ASSOCIATION BETWEEN BLOOD GROUPS / RHESUS FACTOR AND DIABETIC INCIDENCE OF   MALE IN ALJABAL ALKHDAR IN LIBYA

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ABSTRACT

Diabetic disease has considered a major worldwide public health problem , has bad complications and also has different etiological agents such as environmentally , physiologically , immunologically and genetically reasons . It is found that the genetic variants at ABO Locus affect diabetes risk and thus ABO blood group phenotypes may be associated with diabetic incidence. So, this study aims to determine the frequency of blood groups (ABO) and rhesus factor (Rh) in male diabetic patients. Samples of diabetic populations are collected from some clinical laboratories, hospitals in some regions of Aljabal Alakhdar in Libya. By current criteria for diagnosis and taking patient history, it could be classified the diabetes in male individuals into (two types the first type (1) and the second type (2)). Then, ABO group technique was carried out by using agglutination test and statistical analysis was done by split plot design. The findings in this research have supported the hypothesis that diabetes and blood group types are interrelated. Also it could be suggested that the Rh factor may have a role to some extent in determine the type of diabetes related to ABO groups.

Keywords: ABO / Rh groups, Type 1 & Type 2 male diabetes

INTRODUCTION

The number of people living with diabetes is estimated to rise from 366 million in 2011 to 552 million by 2030 . Between 2010 and 2030 , there will be a 69% increase in number of adults with diabetes in developing countries and 20% increase in developed countries . One of the principal effects is the reduction in β - cell mass , which is ubiquitous in almost all patients with type (1) diabetes (insulin – dependent diabetes) and most patients with type (2) diabetes (insulin – non dependent diabetes) . Current therapy focuses primarily on administration of insulin to restore glucose homeostasis (Kaur *et al.* , 2012) .

The two most significant blood group systems were discovered by Karl Landsteiner during early experiments with blood transfusion: the ABO group in 1901 and in cooperation with Alexander S. Wiener the Rhesus group in 1937 (Landsteiner and Wiener , 1940) .

A blood group is a classification of blood based on the presence or absence of inherited antigenic substances on the surface of red blood cells (RBCs) . Several of these red blood cell surface antigens can stem from one allele (or very closely linked genes) and collectively from a blood group system (Anthea *et al.* , 1993). Blood groups are inherited and represented contributions from both parents .

The Rh factor is the second most significant blood group system in human – blood transfusion with currently 50 antigens . The most significant Rh antigen is the D antigen , because it is the most likely to provoke an immune system response of the five main Rh antigens **(Talaro , 2005)** .It is common for D negative individuals not to have any anti – D IgG or IgM antibodies , because anti – D antibodies are not usually produced by sensitization against environmental substances . However , D – negative individuals can produce IgG anti – D antibodies following a sensitizing event . The presence or absence of Rh antigens is signified by the + or – sign (Moise , 2008) .

Some blood groups are associated with inheritance of other diseases for example , Kell antigen is associated with Mcleod syndrome (Chown *et al.* , 1957) . Certain blood types may affect susceptibility to infection , an example being the resistance to specific malaria species seen in individual lacking the Duffy antigen (Miller *et al.* , 1976) . The associated anti – A and anti – B antibodies are usually immunoglobulin M , abbreviated IgM antibodies ABO IgM antibodies are produced in the first years of life by sensitization to environmental substances such as food , bacteria and viruses . There is association between ABO phenotypes and Type 1 diabetes (TID) (Kharagj *et al.* , 2008) .It is found that genetic variants at ABO locus affect diabetes risk (Qi *et al.* , 2010).So , the aim of this study shows the association between diabetes and ABO / Rhesus blood groups and to determine the blood group which appears to be more susceptible to diabetes mellitus

MATERIALS AND METHODS

A total 16290 male diabetic cases (7880 male diabetes patients with positive ABO groups and 8410 male diabetic patients with negative ABO groups) were enrolled from some clinical laboratories and some hospitals in four regions (Derna , AL- Gobba , Al – Abraq and AL-Beida) of Aljabal Alakhdar – in Libya . Biodata information were obtained during history taking and from subject hospital case note . The range age of male diabetes was between 20 – 65 years . Diabetes type 1 and type 2 were identified and classified . The current criteria for the diagnosis of diabetes were applied . ABO / Rh typing was determined by agglutination test ,   Fasting blood sugar (FBS) and post – prandial sugar (PPS) were determined using method as well as measurements of hemoglobin A1c (Hb Alc) by colorimetrical method in the auto-_analyzer (Hekimsoy et al. , 2004). Statistical analysis was carried out by split plot design at significancy (P< 0.05) (Snedecor and Cochran , 1967) .

