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ABO BLOOD GROUP POLYMORPHISMS IN ELEVEN TRIBAL POPULAIONS OF SOUTH INDIA

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ABSTRACT

Background: Southern India is one of the oldest geophysical regions of human evolution and Migration in the world. Genetic and anthropological studies have shown that the peopling the subcontinent is characterized by a complex history, with contributions from different ancestral populations. As the polymorphisms genetic level in always associated with health and disease population level studies is becoming the need of hours. **Aim**: This study is aimed to explore the relationship of ABO blood groups in genetic association Populations. **Methods*:*** Blood samples from 1025 unrelated individuals drawn from south India tribal settlements blood groups of individuals are ascertained with the presence of antigen using monoclonal antibody by a standard blood typing are Protocol, Gene frequencies is calculated by Hardy-Weinberg method. **Results:** The study populations harboused blood groups (A), (B), (O) and (AB) with the of frequencies are 23.9%, 30.1%, 38.9% and 7.02%, respectively. This occurred in the order O> B >A > AB .The allele frequency of blood group O is the highest ABO allele p (A), q (B), r (O) as 0.1688, 0.207 , 0.623, respectively. This occurred in the order O> B >A. The allele frequency of blood group O is the highest, $\chi 2$ The goodness of fit test was resulted in value was = 0.001 and p value was 0.977. The genotype frequencies are reached (D) = 98.0% and (d) = 2%, genotype frequencies are (D) = 0.982 and (d) = 0.018. There is the high proportion of Rh (D) $^{+ve}$ individuals than the Rh $^{- ve}$ in the study populations. **Conclusion**: The present study as carried out Eleven Dravidian for Tribal groups ABO blood group polymorphisms, phenotype frequency.They suggest that O $^{+ve}$ individuals are accounted as the major proportion followed by B,A and AB. The results of the present study indicate that the Dravidian tribal populations

share a common ancestors and a dramatro allele frequency was shown as a result of a founder effect. Data among tribal suggest their common origin as well as a drift from an original population due to the possible founder effect among tribal Dravidian Elven Tribal.

KEYWORDS: ABO, Rh, Blood Groups, Allele Frequencies, Hardy-Weinberg, Dravidian Tribes, India.

1. INTRODUCTION

The Indian subcontinent is currently populated by more than one billion people who belong to thousands of linguistic and ethnic groups.[1, 2] Genetic and anthropological studies have shown that the peopling of the subcontinent is characterized by a complex history, with contributions from different ancestral populations.[2-5] Additional studies of mitochondrial haplogroups show that an early migration may have populated the Indian subcontinent, leaving 'relic' populations in present-day India represented by some Austro-Asiatic and Dravidian speaking populations. India has served as a major passageway for the dispersal of modern humans and Indian demographics have been influenced by multiple waves of human migrations.[3] Because of its long history of human settlement and its enormous social, linguistic and cultural diversity, the population history of India has long intrigued anthropologists and human geneticists.[3] A better understanding of Indian genetic diversity and population history can needed new insights into early migration patterns that may have influenced the evolution of modern humans. They are generally thought to be the aboriginal inhabitants of the Indian subcontinent that are present in the region before the arrival of Indo-European speaker. There are currently about 461 tribes in India that vary in size from a few hundred to a few million; they speak languages belonging to all four of the major language families represented in India (Austro-Asiatic, Dravidian, Indo-European and Tibeto-Burman). Their origins and genetic affinities remain largely unknown, although such information is of primary importance in understanding the possible role of India in early migrations of modern humans, since any remnants of genetic contributions from pre-Indo-European migrants would presumably be presented in tribal populations rather than in caste populations. Frequency distribution of blood groups is important as it is used in modern medicine, genetic research, anthropology, and tracing ancestral relations of humans.[6] With this background, we designed a study based on the blood groups and Rh factor with the objectives of merely describe the frequency and variation of blood groups among south India tribal populations,

but it will attempt to assess the possible role of environment, natural selection and genetic determinants of blood groups in this region .

