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Frequency and Distribution of ABO and Rhesus (D) Blood Groups In and Around Tumkur, Karnataka

Study from Teritiary Care Teaching Hospital

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Abstract: **Blood groups play a vital role in immunologic safety of whole blood or blood components transfusion. The ABO and Rhesus (Rh) blood group are the major blood group systems. The frequencies and distribution of ABO and Rhesus-D blood groups vary from one population to another in different regions of the same country and also in different parts of the world. The main objective was to document the frequency and distribution of ABO and Rhesus (D) groups in and around Tumkur, Karnataka, India. In the present study, 4823 subjects were examined for blood groups.The commonest blood group was O (37.90%), followed by group B (31.85%) and group A (21.54%). The least common blood group was AB (8.71%). The prevalence of Rh positive and negative distribution in the studied population was 94.65% and 5.35% respectively.**

Keywords: **Blood groups, ABO, Rh.**

I. INTRODUCTION

Blood groups of population are determined genetically by the presence of specific antigens on the erythrocytes (Red blood cells).The frequency of ABO and Rh groups vary from one population to another and one region to another.

Austrian scientist Karl Landsteiner's discovery opened the door to the birth of wide spectrum of discoveries in the field of immuno-haematology. In 1901, he described the first human blood group ABO system for which he was awarded Nobel prize in the year 1930. This was the most important achievement in the history of transfusion services [1]. Forty years later i.e., in 1941 both Karl Landsteiner and Weiner discovered the Rh blood group system[2] . The genes of ABO and Rh are located on chromosome nine and one.The antibodies against red blood cell antigens are called agglutinins and individuals are classified according to the presence or absence of agglutinins and antigens into four major blood groups, i.e. A, B, AB and O[3].

The study of distribution of blood groups is important as it plays a vital role in blood transfusion, human evolution, anthropology and tracing ancestral relation of humans. Some blood groups have shown associations with diseases like duodenal ulcer, diabetes mellitus, urinary tract infection and ABO & Rh incompatibility of newborn.[4]

The knowledge of distribution of ABO and Rh blood groups is essential for management of blood banks inventory. It is important to have information on the distribution of these blood groups in any population [5]. Hence the present study was planned with the aim to determine the frequency and distribution of ABO and Rh blood groups in and around Tumkur, Karnataka, India.

II. MATERIALS AND METHODS

Our aim was to determine the distribution of different blood groups in this region as there were no data available. The study included 4823 subjects who were donors, people visited blood donation camps, recipients, patients who attended the Out patient department, In-patient department as well as newborn population. The subjects includes both male and female. The study period was from January 2014 to June 2014. The samples were collected by finger prick in most cases and occasionally by venepuncture in a disposable syringe and immediately transferred to a tube containing ethylene diamine tetra acetic acid (EDTA) anticoagulant.

The ABO and Rh blood grouping was done by agglutination tests using commercially available anti-sera A, B, and Rh (D). For typing of Rh, only anti-D is used, which is most immunogenic. Hence those who tested positive with anti-sera D were considered to be Rh positive and those who did not were considered to be Rh negative.

Few studies of ABO and Rh blood group prevalence among the various populations of eastern, western, central part, southern and northern parts of India were compared with the present study.

III. RESULTS

It is evident from Table – 1, that out of 4823 subjects examined the most prevalent blood group was O (37.90 %), followed by group B (31.85 %) and group A (21.54 %), The least common blood group was AB (8.71%). The prevalence of Rh positive and negative distribution in the studied population was 94.65% and 5.35% respectively.

Table 1: Frequency of ABO and Rhesus (D) blood group among population in the present study group

Blood Groups	Total study subjects	Percentage (%)
ABO Blood Group		
A	1039	21.54
B	1536	31.85
AB	421	8.71
O	1842	37.90
Rhesus (D) Blood Group		
Rh Positive	4565	94.65
Rh Negative	258	5.35

Table 2: Distribution of ABO and Rhesus (D) blood group (including both positive & negative) among population in the present study group

Blood Groups	Total study subjects	Percentage (%)
A Positive	988	95.09
A Negative	51	4.91
B Positive	1469	95.64
B Negative	67	4.36
AB Positive	412	98.10
AB Negative	08	1.90
O Positive	1696	92.78
O Negative	132	7.22

We compared our results with other studies carried out in different parts of India. Table – 3 reveals the distribution of blood groups in eastern, western, central part, northern and southern parts of India. The study group belongs to southern part of India.