RESULTS AND DISCUSSION

The results of this study were subjected to reveal the correlation between relative incidence of different types of diabetic disorders of male patients with ABO / Rh grouping phenotype in some regions of Aljabal

Alakhdar . This study is considered from hypothetico – deductive method of investigation .

Table (1) : **The relation between positive blood groups and diabetic Types 1 & 2 of male patients in Green Mountain in Libya .**

Regions	No. of Cases $\overline{X}$.	Blood groups	($\overline{X}'$)	Diabetic Types	($\overline{X}'$)
Derna AL- Gobba Al – Abraq AL-Beida	287.2 270 230 197.5	O + ve AB+ ve A+ ve B+ ve	280 250 236.3 218	Type 1 Type 2	283.13 209.38
L.S.D * P < 0.05	55.4		N.S		16.7

L.S.D : least significant difference & N.S. : Non significant (P < 0.05)

It was found that Derna town enrolled no. of patients with mean value $\overline{X}'$= 287.2 , Significantly raising with diabetic injury for positive ABO grouping males whereas the mean value of (AL- Gobba ,Al – Abraq and AL-Beida) were (270 , 230 and 197.5) respectively as shown in Table (1). Type 1 diabetic incidence had significantly prevalence from Type 2 diabetic cases (Haiyan *et al.* , 2001) who stated that Type 1 diabetic influenced the manifestation of Type 2 diabetic in Finland and his findings supported a possible genetic interaction between Type 1 and Type 2 diabetes mediated by HLA locus .

The blood group "O" positive was highly distributed among diabetic disorders of male patients with mean value ($\overline{X}'$ = 280) than other groups (AB+ve , A+ve and B+ve) which have had mean values (250 , 236.3 and 218) respectively . These results are in disagreement with (Okon *et al.* , 2008) who found that the blood group " O" positive was significantly lower in diabetes in South Eastern Nigeria .

Table (2) reveals that the blood group "O" positive ($\overline{X}'$:332.5 and 227.5) is insignificantly(P< 0.05) the most interrelated with two diabetic types(type 1 and type 2 respectively) than other groups , but (Okon *et al.* , 2008) who reported that the blood group "O" negative appears to be more susceptible to diabetes mellitus . Also, this table shows the blood groups B +ve and AB +ve with mean values $\overline{X}'$: 235.0 and 197.5 are insignificantly lower interacted with diabetic type 1 and type 2 respectively. While (Okon *et al.* , 2008) reported that blood group (O +ve) was significantly (P<0.05) lower in diabetics.

Table (2) : The relation between the reaction of positive ABO groups and diabetic types in male patients

ABO Groups	Diabetics types Type (1)	Types (2)
	x	x
A +ve	262.5	210.0
B +ve	235.0	202.5
AB +ve	302.5	197.5
O +ve	332.5	227.5
LSD*	NS	NS
P< 0.05		

Table (3) demonstrates that the relative diabetic incidence of negative blood grouping male patients in Derna town with mean value ($\overline{X}'$ = 322.5) was insignificantly elevated than that other regions . It was noticed that the relative incidence of Type (2) diabetic was more than Type (1) with insignificant difference (P<0.05) and this result is consistent with (ALberti and Zimmet, 2004) who explained that the processes including Type (1) , auto immune and non- auto immune , with beta – cell destruction , all of these cause Type (2) .

Table (3): The relationship between negative blood grouping and diabetic types of male patients in Green Mountain in Libya .

Regions	No. of cases $\overline{X}$	Blood groups	$\overline{X}$	Diabetic Types	$\overline{X}$
Derna	322.5	B- ve	318.8	Type (2)	323.8
AL- Gobba	268.8	O- ve	256.3	Type (1)	196.9
Al – Abraq	258.8	AB- ve	246.3		
AL-Beida	201.4	A- ve	230		
L.S.D * P < 0.05	N.S.		N.S.		N.S.

