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Sarawakian and Sabahan Blood Group Pattern Analysis In ASIA Metropolitan University, Malaysia- A Cross Sectional Study.

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Abstract: Very few ABO blood group and rhesus based research has been done in Malaysia. From the literature survey, literature about sarawakian and sabahan ethnics blood group pattern was not present and may be this research was the first conducted in Malaysia focusing individually on sarawakian and sabahan ethnics living in East Malaysia. In this research 600 participants were included with 300 were sarawakian students (150 males and 150 females) and another 300 were sabahan students (150 males and 150 females). A 1.0-2.0 ml sample of blood was drawn from the antecubital vein of each subject in a disposable syringe, and transferred immediately to a tube containing ethylene diamine tetra acetic acid (EDTA). Blood grouping (ABO) and Rhesus factors (Rh), was done by the antigen antibody agglutination test. The anti sera used were obtained from Plasmatec Laboratory, Great Britain. From this research can be concluded that among both sarawakians and sabahans blood group systems, both were revealing the same scenarios where blood group O> B> A> AB and in rhesus system rhesus positive > rhesus negative.
Keywords: ABO, Rhesus factor, Sarawakian, Sabahan, ASIA Metropolitan University, Malaysia.

Introduction and Experimental

A number of blood group polymorphisms have been discovered in man but the most important is the ABO blood[1]. The first human blood group, that is, the ABO system discovered by Landsteiner,is the most commonly used blood system although many blood systems have been identified so far[2]. Landsteiner is an Austrian scientist where he discovered 3 type of blood group which were A, B, O . In 1902, DesCasterllo and Sturli discovered the fourth type, AB[3]. The major blood groups of this system are A, AB, B and O. The A and B antigens are expressed on the red blood cells (RBCs) and these antigens are inherited co- dominantly over O. These antigens are complex oligosaccharides that differ in their terminal sugars. In order to avoid danger of mismatched blood transfusion, it is important to determine the blood groups of those involved prior to a transfusion[4]. These oligosaccharides also expressed in the saliva and body fluid[3].

Cells which have Rhesus antigen on their surface are described as Rhesus positive while those without it are known as Rhesus negative. Both ABO and RHD are useful in blood transfusion and organ transplantation[1]. The Rh blood group system was first described 60 years ago. A woman had a severe transfusion reaction when she was transfused with blood from her husband following delivery of a stillborn child with erythroblastosis fetalis. Her serum agglutinated red blood cells (RBCs) from her husband and from 80% of Caucasian ABOcompatible donors. The following year, Landsteiner and Wiener found that sera from rabbits (and later guinea pigs)

immunized with RBCs fromMacaca mulatta (Macacus rhesusin the original paper) agglutinated 85% of human RBC samples. Initially, it was thought that the animal and human antibodies identified a common factor, Rh, on the surface ofrhesus and human RBCs. It was soon realized that this was not the case. Therefore, the original terms (Rh factor and anti-Rh) coined by Landsteiner and Wiener, although being misnomers, have continued in common usage. The heteroantibody was renamed anti-LW (after Landsteiner and Wiener), and the human alloantibody was renamed anti-D[5].

Group A blood has type A antigen, group B blood has type B antigen, group O blood has neither A nor B antigen and group AB has both antigen A and B. Plasma from blood group A contain Anti- B antibodies, plasma from person with type B blood contain Anti- A antibodies which act against type A antigen, person with AB blood group contain neither A nor B antibodies and plasma from O type blood has both A and B antibodies[6]. International Society of Blood Transfusion (ISBT) has described 29 blood group systems. They were ABO, MNS, P, Rh, Lutheran, Kell, Lewis, Duffy, Kidd, Diego, Yt, Xg, Scianna, Dombrock, Colton, Landsteiner-Wiener, Chido/Rodgers, H, Kx, Gerbich, Cromer, Knops, Indian, Ok, Raph, John Milton Hagen, I, Globoside, Gill. Human ABO genes are located in chromosome 9q34.1-q34.2[3].

There are about 250 blood antigens which have been divided into 29 blood group systems. Apart from the importance of ABO blood groups in blood transfusion, the ABO blood group system has been associated with several diseases[7].There is strong evidence in the literature to suggest there is an association between ABO blood group and certain diseases[8].

ABO and Rh blood groups are useful in population genetic studies, researching population migration patterns, as well as resolving certain medico-legal issues, particularly of disputed parentage. It is, therefore, imperative to have information on the distribution of these blood groups in any population group[9].

