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Original Article

Rhesus Blood Groups Associated with Risk to Obesity and Diabetes Mellitus: A Report on Punjabi Population in Selangor, Malaysia

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ABSTRACT

Introduction: The present study was to evaluate the relationship between ABO and Rh blood groups with diabetes mellitus and obesity in Punjabi population, Selangor, Malaysia.

Methods: This study was carried out at various private clinics where nearby inhabiting Punjabi population at Selangor, Malaysia from August 2013 to July 2014. A total of 990 subjects (600 males and 390 females) were taken for the present study.

Results: Among them, 752 subjects are healthy individuals and 248 subjects had diabetes mellitus, and 159 subjects had obesity. The study incorporated the different blood groups such as group A: 22.52%; group B: 24.44%; group AB: 12.53% and group O: 40.51% respectively. The frequencies of Rh-positive and Rh-negative blood were 88.99% and 11.01% respectively.

Conclusion: Based on the present result, there was a significant difference between healthy subjects and obesity, diabetic patients in blood group B and Rh-positive groups.

KEY WORDS: Punjabi population, ABO and Rh Blood Groups, Obesity, Diabetes mellitus.

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INTRODUCTION

Since 19th Century, there has been an assorted challenge to find out a possible relationship between ABO and Rh blood groups and various metabolic and malignant diseases. Many researchers have made significant endeavour to establish the significance of individual ABO phenotypes to susceptible of the disease. The association between ABO blood groups and disease susceptibility has created a lot of interest.The extensive findings acquired from studies on patients with gastric cancer [1], salivary gland tumors [2], ulcer in duodenum [3], colon cancer [4, 5], thyroid cancer [6], ovarian tumors [7], Upper Urinary Tract tumors [8], small cell carcinoma of lung [9] breast cancer [10], pancreatic cancer [11], coronary heart disease [12-14] and hypercholesterolaemia [15] have shown that a strong association with ABO blood groups. The extensive information has directed to the assumption that some other metabolic and chronic diseases might also be connected with ABO and Rh blood groups. Based on the

sufficient findings, it helps to recognize vulnerability of the diseases and support possible preventive actions and diminish the incidence.

ABO blood groups are also alleged to have a higher rate in definite malignancies; many cancers have been confirmed in large experiment to have a significantly elevated incidence in subject of blood group A [8]. This could be attributed to failure of the immune system of blood group A individuals to identify the antigen of the cancer cells as foreign and cannot devastate them, but group O and B subjects usually have a naturally present anti-A that are probably demolish tumour cells [8]. The AB antigen tends to have evolutionary important due to the frequencies of different ABO blood group vary across diverse populations, demonstrating that a individual blood type confers a selection benefit (e.g. people tends to resist against an infectious disease).

Diabetes mellitus is a metabolic endocrine disorder encompasses major morbidity and mortality worldwide [16]. It has a hereditary nature; although genetic character has vital role, environmental factors also participate enormously in its hereditary expression. Likewise many other hereditary traits, ABO blood groups are also genetically indomitable as a result of the relationship with diabetes mellitus [17]. Detection of a positive link with ABO and Rh blood groups may replicate increased susceptibility to and a negative correlation defense against diabetes.

Previously, many research studies have been broadly investigated the connection between ABO and Rh Blood groups and diabetes in different countries with diverse populations. The augment frequency of blood group A among diabetic patients in Taiwan [13] and Nepal [18] and frequency of blood group B among diabetic patients in Iraq [19], Qatar [20], Italy [21], India [22], the blood group Rh negative is more common in Diabetic patients of Pakistan [17]. However the some study confirmed that there has been no connection between the distribution of the ABO, Rh blood types and diabetes mellitus [23-25].

Since diabetes is a chronic and dreaded disorders cause large blood vessels damage (macrovasular complications) of brain, heart and legs; damage the small blood vessels (microvascular complications) of eye, feet, kidney, and nerves and produce various other life threatened illness like atherosclerosis, stroke, hypertension and obesity. The present study was conducted to find out a possible relationship between ABO and Rh blood groups with diabetes mellitus and obesity of particular Punjabi populations in state of Selangor, Malaysia.