L.S.D : least significant difference & N.S. : Non significant   (P < 0.05)

It was noticed that the frequency of blood type (B) negative phenotype with mean value ($\overline{X}'$)=318.8 occurs insignificantly the highest distribution among diabetes (P< 0.05).Whereas (A) negative with $\overline{X}'$=230 appears the least frequency . This results were confirmed by (Gong *et al.* , 2012) who showed that blood type "B" individuals are susceptible to Type (2) diabetes . Also they are agreement with   (Qureshi and Bhatti , 2003) who concluded that the frequency of blood group B is significantly higher in the diabetes mellitus Type 2 patients .

Table (4) demonstrates that the blood type (A –ve) with mean value ($\overline{X}'$=445) appears to be the most interrelated significantly (P<0.05) among type 1 diabetic individuals while (B-ve) was the least interrelated. On the other side , (B-ve) among type 2 diabetes was the most interactive than other negative groups with insignificantly difference . This results are in agreement with the results of Gong *et al.* , 2012).

Table (4): The relation between the reaction of negative ABO groups and diabetic types in male patients

ABO Groups	Diabetics types Type (1) x	Types (2) x
A -ve	445	192.5
B -ve	240	220
AB -ve	317.5	175
O -ve	312.5	200
LSD*	150	NS
P< 0.05		

The observations from tables (1 to 4) lead to suggest that the factor Rh plays an important role on the association between ABO frequency and diabetes. This suggestion confirmed by (Gloria- Bottini *et al.* , 2000) who reported that , there is the relationship between Rh genetic variability and HbA1C   level and thus they suggested that Rh proteins may influence glucose transport through red cell membrane and / or hemoglobin glycation .

Conclusion :

The results have supported the hypothesis that the diabetes and blood group ABO types are interrelated. It is concluded that the frequency of blood groups "O" and "B" positive is insignificantly higher and lower respectively in the diabetes , while "B" negative was the most increment and interactive in the diabetic incidence . Also, this results proved that the Rh factor may be controlling in determine the type of diabetes in related to ABO grouping.

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علاقـة الأنمـاط المظهريـة لفصـائل الـدم والعامـل الريسـي وداء السـكري للمرضـى الذكور في الجبل الأخضر بليبيا

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يعتبر مرض السكري مشكلة صحية عامة رئيسية في جميع أنحاء العالم ، لها مضاعفات سيئة ، ولها مسببات مرضية مختلفة مثل أسباب بيئية وفسيولوجية ومناعية وكذلك أسباب وراثية. ووجد أن المتغيرات الجينية في فصائل الدم (ABO) تؤثر على مخاطر الإصابة بداء السكري وبالتالي قد يرتبط النمط المظهري لفصيلة الدم بحدوث داء السكري . لذلك تهدف هذه الدراسة إلى تعيين تكرار فصائل الدم (ABO) في مرضى السكري من الذكور .

يتضمن هذا البحث عددا من العينات جمعت من الفئات المصابة بالسكري من بعض المختبرات الاكلينيكية ، والمستشفيات في بعض مناطق الجبل الأخضر في ليبيا . بواسطة المعايير المعتمدة حاليا للتشخيص وأخذ تاريخ المريض الطبي أمكننا تصنيف مرض السكري في الأفراد الذكور إلى النوع الأول (١) والنوع الثاني (٢) . ثم تم عمل تقنيات تحديد فصيلة الدم (ABO) عن طريق إختبارات التراص وتم تحليل النتائج احصائياً بواسطة تصميم القطع المنشقة والاحصاء الحيوي نفذت بواسطة تصميم القطع المنشقة.

وقد دعمت النتائج التي تم التوصل إليها في هذا البحث فرضية أن هناك علاقة بين مرض السكري وفصائل الدم.و تمكنت الدراسة من تقديم إقتراح على أن العامل الريسي (Rh) الموجود على كرات الدم الحمراء ربما يكون له دور إلى حد ما في تحديد نوع السكري ذاتي الصلة بفصائل الدم .

ونوصى بمزيد من الدراسات فى هذا المجال لتأكيد النتائج المتحصل عليها

قام بتحكيم البحث