2. SUBJECTS AND METHODS

2.1 Study Populations

There are eleven tribal population of South India are included their study. The biography of the student groups is given in Table 1.

Table. 1. The details of 11 South Indian study populations

S. No	Name of the tribal populations	Location	Language family	Population no (2011 census) for Tamilndu	Occupation	Racial classification/
1	Irula	Ariyalur, Tirchy, Namakkal and Nilgiri districts in Tamil Nadu	Dravidian language, Tamil and Telugu	1,89,661	Hunting and Food gathering, nomadic foraging community	Negroid
2	Malai Pandaram	Kollam district in Kerala and Thirunalveli district in Tamil Nadu	Dravidian language, Malayalam and Tamil	1,431	Hunting , A nomadic foraging community	Proto – Australoid
3	Paniyans	Niligiri distric , Tamil Nadu	Dravidian language, Tamil, Malayalam	10,131	Lead a traditional hunter-gatherer lifestyle, Now Paniyas are found to be coming under a subtle from of bonded labour	Proto – Australoid
4	kurumba	Dharmapuri District, Tamil Nadu	Dravidian language, Tamil and kannada	30,759	The traditional occupation of the Kurumbas is food gathering, like collection of honey and forests produce. Now, agricultural labourers	A kuruman man looks distinctive in shawl and turban, while a woman bears typical tattoo marks.
5	Kondarredy	Thiruvalluvar District, Tamilnadu	Dravidian language, Tamil and Telugu	9,847	Agricultural labourers	They are characterized by a long and narrow head and broad facial profile with a short and moderately

						broad nose and are short – stature.
6	Malayalei	Namakkal, Tirchy and Salem, Taminadu	Dravidian language, Tamil	3, 87,980	Agriculture	Originally belonged to the Vellala cate
7	Kattunayakkan	Niligiri district, Tamil Nadu	Dravidian Tamil and Malayalam	46,672	Agriculture labours	Hilly terrain, high altitude. Low humidity, thick forest and high rainfall.
8	Kanikaran	Kanyakumari district, Tamilnadu	Dravidian language Tamil and Malayalam	3,487	Hunting, gathering and Besides,them as wage labourers in the forest department	Negritoes-Australoids-Caucasoids.
9	Mannan	Idukki in district, Kerala	Dravidian language, Tamil and Malayalam	5,812	Hunting , gathering and agricultural labours	They are mostly short stature,with a small head of oblong or round shape, and a short broad nose on face .
10	Malaivedan	Madurai, Dindukkal, and Theni districts, Tamil Nadu	Dravidian language, Tamil	7,215	Hunting , gathering agricultural labourers	They are mostly short stature, of long and narrow head shape and show a short and broad nasal profile.
11	Pulayar	Dindukkal, district, Tamil Nadu	Dravidian language, Tamil	-	Agricultural labourers	Negritoes-Australoids-

2.2. Data collection

Blood samples from 1025 healthy and unrelated yours, volunteers of both sexes are drawn from the Dravidian tribal settlements of Tamilnadu and Kerala states of India. Ethical consent was obtained from all participants.

2.3. Laboratory analysis

ABO and Rh blood group tests are carried out by a standard protocol using AB D Antisera typing Kit.

2.4. Statistical analysis

The gene and allele frequencies of blood group, are calculated by Hardy-Weinberg model using S2 ABO estimator software.[7] Allele Frequencies are calculated under the assumption of Hardy–Weinberg equilibrium and expressed as percentages. The chi - square test is used to compare observed allelic and genotypic frequency distributions of the blood group and Rh antigens to that of under the Hardy–Weinberg.

Table 2: Hardy-Weinberg model for ABO blood group

Phenotype (blood group)	Genotype	Phenotype frequency	Genotypic frequency	Expected frequency
A	AA+AO	*n*A	*n*AA + *n*AO	*p*2 + 2*pr*
B	BB+BO	*n*B	*n*BB + *n*BO	*q*2 + 2*qr*
O	AB	*n*AB	*n*AB	2*pq*
AB	OO	*n*O	*n*OO	*r*2

3. RESULTS

The overall phenotype frequencies that are observed in the study population are given in table 3. The results showed that $O^{+\ Ve}$ individual account for about 38.9%,with is a maximum shown blood group in eleven Dravidian tribal populations followed by A (30.15%) ,B (23.9%) and AB (7.02) , Most of the Rhesus factor was shown as positive.

