

Association of ABO Blood Groups with Diabetes Mellitus among the University Students of District Mardan, Pakistan

Sulaiman Shams^{1*}, Shehla Khan¹, Huma Ajmal¹, Fatima Siraj², Sahib Gul Afridi¹

¹Department of Biochemistry, Abdul Wali Khan University Mardan-23200, Khyber Pakhtunkhwa, Pakistan

²Department of Zoology, Abdul Wali Khan University Mardan-23200, Khyber Pakhtunkhwa, Pakistan

Received: 10 October, 2017; Accepted: 17 November, 2017; Published: 22 November, 2017

***Corresponding author:** Sulaiman Shams, Assistant Professor, Department of Biochemistry, University College of Science Shankar, Abdul Wali Khan University Mardan-23200, Khyber Pakhtunkhwa, Pakistan, Tel: +92-333-9202865; E-mail: sulaiman@awkum.edu.pk

Abstract

Diabetes is one of the most common disease in the world and is rapidly increasing in developing countries including Pakistan. The ABO blood types are associated with various diseases including Diabetes, Migraine, Gastric cancer, Stomach Ulcer, Salivary gland tumors, Thyroid disorders, Ovarian tumors, Small cell carcinoma of lung, Hypercholesterolemia and particularly Cardiovascular diseases. Like many other inherited traits, blood groups are also genetically pre-determined and therefore may have an association with diabetes mellitus. In the present study we aimed to investigate the correlation between the ABO blood groups and diabetes. This study was carried out in Biochemistry Department, Abdul Wali Khan University Mardan (AWKUM). The data were derived from 2258 (1159 males (51.32%) and 1099 (48.68%) females) individuals comprising of university students belonging to different departments. Blood groups were determined using ABO typing while the blood glucose levels were analyzed on glucometer using Biosensor Technology. Our study showed that the individual having blood group B (43%) have high blood sugar level followed by A (29%), O (19%), and AB (9%). Both in males and females blood group B having high glucose level as compared to other blood groups, which shows that blood group B have more chances of diabetes. Blood group B is more prone to develop diabetes as compared to other Blood groups. Therefore, Person have blood group B should take care of their diet, health, exercise and intake of less sugar to reduce the chances of diabetes.

Keywords: Blood; Diabetes Mellitus; Glycoprotein; Mardan; Students; University

Introduction

All humans and many other animals have four principal blood types. A, B, AB, and O. Karl Landsteiner discovered A, B and O blood type in 1901 [1, 2]. Alfred von Decastello and Adriano Sturli discovered the fourth type, AB, in 1902 [3]. Two antigens and two antibodies are generally involved for the ABO types and a particular combination of these four types determines an individual's blood group. Depending on the blood group system, the nature of antigens may be proteins, carbohydrates, glycoproteins, or glycolipids. Several of these red blood cell surface antigens can stem from one allele and collectively form a

blood group system [4].

After the discovery of blood groups in 1900, researchers took a keen interest and start their struggle to discover a possible association and link between ABO blood groups and various diseases. The ABO blood types are associated with various diseases including Diabetes, Migraine, Gastric cancer, Stomach Ulcer, Salivary gland tumors, Thyroid disorders, Ovarian and lung carcinoma, Hypercholesterolemia and particularly cardiovascular diseases. Similarly to various types of inherited traits and characteristics, blood groups are also genetically pre-determined and therefore may have an strong association with certain disease including diabetes mellitus. The various results obtained from research on patients with different types of disorder including gastric cancer, duodenal ulcer, colorectal cancer, salivary gland tumors, ovarian tumors, thyroid disorders, lung cancer and heart disease have shown association with ABO blood groups [5, 6]. The information obtain from previous reports has led to the supposition that there may the association of certain other disorders with ABO and Rh blood groups. Such types of studies to determine the associations of blood groups with other diseases are of significance to identify and to adopt possible precautionary measurement to decrease the occurrence [7].

