; group A+ recorded the highest percentage, 52%, while the lowest percentages were O+ and O—2.5% for each. Group B+ was 23%, and AB+ and B—were 10% for each one.

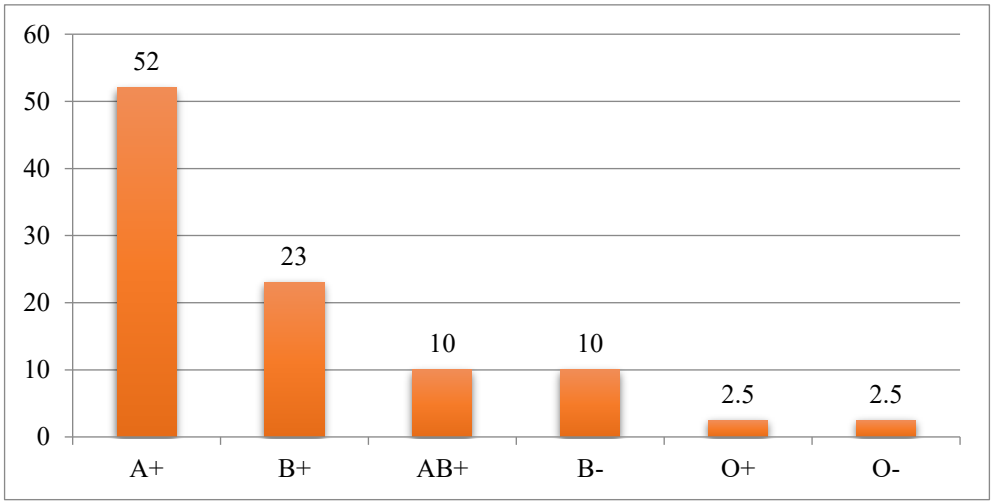

Fig (2) percent of blood group associated with diabetes mellitus

Prolonged exposure to inflammation or stress causes an elevation in bilirubin levels in the bloodstream, subsequently leading to hyperglycemia—however, protracted hyperglycemia caused by diabetes results in a reduction in bilirubin levels in the bloodstream. The typical range for bilirubin is between 0.1 and 1.2 mg/dL, whereas diabetic patients exhibit a range of 1.5 to 2 mg/dL. Itching skin occurs due to high levels of bilirubin, which activates the effect on peripheral sensory neurons. There is a high incidence of type 2 diabetes in people drinking Coffee and tea in the Singapore Chinese Health Study.

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Lin and his friend worked on serum bilirubin, which is inversely associated with insulin resistance and metabolic syndrome in adolescents and toddlers [15]. According to Han and his friends, an increased level of serum bilirubin was associated with a decreased risk of developing diabetes mellitus and diabetic nephropathy [16].

Guzek and his friends gathered information regarding the inverse relationship between serum bilirubin and metabolic syndrome and resistance in the Polish population. Abbasi and his friend established bilirubin as a plausible causative element in the development of diabetes [17].

Conclusions:

1. Group A+ has the highest percentage in relation to diabetes mellitus.
2. Groups O+ and O have the lowest percentages.
3. The highest percentage of diabetes in positive Rh persons is higher than in negative persons.
4. Hemopoietic analysis reveals a decrease in the number of leukocytes and a decrease in Lymphocyte percentage in diabetic persons.
5. Total bilirubin concentrations increased in newly diagnosed cases of diabetes and decreased with the duration of diabetes.

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