

A short Retrospective study to assess the distribution of ABO and RH antigen among the blood donors of south-central Nepal.

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Abstract:

In Human, ABO and Rh blood group systems are clinically most important consideration during blood transfusion in life threatening situation. Demographically the distribution of ABO system and Rh system are different in different geographic zone of world. In Nepal according to “Nepal Rare Blood Community” the overall Antigenic distribution in ABO system and Rh system are O>A>B>AB and Rh positive>Rh Negative respectively. There were only a few records have been found against ABO group distribution in Plane region of Nepal rather than hilly region and their study reflect the ABO group distribution as O>B>A>AB.

This study showed the commonest blood group was Group B followed by group O, group A and group AB. Most of the donors were Rh positive individuals.

Keywords:

Blood group, ABO system, H antigen, Sero-Prevalence, Nepal.

I.Introduction:

The surface of Erythrocyte of our body contain polymorphic A, B & H antigen along with Rh Antigens (1). The ABO system was discovered by Karl Landsteiner et al. while they cross testing human sera and analysing the agglutination reaction in 1901 (2). These A, B and H surface antigens are either glycolipid or glycoprotein [H Antigen-(lipid/protein-glu-gal-NA glucosamine-gal-fucose)] in nature and constructed by enzymes which are synthesized by ABO gene located on long arm of 9th chromosome. Two enzymes namely 3-alpha-N-acetylgalactosaminyltransferase and 3-alpha-Galactosyltransferase are mainly responsible for the conversion of H antigen to A and B antigen by transferring N-Acetyl-D-galactosamine and galactose to H-antigen respectively (3). On the other hand Rh system was discovered in 1941 and the gene for Rh antigen synthesis is existed on 1st chromosome (4). The presence or absence of these antigens may leads to change the membrane morphology as well as functional activity and this structure dependent functions of blood type are related to different diseases (5). Out of more than 26 blood group systems, ABO system and Rh system are most important system which were minimum considering parameters before blood transfusion. In the 1958 During the World wars, it was first discovered that the individuals from different geographical area of world having different frequency of ABO and Rh blood groups (6). Moreover, though all human populations share the same blood group systems but they differ in the frequencies depending on different races, ethnic groups, and socio-economic groups in different part of the world (7). To provide more efficient supply of matched blood within a short period of time along with to assess the probability of spreading of some diseases, we need to know the distribution of blood group within a targeted population. This study was aimed to represent the antigenic

distribution of ABO and Rh group among Blood donors of Southern central Nepal in the territory of National medical college and teaching hospital.

II. Materials and Methods:

This retrospective study was carried out at Blood Bank of National Medical College and Teaching Hospital, Birgunj, Nepal after getting IRC clearance from institutional research committee. Four year's data from 2014 to 2017 were retrieved from blood donor record book for this study that includes volunteer/replacement and Male/Female blood donors who were coming from both rural and urban area of South-Central Nepal at the territory of National Medical College & Teaching Hospital. Before taking blood we were confirmed that the expected donor were physically healthy according to their clinical histories and physical examination and having the age in between 18 to 60 years old.

The study include 7610 donors and from each donor, donor consent was collected prior to take blood and stored it confidentially.

Collection of Sample:

Blood sample were collected separately from donor blood bag and placed it into a pilot tube for further examination and screening purposes.

Analysis of Sample:

Blood samples were tested confidentially as described by Nepal Red Cross Society, Blood Transfusion Service. Blood grouping was performed by using Anti-A+B+D (Rh₀) Monoclonal diagnostic reagent (1×10ml each). Manufactured by ARKRAY Healthcare Pvt. Ltd.

III. Results:

The sample comprises total 7610 blood donor including both Volunteer and Replacement, Male and Female individuals. Out of them 94.52 % donors having Rh D antigen on the surface of their RBC and remaining 5.48% do not have [Table-1]. After retrieving from Blood Bank when we retrospectively analysed whole data on the basis of presence/absence of A,B and H antigen then we have got 2540(33.38%) donors having B & H antigen, 2251(29.58%) donors having only H antigen, 2180(28.65%) individuals having A along with H antigen and remaining 639(9.52%) donors having both A,B and H antigens, though in 2015 group A shows the highest proportion in compare to other groups [Table-2]. Moreover we have also found 84.27% of donor were belongs to Male Replacement category and 73.65% male were coming from Rural area [Table-3].

Table-1. Percentage distribution of Rh antigen among the blood donor of south central Nepal.

