

Prevalence and Distribution of Major Blood Groups A, B, O and Rh among the Permanent Residents of Northern Provinces of Kashmir Valley in India

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Abstract: Prevalence of blood group varies demographically. The study was designed to determine the distribution of the major blood groups including Rh factor among the residents of Northern districts of Kashmir province in India. The pheno-typing of ABO and Rh was carried using the classic tile technique and commercially available diagnostic medical reagents, 1511 subjects screened (34.28%) were from group O, group B (34.48%) group A (23.29%) group AB (7.49%). Among Rhesus group (93.18%) were Rh positive, and (6.81%) Rh negative. Males had a 92.47% and 7.53%. Prevalence of Rh positive and negative groups as compared to females 93.59% and 6.41% respectively. The results were same as for population living in plains though the place is at high altitude. Evidence based data in this study will facilitate the optimum storage of blood and blood products as per requirement in the blood bank of hematology department in Government Medical College Baramulla located at altitude of (> 5200 ft above sea level) in advance as this place is near to the border.

Keywords: ABO, Rh, blood group, antigen, Sera

1. Introduction

Without doubt the history about the evolution and discovery of blood groups for transfusion has been practiced intermittently since 1660s. This led to some catastrophic transfusions of animal blood into humans hence was banned in the UK and France, assuming all blood groups were of same type until the beginning of 20th century the reason for failure of blood transfusions done were not understood. Karl Landsteiner on doing experiments at the University of Vienna on the major blood group ABO by mixing the RBC and serum of his office staff, [1] These early experiments identified three types, A B C, C was later renamed 'O' for German "Ohne" meaning without or "zero" null in English. AB group was discovered later, for his work Karl got Nobel Prize in 1930. According to some of the old hypothesis the mutation of O blood group which is resistant to many infections resulted in all other different groups, based on this theory Red Indians of South America and Eskimos had a frequency of 75- 100% for "O" group. Karl along with Alexander Wiener discovered blood group Rh in 1940-41. [2] There is a demographic variation, which depends on genetics and other factors i.e. racial differences, geographical variations, different ethnic groups, external environment and genetic codes. [3, 4, 5,] The also effect immunity and plays a vital role on certain diseases, food habits, personal behavior and medical legal issues i.e., disputed paternity, anthropology, criminal cases. Physiological basis of ABO system depends on fucose containing H antigen, basics of antigens A and B which are

complex oligosaccharides differing in their terminal sugars. Those found on RBC are glycolipids, while in other tissue fluids are soluble glycoproteins. [6]. Despite 400 red cell antigens identified, international Society of blood transfusion define blood group system where one or more antigens are controlled at a single gene locus or by two or more [7] Rh is highly immunologic and present only on RBCs with 49 antigens known till date is the largest of 30 blood groups, located on chromosome 1. [8,9] Majority of humans can be divided on the basis of these antigens as secretors i.e., in juices of digestive system, semen etc., rest of the minor population is known as non-secretors. [10] Out of all types, only major groups were tested initially for the blood transfusion hematopoietic stem cell and organ transplantation.

In spite of DNA technology, cross matching techniques are still effective in decreasing fatality rates, as more blood groups may still be discovered. The whole spectrum of blood groups is still not clear

2. Aims and Objectives

- The present study was conducted to determine the distribution and frequency of major blood groups ABO and Rh factor among the rural population of northern districts in Kashmir, India.
- To compare the data obtained with other studies outside the state and abroad.

3. Material and Methods

The study was carried in collaboration with immunehematologic section of pathology department of Govt. Medical College, Baramulla. (A tertiary care hospital)A total of 1511 people of both genders were involved. The blood samples were taken from the subjects under proper supervision, primary medical examination and aseptic condition. The groups were determined by tile method of agglutination. Drops of blood were obtained from middle ring finger of the left hand using a sterile lancet and alcohol swab, blood drop was then placed on clean white tile at 3 places in a row. A drop of commercially available Anti-A, Anti-B and Anti-D [monoclonal IgM and IgG antisera] by Tulip Diagnosis Ltd. India, were added respectively, after waiting for 10 minutes the slide was examined by naked eyes and then confirmed by microscope under low objective lens. After excluding the sample, technical and observational errors on the basis of agglutination of serum by respective anti-sera, blood groups were determined, and the results was confirmed.

