



Association of ABO and Rh blood Groups With Type 2 Diabetes

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Abstract: The present study including collection of 100 serum samples and from totally 100 patients include 28 males and 72 females clinically diagnosed with type 2 diabetes mellitus from binging of July to end of August 2016, who they attended to Al-Zafaraniyah Hospital. The estimation of fasting blood sugar (FBS) concentrations in type 2 diabetes mellitus patients, have indicated that the FBS concentrations could be divided into three groups; the first group contains 85 males and females diabetic patients with FBS concentrations range from 120-200 mg/dl and the second group contains 14 males and females diabetic patients with FBS concentrations range from 200-300 mg/dl, whereas the third group contains one male diabetic patients with FBS concentration more than 300 mg/dl in both of males and females diabetic patients. The determination of ABO blood groups and Rh in type 2 diabetes mellitus patients, have indicated that the blood group A was the most dominant blood group comparing to other blood groups followed by blood groups B, O and finally AB. The results showed that to sum up 39 out of 100 blood samples were determined for blood group A, 28 of blood samples were determined for blood group B, 24 of blood samples were determined for blood group O and 9 of blood samples were determined for blood group AB from both of males and females patients clinically diagnosed with type 2 diabetes mellitus.

Keywords: ABO, FBs, DM.

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Introduction

The phenotypic ABO blood groups are polymorphic, inherited, antigenic substances found on the surface of red blood cells in addition to other tissues. The “ABO” blood group was first discovered by Karl Landsteiner in 1900. ABO and “Rhesus” blood group antigens are major human blood group system antigens with prime importance in transfusion medicine (1).

The blood type of an individual defined by small carbohydrate epitopes depends on the presence or absence of genes A and B. The gene is positioned on chromosome 9q34 and consists of 7

exons spread over 18 kb. The ABO system contains four major ABO phenotypes A, B, O and AB (2).

Diabetes Mellitus (DM) is one of the diseases investigated for such interrelation. 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) (2).

The aim of this study was planned to, review the discoveries, genetics, inheritance, risk factors and other information associated with ABO

groups and diabetes mellitus in human. Determine the ABO and Rh groups and estimate the fast blood sugar and glycohemoglobin A1C (Hb1AC) concentration in type 2 diabetes mellitus patients, find out the possible linkage between ABO and Rh blood groups with type 2 diabetes mellitus in some Iraqi diabetic patient.

Materials and Methods

During the period from beginning of July to end of August 2016 collection of 100 serum samples and 100 blood samples from totally 100 patients include 28 males and 72 female clinically diagnosed with type 2 diabetes mellitus, who attended to Al-

Zafaranyah Hospital and Al-Mashtal private laboratory. The fasting blood sugar (FBS) in (type 2 DM) patients' was estimated using. The glycohemoglobin A1C (HbA1C) concentration in type 2 diabetes mellitus patients' was estimated using (STANBIO/ USA) kit The ABO blood groups in type 2 DM patients' were determined by the tubes method using (Omega/USA) kit.

The Statistical Analysis System-SAS (2012) program was used to effect of difference factors in study parameters. Chi-square test was used to significant compare between percentage and Least significant difference -LSD test was used to significant compare between means in this study.

Table (1): Effect of Rh group in FBS and HbA1C in type 2 diabetes mellitus patients

Rh group	Patients No.	Mean \pm SE	
		FBS	HbA1C
Positive	87	160.79 \pm 3.65	7.69 \pm 0.07
Negative	13	168.23 \pm 18.43	7.74 \pm 0.16
LSD value	---	23.316 NS	0.395 NS
P-value	---	0.528	0.799

NS: Non-significant

Results and Discussions

The results of gender effect in FBS concentrations in type 2 diabetes mellitus patients showed non-significant difference (P 0.349) in FBS concentration between the males and females diabetic patients, but the results

females diabetic patients, but the results of gender effect in HbA1C concentrations in type 2 diabetes mellitus patients, showed highly significant difference (P 0.0077) in HbA1C concentrations between males and females which were 7.4% for males and 7.8% for females in diabetic patients.

Table (2): Effect of gender in FBS and HbA1C concentrations in type 2 diabetes mellitus patients

Gender	Patients No.	Mean \pm SE	
		FBS	HbA1C
Male	28	155.96 \pm 6.99	7.42 \pm 0.11
Female	72	164.12 \pm 4.75	7.81 \pm 0.07
LSD value	---	17.239 NS	0.282 **
P-value	---	0.349	0.0077
** (P<0.01), NS: Non-significant			

The results of age group effect in FBS concentrations in type 2 diabetes mellitus patients, showed highly-significant difference ($P < 0.017$) in FBS concentrations in 50-60 years old diabetic patients which was 180 mg/dl followed by less than 50 years old diabetic patients which was 154.9

mg/dl, while the lower FBS concentration was in more than 60 years old diabetic patients which was 149.1 mg/dl, whereas the results of age group effect in HbA1C concentrations in type 2 diabetes mellitus patients showed non-significant difference ($P < 0.346$) in diabetic patients.

Table (3): Effect of age group in FBS and HbA1C concentrations in type 2 diabetes mellitus patients

Age group (year)	Mean \pm SE	
	FBS	HbA1C
Less than 50	154.90 \pm 5.12	7.80 \pm 0.12
50-60	180.23 \pm 8.78	7.74 \pm 0.12
More than 60	149.17 \pm 4.09	7.57 \pm 0.10
LSD value	18.167 **	0.324 NS
P-value	0.0017	0.346
** (P<0.01)		

Previous studies has been comprehensively investigated the association between ABO and Rh Blood factor and diabetes thevarious countries. The result of present report in agreement with result of the study that conducted by(3) who studied 1333 diabetic patients and concluded increase frequency of blood group A among these diabetic patients and this result was confirmed by the study that conducted by (4).