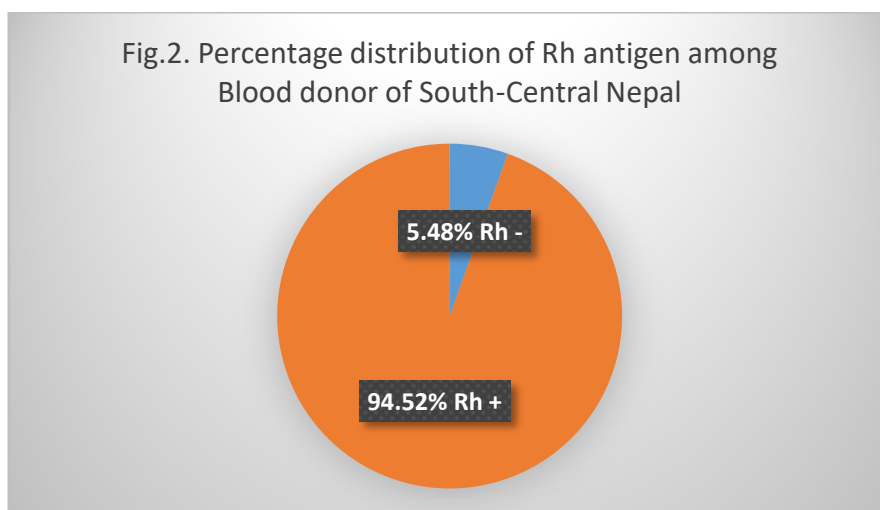
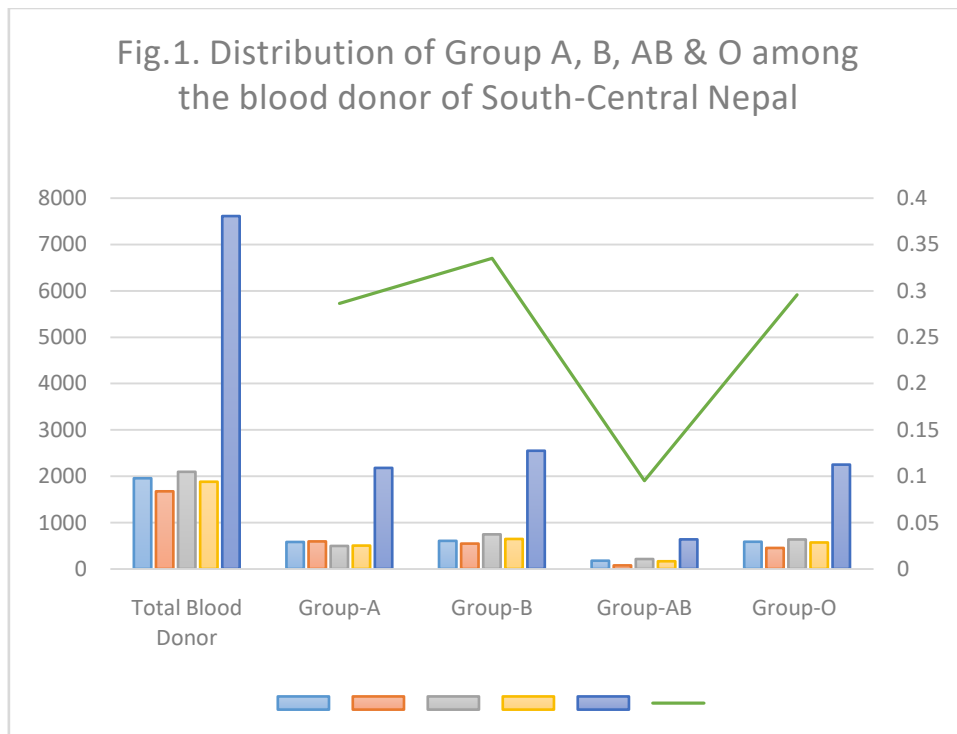
Duration	Rh-Negative donor	Rh Positive Donor	Total
2014-2017	417	7193	7610
Percentage	5.48%	94.52%	