4. Results

Frequency of ABO blood group in a total population of 1511 was compared (study table 1 - 2). Group O was found to be most prevalent with (34.6%) followed closely by B (33.7%), A (23.9%) and least prevalent being AB (7.9%). On further analysis prevalence of Rh positive was found to be maximum with (93.7%) while Rh negative make only (6.8%) (study table. 3).

- 1) In high altitude area the most common blood group combined major blood group with Rh was found to be B+ve (31.5%).
- 2) While in ABO blood typing only O group (34.6%) without Rh type.
- 3) In high altitude area, the least common blood group was found to be AB-ve.
- 4) Trend of distribution being O positive (34.6%) > B positive (33.7%) > A positive (23.9%) > AB positive (7.9%)
- 5) Trend of distribution being O negative (2.8%) > B negative (2.3%) > A negative (1.1%) > AB (0.4%)

Study Table 1: Distribution of ABO and Rh Blood Groups

S. NO.	Group	Males	Females	Total
1	A+ve	123	221	(22.7%) 344
2	B+ve	198	278	(31.5%) 476
3	AB+ve	37	76	(7.4%) 113
4	A-ve	10	8	(1.1%) 18
5	B-ve	13	22	(2.3%) 35
6	O-ve	18	25	(2.8%) 43
7	O+ve	158	317	(31.4%) 475
8	AB-ve	1	6	(0.4%) 7
	Total	558	953	1511

Study table no. 2

S. No.	Group	Males	Females	Total
1	A	(8.8%) 133	(15.1%) 229	(23.9%) 362
2	B	(13.9%) 211	(19.8%) 300	(33.7%) 511
3	AB	(2.5%) 38	(5.4%) 82	(7.9%) 120
4	O	(11.6%) 176	(22.6%) 342	(34.6%) 518

Study table no. 3

S.NO	Male	Female	Total
Rh +ve	(34.1%) 516	(59%) 892	(93.1%) 1408
Rh -ve	(2.7%) 42	(4.0%) 61	(6.7%) 103

5. Discussion

Blood typing is among the oldest and most important health parameter. In spite of advancements in blood grouping and cross matching techniques transfusion of wrong ABO and Rh is one of the leading causes of death reported to FDA [12]. There exists ignorance of blood groups among most of the population and surprisingly even among the literates, as they are genetically determined almost immediately after the birth.

The study under discussion has determined the distribution frequency of ABO and Rh blood group in a tertiary care teaching hospitals. Our results showed in Kashmir valley blood group O is the commonest followed by a close second blood group B and AB happens to be the rarest. Recently subgroups have been identified, A subgroups are more common than B in addition to A₂ several other weaker A subtypes having been identified. The incidence of phenotype helps in estimating the availability of compatible blood, prevention of hemolytic disease of newborn, resolving medico legal cases for paternity/ maternity disputes, and for forensic purposes. Further as there is a definite genetic association with some diseases i.e. group O (non-secretory) has higher incidence of duodenal ulcer [13,14,15] while group A carries increased incidence of gastric carcinoma [16] the present study was conducted in an area that is bounded by Srinagar in the northeast, south and west by Poonch and in the north and northwest by Baramulla. Although the district has several high mountains, its average height is just 5,281 feet above sea level. The incidence major blood group A was (23.9%), B (33.7%) AB (7.9%), and O was found (34.6%). In Rh group, Rh+ve were about (93.7%), Rh -ve were (6.8%). Incidence of the above groups in India is A (22.88%), B (32.26%), AB (7.74%), O (37.12%).