Also the results of this report in agreement with results of (5)which study that the link of ABO blood type A, B, AB and O, Rh factor positive or

negative with type 2 diabetes. Subjects with blood group A and blood group B were at higher risk of type 2 diabetes mellitus compared with those with blood group O. There was no significant difference in type 2 diabetes risk between Rh+ve and Rh-ve blood groups.

In addition, (6) determined the incidence of type 2 diabetes among ABO blood groups. They found that the values were 4.36% for blood group A; 17.15% for blood group B and 7.34% for blood group AB higher in diabetic patients. However, the value was 29.0% lower for the blood type O.

As well as, the results of this report agree with some results and disagree with others of Sidhu *et al.*, (1988) conducted a study on the rapport between blood groups ABO and Rh and diabetes mellitus. They compared the blood groups of 520 of diabetic patients with 6204 normal individuals taken as control. They found an association of diabetes mellitus with blood group AB, A and Rh+ve blood groups. The highest differences were noticed for AB groups and minimum in the group A.

At the same time results of present report disagree with result of the study that conducted by (7) that showed an increase frequency of blood group B among diabetic patients in Iraq, and disagree with results of the study that conducted by (8) from Italy that showed an increased frequency of blood group B among diabetics.

Also the results of this report disagree with results that carried out by (7) which found that the blood group B is associated with high incidence of type 2 diabetes and blood group O has minimum association with type 2 diabetes, while the blood group A and AB were almost equally distributed among diabetic and non-diabetic population. But agrees with the result of same study which referred to disability find out an association between Rh+ve and Rh-ve blood groups with type 2 diabetes.

In addition, the result of this report disagrees with result of (9) that found the Rh negative blood group is more frequent in diabetic patients in Pakistan, and disagrees with result of (10) which suggested that there is no association between the distribution of the ABO blood types and diabetes mellitus.

As well as, the results of present report disagree with results of study that

carried out by (11) that investigated the linkage between the ABO blood groups and diabetes mellitus in Qatar. They demonstrated that, blood type B was significantly common and blood group O was significantly less common in diabetic patients compared to healthy non-diabetic population.

In addition, the investigations in different countries showed varying findings regarding the susceptible of blood group as risk factor for diabetes mellitus in different population (12).

Conclusion

This report exhibit remarkable association between the ABO blood groups and Type 2 diabetes mellitus patients (type 2 DM patients). The results showed that the blood group A the was highly associated with incidence of type 2 DM and the blood group AB has low association, while the blood groups O and B were almost have equal association with incidence of type 2 DM, The report explain that facer no association between the Rh and type 2 DM patients. The report exhibited that the highest F.B.S. concentrations were in 50-60 years old type 2 DM patients and the highest HbA1C concentrations were in less than 50 years old diabetic patients, whereas the both lowers F.B.S. and HbA1C concentrations were in more than 60 years old diabetic patients.

References

1. Siransy, L. K.; Nanga, Z. Y.; Zaba, F. S.; Tufa, N. Y. and Dasse, S. R. (2015). ABO/Rh Blood Groups and Risk of HIV Infection and Hepatitis B Among Blood Donors of Abidjan, Côte D'ivoire. *European Journal of Microbiology and Immunology*, 5(3): 205–209.

2. Farhud, D. D. and Zarif Yeganeh, M. (2013). A brief history of human blood groups. *Iranian Journal of Public Health*, 42(1): 1–6.
3. McConnell, R. B.; PYKE, D. A. and ROBERTS, J. A. (1956). Blood groups in diabetes mellitus. *British Medical Journal*, 1(4970): 772–776.
4. Andersen, J. and Lauritzen, E. (1960). Blood groups and diabetes mellitus. *Diabetes*, 9: 20–24.
5. Fagherazzi, G.; Gusto, G.; Clavel-Chapelon, F.; Balkau, B. and Bonnet, F. (2015). ABO and Rhesus blood groups and risk of type 2 diabetes: evidence from the large E3N cohort study. *Diabetologia*, 58(3): 519–522.
6. Qureshi, M. A. and Bhatti, R. (2003). Frequency of ABO blood groups among the diabetes mellitus type 2 patients. *Journal of the College of Physicians and Surgeons--Pakistan: JCPSP*, 13(8): 453–455.
7. Meo, S. A.; Rouq, F. A.; Suraya, F. and Zaidi, S. Z. (2016). Association of ABO and Rh blood groups with type 2 diabetes mellitus. *European Review for Medical and Pharmacological Sciences*, 20(2): 237–242.
8. Tedeschi, G. and Cavazzuti, F. (1959). Contributo casistico allo studio dei rapporti tra diabete mellito e gruppi sanguigni ABO and Rh [Casuistic contribution on the study of the relations between diabetes mellitus and the ABO and Rh blood groups]. *Il Progresso Medico*, 15(3): 76–82.
9. Abdul Ghani, W. M.; Awwab Khan, I. O. and Tahir, M. (2012). Association of diabetes mellitus with ABO and Rh blood groups. *Annals of Pakistan Institute of Medical Sciences*. 8(2): 134-136.
10. Sidhu, L. S.; Malhotra, P. and Singh, S. P. (1988). ABO and Rh blood groups in diabetes mellitus. *Anthropologischer Anzeiger; Bericht uber die biologisch-anthropologische Literatur*, 46(3): 269–275.
11. Bener, A. and Yousafzai, M. T. (2014). The distribution of the ABO blood groups among diabetes mellitus patients in Qatar. *Nigerian Journal of Clinical Practice*, 17(5): 565–568.
12. Koley, S. (2008). The distribution of ABO blood types in patients with Diabetes Mellitus. *Anthropologist*. 10(2): 129-132.