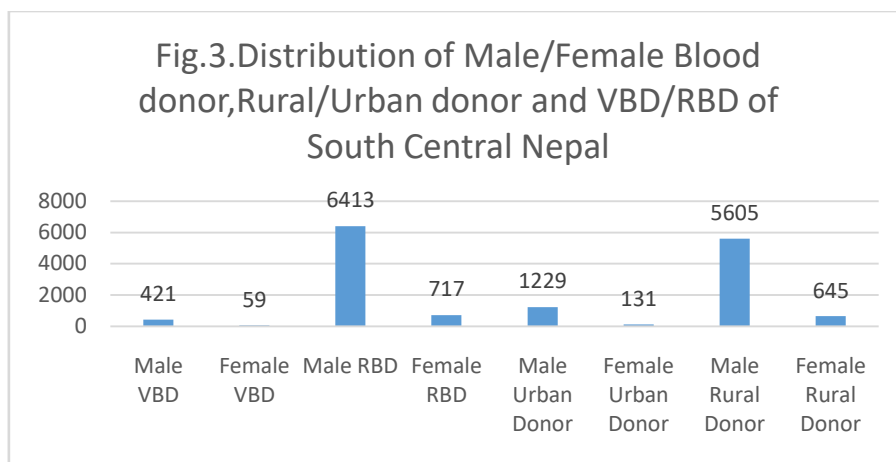
Table-2. Percentage distribution of A, B and H antigen among the Blood donor of South Central Nepal.

year	Total Blood Donor	Group-A	Group-B	Group-AB	Group-O
Aug 2014-July 2015	1957	583	607	179	588
Aug 2015-July 2016	1675	595	548	78	454
Aug 2016-July 2017	2096	497	747	215	637
Aug 2017-Jan 2018	1882	505	638	167	572
Total	7610	2180	2540	639	2251
Percentage		28.65%	33.38%	9.52%	29.58%

Table-3. Male/ Female, VBD/RBD and Rural/Urban blood donor distribution among blood donor of south-central Nepal.

Type of Donor	Amount of Donor	percentage of donor
Male VBD	421	5.53%
Female VBD	59	0.78%
Male RBD	6413	84.27%
Female RBD	717	9.42%
Male Urban Donor	1229	16.15%
Female Urban Donor	131	1.72%
Male Rural Donor	5605	73.65%
Female Rural Donor	645	8.48%





IV. Discussion

The genetic history of a person can be known by studying the blood groups [8]. ABO and Rh system are most valuable predictor for different disease and are mainly responsible for the mismatched agglutination that leads to create various complications on recipient body. So before transfuse blood we need to know the group of blood especially ABO system and Rh group because they are two major blood group system. Not only to prevent blood transfusion hazards but also we can predict rate of suicidal tendency as well as probability to development of obesity. (9,10) Worldwide the percentage distribution of ABO blood group are different in different location, some country like Egypt, US, Saudi Arabia and Iran showed group O was the commonest blood group (11-14) and even in south India specially Karnataka along with a Jammu & Kashmir of North India distinguished group of researcher found the same result (15-17). In Nepal Antigenic distribution of ABO system and Rh system is different some researcher found that the group A having the highest proportion (18,19) other observed group O shows highest percentage (20,21). We have conduct this study in south central part of Nepal and we found group B is the most commonest group followed by group O, group A and group AB and this result is different from other [Fig.1] research conducted in Nepal (18,19) but the same type of result found by different individual research group in India and they interpreted that group B is the commonest blood group and group AB is the least common blood group in population (22-26). Our results indicate that the susceptibility to development of osteoporosis in normal hip-joint and spinal osteoporosis in this population will be little bit low because, group O and occurrence of these diseases are reversible to each other (27,28). Hence our study population had blood group B was a major contributor of ABO system, so the chance of infection like Gonorrhoea, tuberculosis, pneumonia and typhoid would be frequent within this population (29).

On the other hand in case of Rh System, our study shows 94.52% of the blood donor having Rh antigen on the surface of RBC. While only 5.48% donor do not have Rh antigen [Fig.2.]. These finding is supported by other studies carried out Maharashtra, India (25, 30), Nairobi, Nigeria and Bangladesh (31-33).

In addition, we have also found that large proportion of donors were mostly male donors and they were coming from Rural area and even they were not voluntarily donate their blood [Fig.3].

Conclusion

The commonest blood group in ABO system was blood group B and least distributed blood group was group AB and this study also depicted that most of the blood donors had Rh antigen.

Limitations of the Study:

This study was constrained by small amount of Volunteer blood donor and female and urban blood donor sample size. There is need to boost up the population to get subsequent amount of respected blood donor for calculating exact percentage of ABO blood group distribution within this population. The documentation and screening processes, data analysis, and demography of prospective blood donors must be improved in future similar studies.

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