Diabetes mellitus (DM) is a type of metabolic disorder in which an individual has high level of sugar in his blood [8]. Diabetes is due to inefficiency of the pancreas not to produce requiring amount of insulin, or lack of the ability of body cells not to respond properly to the insulin [9]. Diabetes mellitus is a one of the top 10 medical problem and have high rate of morbidity and mortality worldwide. It is a genetic problem, but environmental factors also play their role in its genetic expression. Therefore it is strongly believes that like many other inherited traits and characteristics, blood groups may have an association with diabetes mellitus [5].

Based on the previous knowledge we conducted this study to find out a possible association between ABO blood groups and diabetes mellitus. This study was conducted at department of biochemistry, AWKUM Shankar campus. Total number of

samples were 2258, comprising 1159 males and 1099 females. Samples were taken from different department, which include Agriculture, Biochemistry, Biotechnology, Botany, Chemistry, Computer Science, Physics, and Zoology. Our study shows that the individual having blood group B (43%) have high blood sugar level followed by A (29%), O (19%), and AB (9%). In females blood group B having high glucose level as compared to other blood groups and also in males blood group B having high glucose level as compared to 3 Association of ABO Blood Group with Diabetes among Students of AWKUM other blood groups which shows that blood group B have more chances of diabetes. Therefore, this study concluded that blood group B has risk of diabetes as compared to other blood groups.

Materials and Methods

Study design

A cross-sectional study was design. The source population of the current study was the students of Abdul Wali Khan University Shankar Campus Mardan. Blood Samples were collected from students of different departments including Agriculture, Biochemistry, Biotechnology, Botany, Chemistry, Computer Science, Physics and Zoology. Blood samples were collected in biochemistry lab from AWKUM Shankar campus Mardan.

ABO blood group test

In the current study (2258) blood samples were collected from different department of AWKUM Shankar campus, with the help of pricker /Lancet. The finger of each student was pricked and a drop of blood was placed on a transparent glass slide at three different positions. Then anti-sera were added on each drop, the anti-sera were anti A, anti B and anti D. The antisera were mixed with each blood drop with the help of match sticks. Blood groups were determined on the basis of agglutination. The socio demographic data like age and gender were also analyzed at the testing time.

Blood glucose measurement

Blood sugar level was measured at fasting using a biosensor glucometer. The blood is biological component and the transducer of biosensor glucometer converts this biological component into electronic detector. This electronic detector gives result in the form of digits in few seconds. With the help of pricker /Lancet the finger of each student was pricked. Glucometer was switch on, and then insert strip in glucometer and a drop of blood was placed on strip. Subjects were divided into subgroups according to their sugar level. We distributed individual having low sugar level 41-80 mg/dL in group I, normal sugar level as 81-120 mg/dL in group II, and high sugar level 121-160 mg/dL in group III.

Statistical analysis

chi-squared test was used to determine the significant differences between different groups. $P < 0.05$ was considered statistically significant.

Results

Total number of samples was 2258 comprising 1159 males

and 1099 females. Samples were taken from different department, which include Agriculture, Biochemistry, Biotechnology, Botany, Chemistry, Computer Science, Physics, Zoology and also from some faculty members.

Gender Wise distribution of individuals

Total of 2258 samples were collected during the course of our study, in which randomly 1159 blood samples were collected from males and 1099 from females as shown in table 1.

	Male Students	Female Students	Total Students
Number	1159	1099	2258
Percentage	51.32%	48.68%	100%

Percentage distribution of students according to blood sugar level

The resent study determined the association of diabetes with blood groups. Blood group B having more chances followed by A, O and AB. Group I represent low blood sugar level range from 41-80 mg/dL, group II represent normal blood sugar level 81-120 mg/dL, and group III represent high blood sugar level 121-160 mg/dL. (10%) students lies in group I having low blood sugar level 41-80 mg/dL, (65%) students lies in group II having normal blood sugar level 81-120 mg/dL, and (25%) students lies in group III having high blood sugar level 121-160 mg/dL. In blood group B 43% of individuals have significantly high sugar level which shows that blood group B individual having more chances of diabetes as shown in table 2.

S. No	Groups of sugar level	% of students in groups	% of students in each blood group			
			A	B	AB	O
1	Group I	10%	12%	36%	11%	41%
2	Group II	65%	22%	41%	16%	21%
3	Group III	25%	29%	43%	9%	19%

Female distribution

There were 1099 female students. In group III Blood group B has 45 % of individual having high blood sugar level 121-160 mg/dL. As blood group B have high sugar level which shows that blood group B individual having more chances of diabetes followed by A, O and AB as shown in table 3.

