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Incidence of A_1 & A_2 Sub Grouping among Blood Group A & AB in Blood Donors Attended at Blood Bank MGH, Jodhpur

Rajshree Behra[1], Yogi Raj Joshi[2]

[1]Professor, Department of Immunohaematology and Transfusion Medicine, Dr. Sampurnanad Mrdical College, Jodhpur

[2]Assistant Professor, Department of Pathology, Dr. Sampurnanad Mrdical College, Jodhpur

Abstract: ***ABO groups and subgroups are medically important since these are responsible for transfusion reactions. Variation in A and AB subgroups are observed widely. The study was done in 1000 Blood group who had either A or AB blood group. In our study 711blood donors had A blood group and 289 had AB blood group. 84.9% had A_1 subgroup and 15.1% had A_2 subgroup. Among AB blood group 81.6% had A_1B and 18.4% had A_2B subgroup.***

Keywords: Blood groups, ABO group, Subgroup A_1 A_2

1. Introduction

Blood group is genetically predisposed. There are about 400 blood groups and the most common amongst them are ABO and Rh[1]. The discovery of ABO blood groups by Karl Landsteiner was an important achievement in history of blood transfusion followed by discovery of Rh (D) antigen[2].

The bombardment of the red blood cells with A and/or B antigens occurs because of the action of the glycosyl transferase enzymes that add specific sugars to the precursor substance. A & AB Blood Group have been divided in to subgroup A_1 , A_2, A_1B & A_2B depending upon the reaction with anti A_1 Lectin (Dolichous Bi Florous or Human anti – A). About 80 % blood group A & AB belong to sub group A_1 & A_1B i.e. they react with Anti A_1 Lectin while 20% belongs to A_2 & A_2B i.e. they fail to react with Anti-A_1 Lectin. At times the individual with sub group A_2 or A_2B have anti A_1 in their serum. But this antibody is usually weak and most of the time has no importance in selecting blood for transfusion. The difference between A_1 & A_2 is both quantitative & qualitative. A_1 red blood cell have about one million A antigen per cell. A_2 red cells have only 250,000 A antigen per cells or one fourth the amount that A_1 cells have[3].

A frequency of ABO blood group varies, till date only few studies have done on incidence of A_1, A_2, A_1B & A_2B. Study was conducted to determine incidence of A_1, A_2, A_1B & A2B in blood donors of Mahatma Gandhi Hospital Jodhpur.

Aim

The study was done to assess the prevalence of A_1 , A_2, A_1B and A_2B subgroup in blood donors at Mahatma Gandhi Hospital Jodhpur, Western Rajasthan.

2. Material & Method

A total of one thousands blood donors with blood group A & AB were taken who attended Blood Bank MGH Jodhpur for donating blood voluntarily as well as on the replacement basis.

A and AB Blood groups are tested for their subgroups. On slide and tube a drop of Anti A_1 was placed and a drop of blood sample having blood group A & AB mixed on slide and test tubes were centrifuged, just after centrifugation result were recorded for agglutination. If agglutination was present then that blood group was recorded as A_1 & A_1B respectively, and if no agglutination then A_2 & A_2B. Anti A_1 lectin is purified extract of the seeds of Dolicus biflorus containing phytoheamagglutinin (Lectin) which agglutinate human red cell only.

3. Observation

1000 blood donors who had either A or AB were taken for this study. 711 blood donors had A blood group and 289 had AB blood group.

Out of 711 ‘A’ blood group donor, 604 had A_1 subgroup while rest (107) had A_2 subgroup. (Table No. 1)

Out of 289 AB blood group, 236 had A_1B subgroup and 53 had A_2B subgroup (Table No. 1)

Hence in total 83% had A_1 subgroup while rest had A_2 sub group. (Table No.1)

4. Discussion

The information of Blood Group is very essential as ABO blood groups system have a key role in evolutionary biology, anthropology, studying migration patterns, medical importance in diseases and organs transplantation, forensic pathology and medico legal issues such as mismatch pregnancy and disputed paternity[4].

ABO subgroups are distinguished by decreased amount of antigen in RBCs and in secretor, present in the Saliva.

The distribution of A & AB subgroups varies greatly among different population. Approximately 80% of Blood Group A or AB are classified as A_1 or A_1B the remaining 20% are either A_2 or A_2B[5,6]. In 1911, Von Dungern described two different A antigens based on reaction between A, RBC, anti-A and anti-A_1[7]. Classification into A_1 and A_2 phenotypes account for 99% of all group A individuals. The cells of approximately 80% of all group A (or AB) individuals are A_1 (or A_1B) and 20% remaining are A_2 (or A_2B) or weaker subgroups.

In our study 1000 blood samples were taken having blood group A and AB and has been tested for their subgroups i.e. A_1, A_2, A_1B, and A_2B. It was found that from total of 711 A group, 604 (84.9%) were A_1, 107 (15.1%) were A_2, and from 289 AB blood group, 236 (81.6%) were A_1B and 53 (18.4%) were A_2B. It is same as described by Von Dungern[7] and by Prof. R.N. Makroo, Test Book of Transfusion Medicine[3].

The study done in Southern India[8] shows 95.9% of A_1 and 4.1% of A_2 while among A_1B AB, it is 81.6% A^1B and 18.4% A_2B. Other studies done in India also shows, More than 90% of A_1 but among AB it ranged from 68.5% to 91.4% of A_1B and 31.5% to 8.6% of A_2B. (Table No. 2) [9,10]

In the studies done at International level in Pakistan[5], Saudi Arab[11], Sudan[12] and Japan[13] A_1 was 75.8% to 99.93% and A_2 was 0.17% to 24.2%. A_1B 79.8% to 98.9%, and A_2B was 1.12% to 20.2%.

All these studies had more number of A1 and A1B subgroup which is also seen in our study.

Table 1: Incidence of A and AB Subgroup in our Study

Blood Group	No. of Donors	Percentage
A_1	604	84.9
A_2	107	15.1
A_1B	236	81.6
A_2B	53	18.4

Table 2: Incidence of A and AB Subgroup in Different Part of India

Places in India	A_1	A_2	A_1B	A_2B
North-West India (Rajasthan, Jodhpur)	84.9	15.1	81.6	18.4
Southern India (Tirupati)	95.9	4.1	80.8	19.2
Eastern India (Cuttack)	94.2	5.8	68.5	31.5
Central Part of India (Gwalior)	92.0	8.0	91.4	8.6

Table 3: Incidence of A and AB Subgroup in Various Countries

Country	A_1	A_2	A_1B	A_2B
India (Our Study)	84.9	15.1	81.6	18.4
Saudi Arab	85.6	14.4	98.3	1.7
Pakistan	75.8	24.2	79.8	20.2
Suddan	93.42	6.58	91.67	8.33
Japan	99.83	0.17	98.86	1.14

5. Result

Variation in A & AB subgroups are observed widely. The common in all is that A_1 and A_1B are the commonest subgroup in A & AB subgroups.

In our study incidence of A_1 is 84.9%, A_2 15.1%, A_1B 81.6% and A_2B 18.4%.

The range of differences in A_2 in different places varies from 4-15% but range of differences in A_2B in difference places are wide i.e. 8-31.5%.

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