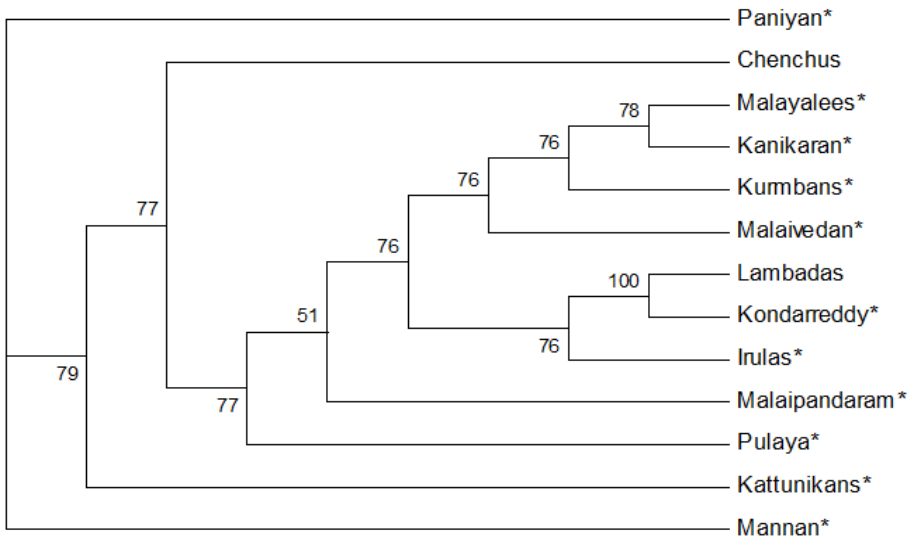
Table: 2 Frequency of ABO blood groups and Rh factor in eleven South India tribal populations

Populations	A	B	AB	O	N	Phenotypic frequency	$Rh^{+\ Ve}$	Rh^{-Ve}
Irulas	22.6 %	82(38.7 %)	14(6.6 %)	68 (34%)	212	O > B > A >AB	209 (98.6%)	03(1.4%)
Malai pandaram	29.8 %	14 (24.6 %)	11(19.3 %)	15 (19.3%)	57	A > O > B > AB	56 (98.1 %)	1(1.9%)
Paniyan	50 %	6 (20%)	9(30%)	-	30	A > AB > B	30 (100%)	-
Kurmbans	24.5	12(22.6%)	3 (5 %)	25 (47.1%)	53	O > A > B >AB	52 (98.1 %)	1
Kondarredy	6.3 %)	65 (68.4)	-	24 (25.3%)	95	B > O > A	82 (86.3)	8 (13.7%)
Malayalees	15.2%	81(25.7%)	10 (3.6%)	180 (55.4%)	312	O > B > A >AB	276 (100%)	-
Kattunikans	57.1%	8 (22.9%)	2 (5.7%)	5 (14.3%)	35	A > B > O >AB	35 (100%)	-
Kanikaran	15 %	13 (17.8%)	5 (6.8 %)	44 (60.2%)	73	O > B > A >AB	73 (100%)	-
Mannan	57.1 %	6 (14.3 %)	6 (14.3	6	42	A > B = O = AB	42(100%)	-

			%)	(14.3%)				
Malaivedan	35.1%	13 (13.8 %)	6 (6.38)	42 (44.7%)	94	O > A > B >AB	89 (94.7%)	5 (5.3%)
Pulaya	27.6 %	19 (32.8 %)	6 (10 %)	17 (29 %)	58	B > O > A >AB	58 (100%)	-
Total	23.9 %	309(30.15 %)	72(7.02 %)	399 (38.9 %)	1025	O > B > A >AB	1006 (98 %)	19 (2 %)