Male student's distribution

There were 1159 male students, In group III Blood group B has 40% individual having high blood sugar level 121-160 mg/dL and blood group B having more chances of diabetes followed by A, O and AB as shown in table 4.

Table 3: Female Distribution of Diabetes Association with Blood Groups

S. No	Groups of sugar level	% of students in each blood group			
		A	B	AB	O
1	Group I	0%	34%	0%	66%
2	Group II	29%	29%	19%	23%
3	Group III	33%	45%	11%	11%

Table 4: Male distribution of diabetes association with blood groups

S. No	Groups of sugar level	A	B	AB	O
1	Group I	15%	36%	14%	35%
2	Group II	18%	48%	14%	20%
3	Group III	33%	40%	6%	21%

Discussion

The present study comprising of 2258 subjects including 1159 (51.32%) male and 1099 (48.68%) females was carried out in biochemistry department AWKUM to determine the association of blood group with diabetes. The current study showed that the individual having blood group B (43%) have high blood sugar level followed by A (29%), O (19%), and AB (9%) as shown in table 2. Both in males and females blood group B having high glucose level as compared to other blood groups. The current study shows that blood group B has more chances of diabetes. The previous study which support our work that Blood type B individuals are susceptible to esophageal and biliary cancer. Type 2 diabetes is significantly associated with gastric, biliary and especially pancreatic cancer [10]. Also other study demonstrated that blood group B was associated with diabetes mellitus and hypertension [11].

Conclusion

Base on the current study it was concluded that in older age regularly check blood glucose, blood pressure and blood cholesterol levels. Person have blood group B should take care of their diet, health, exercise and take less sugar for avoiding the chances of diabetes. Therefore it is highly recommended for all obese, smoker, and old age persons and especially for those

having blood groups B, that to avoid alcohol, smoking, eat fresh vegetable and fruits, take regular exercise and check blood pressure and blood glucose and cholesterol levels regularly to reduces the risk and the chances of diabetes.

Acknowledgment

We thank students of Shankar campus AWKUM for their cooperation during the course of this study.

References

1. R. R. Race and R. Sagner, Blood group in man, Blackwell Scientific Publication, Oxford. UK, 12 (1978)
2. W. G. Burns, An Introduction to heredity, McMillan Publishing Company Inc, New York, p. 179 (1980).
3. V Decastello and A Sturli, Ueber die Isoagglutinine im Serum gesunder und kranker Menschen. Mfi Med Wschr. 1902.
4. M Anthea, J Hopkins, C William, S Johnson and M Quon, Human Biology and Health, Englewood Cliffs NJ: Prentice Hall, New Jersey, USA, 1993.
5. JA Pinkston and P Cole. ABO blood groups and salivary gland tumors. Can Cau Control. 1996;7(6):572-574.
6. H. Wazirzai, A Ashfaq and J W Herzig, Association of blood group A with increased risk of coronary heart disease in the Pakistani population, Pak J Physiol. 2005;1(1-2).
7. A. G. Waseem, Association of Diabetes Mellitus with ABO and Rh blood groups, *Inst. Med. Sci*, **8**, 134 (2012).
8. David B. Sacks. A1C versus glucose testing: A comparison. *Dia Care*. 2011;(34)2:518-521. doi: 10.2337/dc10-1546
9. Sandhya Sharma , Jayant Kumar , Raghuvveer Choudhary, N D Soni, Study of Association between ABO Blood Groups and Diabetes Mellitus , *Sch J App Med Sci*. 2014;2(1A):34-37.
10. Gong Y, Yang YS, Zhang XM, Su M, Wang J, Han JD, et al. ABO blood type, diabetes and risk of gastrointestinal cancer in northern China, *World J Gastroenterol*. 2012;18(6):563-569. doi: 10.3748/wjg.v18.i6.563.
11. S Hadeal. Association of ABO and Rh Blood Groups with Diabetes Mellitus and Hypertension in Basrah City Basrah. *J Sci*. 2008;26(1):29-37.