If an individual is exposed to a blood group antigen that is not recognized as self , the immune system will produce antibodies that can specifically bind to that particular blood group antigen, on the surface of the red blood cells and leading to the destruction of that cells (agglutination), low blood pressure, and even death. ABO blood types are also present in some animals , such as cows , sheep and apes (Chimpanzees & gorillas)[10].

Blood grouping has improved with the advent of monoclonal antibodies and the automation of tests. Although different advanced techniques, such as micro plate method, PCR based, FMC based typing, mini sequencing analysis, fluorescent immuno microplate technique, sandwich ELISA method for ABO geno-typing are available, but manual method has its own significance not only in blood typing but also measuring its genotypic frequency by Hardy-Weinberg Law, with no additional costs in the areas with limited access to advance/automated techniques[11].

This study was conducted to analyze the frequency of ABO blood group and the Rhesus factor among Sarawakian and Sabahan students in ASIA Metropolitan University. To the best knowledge, from the literature survey, may be this was the first study conducted in Malaysia for these ethnics since no literature mentioned about the blood group patterns of these ethnics. Sarawakian and Sabahan live in 2 different states which are known as Sarawak and Sabah situated in East Malaysia. ASIA Metropolitan University is one of the leading university in Malaysia where many Sarawakian and Sabahan students pursuing undergraduate studies in Health Science programmes and this opportunity was taken to evaluate the frequency of ABO blood group and the Rhesus factor among Sarawakian and Sabahan students.

600 students were involved in this study. They were divided into 2 different groups named as Sarawakian (300) and Sabahan (300). Out of 300 students, they were than divided into two (2) subgroup named as male (150) and female (150) students. Students were chosen randomly from these two ethnics and being placed in each respective group.

A 1.0-2.0 ml sample of blood was drawn from the antecubital vein of each subject in a disposable syringe, and transferred immediately to a tube containing ethylene diamine tetra acetic acid (EDTA). Blood grouping (ABO) and Rhesus factors (Rh), was done by the antigen antibody agglutination test. The anti sera used were obtained from Plasmatec Laboratory, Great Britain[11].

Table 1: ABO and rhesus blood grouping among Sarawakians

Blood group	Total donors	Percentage (%)
ABO blood grouping		
A	81	27.00
B	95	31.67
O	121	40.33
AB	3	1.00
Rhesus (Rh) blood grouping		
Rh +ve	296	98.67
Rh -ve	4	1.33

Table 2: Frequency distribution of ABO and Rh blood groups among Sarawakians.

Blood group	Male	Female	Total donors	Percentage (%)
A + ve	41	40	81	27.00
B + ve	49	45	94	31.33
O + ve	56	62	118	39.33
AB + ve	3	0	3	1.00
A - ve	0	0	0	0.00
B - ve	0	1	1	0.33
O -ve	1	2	3	1.00
AB - ve	0	0	0	0.00

Table 3: ABO and rhesus blood grouping among Sabahans

Blood group	Total donors	Percentage (%)
ABO blood grouping		
A	67	22.33
B	90	30.00
O	139	46.33
AB	4	1.33
Rhesus (Rh) blood grouping		
Rh +ve	292	97.33
Rh -ve	8	2.67

Table 4 : Frequency distribution of ABO and Rh blood groups among Sabahans.

Blood group	Male	Female	Total donors	Percentage (%)
A + ve	34	32	66	22.00
B + ve	42	46	88	29.33
O + ve	70	65	135	45.00
AB + ve	1	2	3	1.00
A - ve	1	0	1	0.33
B - ve	0	2	2	0.67
O -ve	1	3	4	1.33
AB - ve	1	0	1	0.33

Result And Discussion

From the table 1, blood group O was the most prevalent blood group compared to all other blood groups among the Sarawakian Health Science students. 121 students were O blood group with the percentage of 40.33 and followed by B blood group with 95 students with 31.67 percentage, followed by A blood group with 81 students with the percentage of 27.00 and the least prevalent was blood AB with only 3 of them with the percentage of 1. For the Sarawakian it can be simplified as O> B> A> AB. When comparing with the rhesus factors, it was a

clear evident that rhesus positive recorded with the highest percentage (98.67%) with 296 students out of 300 and only 4 students were rhesus negative (1.33%).

The evidence from the table 1 were further derived and composed in the table 2. Frequency distribution of ABO and Rh blood groups among Sarawakians were divided into two categories which were male and female. In these finding can be concluded that male students were not having rhesus negative as frequent as female students. Only 1 male student was entered into the O negative blood group with other 149 students were recorded into rhesus positive blood group. In case of female, 2 were recorded in the blood group O negative and 1 was in the blood group B negative.