The distribution of ABO blood groups varies from one population to another. The comparison of frequency and distribution of ABO and Rh blood groups in blood donors at Kashmir (comparison study table 4) (12) with the similar studies carried out within and outside India is given in comparison table (1-3) our study is similar to values in southern states and some countries of world. In Nepal (21) a high altitude place, Nigeria delta (17) is similar as the distribution of these groups in the Kashmiri population of Jammu and Kashmir State in plain

Table 1: Comparison; with studies inside India (in %) Table. No. 1

Region	NO.	A	B	AB	O
North ¹⁸	6334	24.7	37.50	32.50	5.30
Kashmir ¹⁹	1,00,980	22.95	32.05	38.43	6.55
Banjara Caste Maharashtra ²⁰	275	22.01	37.45	27.64	12
Bangalore ²¹	36964	23.85	29.95	39.81	6.37
Thiruvantha Puram ²²	27,719	26.21	27.39	40.05	6.36

Table 2: Comparison; with studies outside India (in percentage)

In India is similar to the population of Southeast Asia thereby assuming that probably migration of people from the same race.

Population	A	B	AB	O
Bangla Desh ²³	25.40	31.10	9.70	33.80
Saudia ²⁴	23.16	20.13	3.49	53.20
Pakistan ²⁵	21.15	40.76	7.56	30.50
India ²⁶	22.88	32.26	7.74	37.12
Kenya ²⁷	26.20	22.00	4.4	47.48
Hungary ²⁸	27.66	12.18	4.23	55.53

Table 3: Comparison; with studies inside India (in %)

RH D	Rh positive	Rh Negative
Present study	93.70%	6.80%
Bangalore (13)	94.20%	5.79%
Chittoor (14)	90.60%	8.42%
Vellore (15)	94.50%	5.47%
Shimoga-Malnad (16)	94.90%	5%
Davangree (17)	94.80%	5.50%
Eastern Ahmadabad (18)	94.20%	5.80%
Punjab (19)	97.30%	2.70%

Table 4: Comparison with studies inside and outside India (in (in %))

Study	Rh D Positive	Rh D Negative
KASHMIR STUDIES(12)		
High Altitude	87%	13%
Plain Area	93%	7%
Pakistan (20)	89.1%	10.9%
Nepal (21)	96.7%	3.3%
Britain(22)	83%	17%

The steady data showed that there is no effect of altitude upto 5000 ft.on Rh group as mentioned in one Comparison with studies inside and outside India (in percentage) Table 4.

The population that lives in town show no difference to rest of population in plain areas due to migration from high altitudes to urban areas and also may due to inter-racial marriage. The original Gujjar community who lives actually on hill tops don't visit the hospital for their ailments reason being transport or low economic status, still needs more to be explored in detail. This study data will help to have more efficient blood transfusions services especially for the pregnant females with the Rh negative blood groups, in emergency cases due to high traffic accident rates, and criminal procedures as being in this border area. This will also help to motivate the general population for blood donation in advance.

6. Conclusion

The study data generated shows high incidence of O, B group (almost equal) and Rh +ve, in population at high altitudes with low social economic conditions. It will also help in establishment of more efficient functioning and better services by health planners, blood bank services especially in gynecology, surgery departments because of injuries due to increase in the traffic road accidents, in future for the hematopoietic stem cell transplantation, solid organ transplant, cloning of the genes, stem cell therapy, and

marrow transplants, which are still in infancy of medical therapy. As some of disease have been found to have definite relation with blood typing hence further investigation to identify a clear association to each other will be challenge to face. i.e., group O (non-secretory) has higher incidence of duodenal ulcer while group A carries increased incidence of gastric carcinoma, similarly B type is found to be associated with ovarian carcinoma, blood type B and AB showed a tendency of higher frequency among topic dermatitis.

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