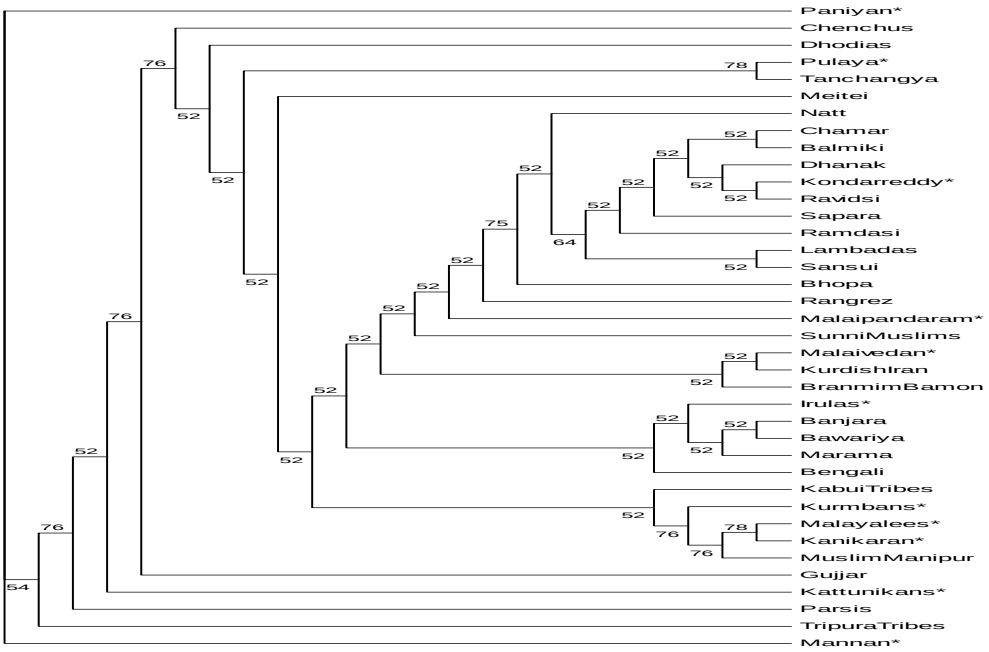
Table 4: shows the overall allele frequencies for the ABO and Rh antigens in the eleven study populations

Group	Gene frequency *p*[A]	*q*[B]	*r*[O]	Hardy-Weinberg log likelihood	Genotypic frequency	$\chi 2$	*P*value	Rh^{+}(D)	Rh^{-}(d)
Total	0.1688	0.207	0.623	-1288.83	O > B > A	0.001	0.977	0.982	0.018
Irulas	0.159	0.263	0.593	-265.233	O > B > A	1.357	0.128	0.985	0.015
Malai pandaram	0.279	0.244	0.476	-79.5	O > A > B	2.312	0.128	0.982	0.018
Paniyan	0.612	0.387	0.0	0.0	A > B > O	-	0.0	1	-
Kurmbans	0.164	0.152	0.68	-63.52	O > A > B	0.059	0.8	0.981	0.018
Kondarreddy	0.0325	0.443	0.523	-77.97	O > B > A	-	0.0	0.863	0.136
Malayalees	0.0989	0.159	0.741	-229.039	O > B > A	0.249	0.617	1	-
Kattunikans	0.405	0.16	0.434	-40.053	O > A > B	3.19	0.073	1	-
Kanikaran	0.114	0.13	0.754	-80.82	O > B > A	3.78	0.051	1	-
Mannan	0.465	0.154	0.379	-48.457	A > O > B	0.0015	0.968	1	-
Malaivedan	0.23	0.106	0.659	-110.87	O > A > B	0.525	0.468	0.946	0.053
Pulaya	0.225	0.256	0.52	-76.285	O > B > A	0.0007	0.978	1	-



*Present study

Fig. 2. Dendrogram of 11 South Indian Tribal populations on diversity for two (ABO and Rh) polymorphic loci



*Present study

Fig.3 Neighbour – Joining tree depicting genomic affinity among the Caste and Tribal Populations of India

Conure the results of all eleven populations into two paragraphs. The r (O) gene was the maxims gene registered in Kanikkaran (0.754) was absent in Paniyan.