MATERIAL AND METHODS

Study area: The state of Selangor consists of 9 districts and has the largest population (5.75 million inhabitants as of 2010) in Malaysia; with an area of about 8,000 sq. km expand along the west coast of Peninsular Malaysia at the northern outlet of the Straits of Malacca, longitude and latitude of 3.3333° N, 101.5000° E. A large percentage of Selangor's population lives around the Federal Territory of Kuala Lumpur, a capital of Malaysia. The Selangor state's ethnic population consists of Malay (57.1%), Chinese (28.6%), Indian (13.5%), and other ethnic groups (0.8%). Punjabi are a small minority ethnic among the approximately two million Indians in Malaysia. Punjabi are predominantly followers of the Sikh religion. Recent senses stated that there are 70,000 Sikhs/ Punjabi populations in Malaysia.

Experimental Study design: This study was conducted at various private clinics at Selangor state, Malaysia from August 2013 to July 2014. A total of 990 individuals (600 males and 390 females) were used for the present study. The rationale and method of study were explained to all diabetic individuals coming to medical OPD or admitted in the patient's ward. About 248 consecutive diabetic patients who consented to be taken in study were registered irrespective of their sex, age, economic status and duration of the disease. These patients were already investigated to have diabetes, were under treatment and coming for follow up to hospital for their disease management. The controls were taken from healthy subjects coming for blood donation at private clinics blood

bank over this period of study. Obesity was estimated suitably using the Body mass index (BMI).

BMI Calculation & Blood group analysis: It is determined as the person's weight (kg) divided by square of individual's height in meter (kg/ m^2)

BMI =weight (Kg)/ Height^2 (m)

Category	BMI range (Kg/m2)
Starvation	<15
Under weight	15-18.5
Normal	18.5-25
Over weight	25-30
Obese	30-40
Morbidly obese	>40

Two ml of blood sample was collected in EDTA tube from patients by a phlebotomist, labeled and transferred to laboratory for determination of blood groups. ABO and Rh blood groups were determined using tile method.

Statistical analysis: The data obtained were analyzed statistically to determine any association between DM and different ABO blood groups. Data were analyzed and given as percent and absolute number of frequency. Statistical analysis was used as Chi- square test, $p<0.05$ was measured to be statistically considerable.

RESULTS

The distribution of ABO and Rh blood groups in Punjabi population at Selangor state were summarized in **Table 1**. The table gave an idea about gender along with number and percentage of blood groups. The number and percentage of ABO and Rh blood groups of healthy and diabetic individuals showed in **Table 2**. There was significant difference between diabetic patients and healthy individuals in blood group B ($p<0.05$), also there was significant difference in Rh positive among both groups ($p<0.05$). The noteworthy of frequency of Rh positive among

Blood groups	Number of subjects	Percentage of subjects	Number of Males	Percentage of Males	Number of Females	Percentage of Females
A	223	22.52	113	18.83	91	23.33
B	242	24.44	231	38.5	144	36.92
AB	124	12.53	87	14.5	43	11.03
O	401	40.51	169	28.17	112	28.72
Rh+	881	88.99	541	90.17	334	85.64
Rh-	109	11.01	59	9.83	56	14.36
Total	990	100	600	100	390	100

Table 1: Distribution of ABO and Rh blood groups in Punjabi Populations.

Blood groups	Number of healthy subjects	Percentage of healthy subjects	Number of diabetic patients	Percentage of diabetic patients	P-value
A	178	23.67	55	22.18	0.22
B	140	18.62	82	33.06	0.01
AB	94	12.5	30	12.1	1.72
O	340	44.21	81	32.66	1.56
Rh+	685	91.1	196	79.03	0.02
Rh-	67	8.9	52	20.97	0.42
Total	752	100	248	100	-

Table 2.: Comparison between the ABO and Rh blood groups of healthy subjects and diabetic patients in Punjabi Populations.