Table 3: Comparision of frequency percentage of ABO and Rhesus (D) blood group among population in different regions of India.

Region wise in India	A	B	AB	O	Rh Positive	Rh Neg
Eastern India						
Durgapur, West Bengal [7]	23.90	33.50	7.70	34.80	94.70	5.30
Tripura [8]	23.77	32.80	9.64	32.75	97.06	2.94
Western India						
Maharastra [9]	23.38	31.89	8.72	30.99	95.36	4,64
Surat [10]	24.10	34.89	8.69	32.32	94.18	5.82
Eastern Ahmedabad [11]	23.30	35.50	8.80	32.50	94.20	5.80
Western Ahmedabad [12]	21.95	39.41	7.85	30.79	95.05	4.95
Western Rajasthan[13]	22.20	36.40	9.40	31.70	91.75	8.25
Jhalwar, Rajasthan[14]	25.02	31.76	10.40	32.80	93.40	6.60
Central part of India						
Indore[15]	24.15	35.25	9.10	31.50	95.43	4.57
Northern India						
Punjab [16]	21.91	37.56	9.30	31.23	97.30	2.30
Lucknow [17]	21.73	39.84	5.33	29.10	95.71	4.29
Lathur[18]	29.35	31.25	9.74	29.64	93.10	6.90
Southern India						
Hyderabad [19]	19.57	34.11	5.76	40.54	95.37	4.63
Vellore [20]	21.86	32.69	6.70	38.75	94.50	5.50
Pondicherry[21]	39.50	20.50	6.50	34.00	97.00	3.00
Bangalore [22]	23.85	29.95	6.37	39.82	94.20	5.80
Bellary [23]	22.40	35.28	8.49	34.33	94.75	5.25
Davangere [24]	26.15	29.85	7.24	36.76	94,80	5.20
Dakshina Kannada [25]	25.80	27.30	4.80	42.00	94.64	5.36
Shimogga [26]	24.27	29.43	7.13	39.17	94.93	5.07
Present study (Tumkur)	21.54	31.85	8.71	37.90	94.65	5.35

Table -4 shows the studies outside India that were carried out in different countries of the world, like Britain, USA, Australia, Nepal, Pakistan, Saudiarabia. Nigeria, Guinea. The commonest blood group was O in all the countries, but in Pakistan and Nepal the common blood groups were blood group B and group A respectively.

Table 4: Comparision of frequency and percentage of ABO blood group among population in different parts of the world

Region wise across the World	A	B	AB	O	Rh Pos	Rh Neg
Britain [27]	41.70	8.60	3.00	46.7	83	17
USA [28]	41.00	9.00	4.00	46.00	85	15
Nepal [29]	34.00	29.00	4.00	33.00	97	3
Pakistan [30]	23.80	38.00	10.00	10.00	93	7
Saudi arabia[31]	24.00	17.00	4.00	52.00	93	7
Nigeria[32]	21.60	21.40	2.80	54.20	95	5
Guniea [33]	22.50	23.70	4.70	48.90	96	4

IV. DISCUSSION

ABO and Rh genes and phenotypes vary widely across races and geographical boundaries despite the fact that the antigens involved are stable throughout life[4,6]. The resultant polymorphism remains important in population genetic studies, estimating the availability of compatible blood, evaluating the probability of haemolytic disease in the new born, resolving disputes in paternity/maternity and for medico-legal issues. [2, 7]

The knowledge of blood group distribution is also important for clinical studies, for reliable geographical information and it will help a lot in reducing the maternal mortality rate, an acess to safe and sufficient supply of blood will help significantly in reducing the preventable deaths.

Generation of a simple database of blood groups, not only provides data about the availability of human blood in case of emergencies and regional calamities, but also serves to enable insight into possibilities of future burden of diseases [6].

V. CONCLUSION

Distribution of blood groups among the population in a specific geographic area helps us for a good inventory management. The knowledge of frequencies and distribution of the different blood groups is very important for blood banks and transfusion services so that they could contribute significantly to the National health system to formulate the policy.

The present study has been compared with other studies carried out in different geographical areas in India as well as across the world. It is hoped that the data generated in this study would assist in the planning and establishment of a functional blood service that would meet the ever-increasing demand for safe blood and blood products. Hence this study is useful in providing information on the status of ABO and Rh blood group distribution in and around Tumkur, Karnataka, India.

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