4. DISCUSSION

Blood groups since the discovery, has been linked with many diseases, though the explanation for the association between ABO blood groups and some diseases is still not understood. The genetic composition of the ABO blood type is an easily accessible component.[8] The ABO blood group system was discovered by Landsteiner in 1900, and is later followed by the discovery of the rhesus system, The determination of blood groups is based on antigenic substances which are inherited on the surface of red blood cells.[9] The ABO locus is located on chromosome 9, specifically, in the segment 9q34.1-q34.[10] The human blood group Rh polypeptide has been used to map the Rh locus, by in situ hybridization, to the region p34.3-p36.1 of chromosome 1.[11] This gene encodes a glycosyl transfer's enzyme that adds a sugar residue to a carbohydrate structure known as the H antigen that is present in the membrane of red cells as well as most epithelial and endothelial cells. The A allele codes for an enzyme that adds an N-acetyl galactosamine to the H antigen, while the B allele, which differs from the former by four amino acid changes, codes for an enzyme that adds a D-galactose.[8]

All human populations share the same blood group systems, differing only in the frequencies of specific types. The incidence of ABO, Rh and MN groups varies in different parts of the world and in different races.[12] Geographical and ethnic groups and socioeconomic groups,[13] O blood group has an association with skin and melanoma,.[14] Many studies have revealed possible associations of various diseases with the ABO blood group, but the reasons for such associations are remain controversial,.[15-16] With Blood group O has a greater incidence of association with hypertension.[17] As far as abortion is considered, it is higher in between A type husband and O type wife and still births are higher in couples with of combination A type husband and B type wife.

The frequencies of Rh positive and Rh-negative individuals are 96.5% and 3.5% Respectively.[18] ABO blood groups are important in determining migration of races and in hereditary diseases.[19] Some diseases are more common to develop in certain blood groups; hence the relationship of different blood groups with diseases is important.[20]

Geographical distribution of Blood Groups in India from above studies shows that in Northern & the Western part of India, B is the commonest blood group, whereas in Eastern, Southern and Central part, O are the most prevalent blood group. But overall in India O is the most common blood group encountered in the donors.

In this context, we report the result of our study, which is aimed to quantity the genetic relationships of eleven Dravidian tribal population of South India based on ABO blood group polymorphisms. The results of the present study attest the previous studies using DNA markers that Dravian tribal population more diverse related to other Dravidian neighbours.

In our present study B (35.7%) is the most frequent blood group encountered, but there is not much significant difference with the occurrence of O (34.4%) blood group which is followed by A (22.3%) and AB (7.6%). Similarly a study from Northern parts of India (Lucknow and Punjab) showed blood group B is the commonest, followed by O, A and AB. Study from South India showed that blood group O is commonest (38.75%) followed by group B (32.69%), group A (18.85%) and AB (5.27%). Internationally, a study of Pakistan showed that the frequency of blood group B (32.04%), followed by O (30.5%), A (22.4%) and AB (8.4%); while other studies [from USA, Britain, Australia etc.] showed O blood group to be the most prevalent. In Rhesus system, our study shows the frequency of Rh-positive is 95.36%, while only 4.64% is Rh negative. These figures are similar to the other studies

carried out in different parts of India and internationally.[21] Rh-positive groups are predominant group and the frequency more or less the same. The allelic frequencies of the total population of the world are estimated to be O= 62.3%; A =21. 5% and B= 16.2%.[22]

The genomic affinities among eleven study populations are represented in Figure 1, using allele frequency data of four loci by a standard NJ tree. It is seen that all student groups are genetically related to each other, to asses genomic affinities of the eleven study populations, the data from the results of presents study groups are assured togelhts and repserented in an others NJ tree (Fig.2).

CONCLUSION

In conclusion, based on ABO blood group poylmpohsms the Dravian tribes are vital genetic roots of others India populations studies association of and ABO blood group polymorphism and disease populations in India and also by using molecular marks, such as nDNA, mtDNA may right clear picture in the human biography of the Indian subcontinent.

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