Blood groups	Number of healthy subjects	Percentage of healthy subjects	Number of obesity patients	Percentage of obesity patients	P-value
A	194	23.35	29	18.24	0.15
B	176	21.18	66	41.51	0.04
AB	105	12.64	19	11.95	1.82
O	356	42.84	45	28.3	1.76
Rh+	775	93.26	106	66.67	0.01
Rh-	56	6.74	53	33.33	0.34
Total	831	100	159	100	-

Table 3: Comparison between the ABO and Rh blood groups of healthy subjects and obesity patients in Punjabi Populations.

diabetic in the present study was 79.03%. The blood group B and O and Rh positive blood group (33.06 & 32.66%) was most frequency blood group among diabetic patients. The numbers of healthy and obesity individuals and percentage of blood group ABO and Rh blood group were significant difference between healthy individuals and obesity persons in blood group B and Rh positive ($p<0.05$), which was demonstrated in **Table 3.** The results of healthy and obesity individuals are almost similar to that of healthy and diabetic individuals.

DISCUSSION

The extensive studies have tried to investigate a possible relationship between ABO & Rh blood groups and diabetes mellitus in Punjabi populations. The results have been proved as inconsistent and differed from one county to other. Many researchers have documented that there were no relationship between blood groups and diabetes [17, 23-25]. But the results of the present study suggested that subjects with blood group AB was small numbers while those with blood group B and O are higher susceptible to have Diabetes. Rh positive is higher frequency in diabetics. Our results are similar to those of Abdul Ghani et al. [17] and Pramanik and Pramanik [18].

Many research studies have been established equal distribution of ABO blood groups among diabetics and non-diabetics. Macafee [26] investigated an association between ABO blood groups and Diabetes Mellitus. Based on his observation, our results also suggested similar distribution of different blood groups in Diabetics and healthy subjects. Koley [24] also confirmed that there was no significant difference of ABO blood groups in diabetics and healthy subjects. Similar findings have been made by Sidhu et al.[23] and Qureshi and Bhatti [27].

In the present study, the blood group B and Rh positve were more susceptible to get obesity as compared to blood group O and A; whereas AB blood group had a lesser chance of getting obesity. This could propose that the blood group B might hereditarily more prone to get obesity as compared to other blood groups. However it is initial study, a clear drift is seen in agreement with previous studies [28-30] carried out in Iran [31].

Research on ABO group system has been of massive attention, due to its medical significance in diverse diseases. The ABO blood group system is not only significant in cardiovascular diseases, blood transfusions, erythroblastosis in neonates and organ transplantation, but also one of the powerful interpreters of country wise suicide rate and a obesity genetic marker [32, 33]. In contrast, the blood group O is the most prevalent group in Egypt [34] and India [35] and Blood group A in Russian Federation [36]. The familiar groups in Australians are A and O, while in Africans B group is commonest [37]. In south India showed that blood group O was commonest (38.75%) followed by group B (32.69%) [35].

Our donor population of obesity showed Rh negativity of 33.33% as compared to 17% in Britain. This suggests that the ordinary frequency of Rh iso-immunization would be higher in our population than that encountered in the Britain population. The probable explanations of these contradictory findings are about undoubtedly racial and environmental factors have a role in genetic expression of many diseases. Furthermore many studies investigated in this regards have little number of population. Most likely studies on larger scale and a meta-analysis of mission done so far will offer a solution to this problem. The study clearly shows that significant difference between healthy subjects and diabetic patients in blood group B and Rh-positive groups. On the subject of the healthy and obesity subjects there was significant difference in blood group B and Rh-positive groups in Punjabi population.

CONCLUSION

In conclusion, the blood group B in blood donor was more susceptible to diabetes and obesity. The commonest ABO blood group was group B in blood donors of diabetes and obesity with the percentage of Rh negativity at only 20.97 and 33.33% respectively. This was in contrast to the occurrence of ABO and Rh blood groups in other parts of the world and ethnic group as well as within the country.

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