From the table 3, among the Sabahan students, blood group O was the most prevalent with 139 students were entered into this group with the percentage of 46.33, followed by blood group B (90 students) with 30.00% followed by blood group A with 67 students with the percentage of 22.33 and the least prevalent blood group among Sabahans was blood group AB with 4 students with the percentage of 1.33. Overally, the blood group pattern of Sabahan students can be simplified as O> B> A> AB. The rhesus system for Sabahans were recorded with 292 students were rhesus positive (97.33%) and 8 students were rhesus negative (2.67). Overally, Rhesus positive > Rhesus negative.

From the table 4, 3 male students were having rhesus negative with 1 student was A-, with another 1 student O-, and another 1 student was AB-. 5 female students were having rhesus negative with with 3 of them were having blood group O and 2 of them blood group B. With 147 male students were having rhesus positive and 145 female students were having rhesus positive.

While comparing the 2 groups (sarawakian and sabahan), Sabahans were having higher number of rhesus negative (2.67 %) students compared with Sarawakian which only recorded 1.33 %. In another comparison Sabahans were having blood group O in higher percentage (46.33 %) than Sarawakians (40.33%).

Each individual must get to know their blood group because ABO blood group pattern has a strong association with certain type of diseases[8]. If a person well known about his or her blood group than he or she can take preventive action to avoid certain type of disease. This was one of the objective why this studies (sabahan and sarawakian) was conducted.

Squamous cell carcinoma of skin, basal cell carcinoma of skin, pancreatic cancer, gastric cancer, breast cancer, cervix cancer, malaria, cholera & GI infections by E.coli, Plague, H.pylori infection &GI ulceration, otitis media with effusion are the disease that associated with O blood group. Ovarian cancer, cervix cancer, lung cancer, buccal cancer, venous thromboembolism are the diseases associated with blood group B. Gastric cancer, venous thromboembolism, smallpox are the disease associated with blood group A. Venous thromboembolism, ischemic heart disease (IHD) are the diseases that in association with blood group AB[7].

Blood group O (32.9%), A (30.1%), B (23.3%) and AB (13.7%), respectively had most frequency for myocardial infarction. According to official data of Blood Transfusion Organization of Iran, blood group O predominates (33.6%) in the Iranian population, followed by group A (30.2%), B (24.4%) and AB (11.8%)[12]. The prevalence of CHD in blood group O is markedly higher than in all other ABO blood groups[13]. The blood group A was the most common (57.1%) and blood group O was the second (30.5%). The frequency of non-O versus O blood groups among the patients was more than two-fold, i.e., 69.5% and 30.5%, respectively. The following general formula A>O>B>AB was obtained among the patients[14].

The blood group A was the commonest among myocardial infarction and angina pectoris patients while these diseases were least in blood group O patients[15]. The incidence of IHD was significantly higher in those of blood group AB than in those of groups O, A or B, particularly for fatal events[16]. In a separate research in 1973, researchers found out that O and B blood groups were predominant in patients with MI[17].In another separate research findings showed that the prevalence of MI in blood group B is significantly higher than in all other ABO blood groups[18].

In a research done in 2009, a total of 170 MI patients and 170 controls were tested for ABO blood groups. Statistical analysis showed that among 170 MI subjects, 54 (31.8%) were blood group B and among 170 controls, 51 (30%) were blood group B. Simple logistic regression analysis showed no association of MI with blood group B (p=0.824, crude OR 0.95, 95% confidence interval 0.62-1.47). Multiple logistic regression

analysis also did not show association of blood group B with MI (p=0.222, adjusted OR 0.68, 95% confidence interval 0.37-1.26)[19].

Few studies stated above that were conducted in various parts of the world about the disease associated with the heart. Although findings from the researchers were conflicting, but it provides a good platform for the publics to understand that from the ABO research additional awareness can be created to prevent the disease by taking initial preventive steps.

Rhesus system become the second most important blood group system due to hemolytic disease of newborn and its importance in RhD negative individuals in subsequent transfusion once they developed Rh antibodies. Rh incompatability can pose a mojor problems in some pregnancies when the mother is Rh negative and the foetus is Rh positive. If foetal blood leak through placenta and mixes with the mother's blood, the mother become sensitized to the Rh antigens. The mother produce Rh antibodies that cross the placenta and cause agglutination and hemolysis of foetal erythrocytes. This disorder is called Haemolytic disease of new born (HDN) or erythroblastosis foetalis and it may be fatal to the foetus[20].

From this research can be concluded that among both Sarawakians and Sabahans blood group systems, both were revealing the same scenarios where blood group O> B> A> AB and in rhesus system rhesus positive > rhesus negative.

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