

Original Research

Distribution of ABO Blood Groups in Population of Uttar Pradesh: A Randomized Study

Gagandeep Kaur¹, Gunjeet Singh Sandhu²

¹Senior Resident, Department of Physiology, ²Senior Resident, Department of General Surgery, Government Medical College and Hospital, Patiala, Punjab

ABSTRACT:

Background -Blood provides an ideal opportunity for the study of human variation without cultural prejudice. The frequency of blood groups differ in different geographical areas but the geographical gradients of A and B genes give an indication that the blood groups are affected by environmental selection. The distribution of blood groups is variable in different parts of India. This distribution varies according to different races, population and geographical conditions. **Aim** – To study the distribution of ABO blood group in different caste groups in population of Uttar Pradesh. **Material and Method**- The total of 1842 subjects from the population of Uttar Pradesh were randomly included in the study. Venous sample was collected from the subjects and then Cell grouping and Serum grouping was done. **Results** - Distributional sequence of blood groups is B>O>A>AB in 1842 subjects belonging to the State of UP is followed by the various caste groups except the Brahmin caste groups which shows the following pattern: O > B > A > AB. **Conclusion**- Caste system in India was according to hereditary professions and status in society. But this is not true nowadays. People change professions and also leave their hometowns for earning their livelihood. But there is still endogamy observed in the different caste groups. Blood groups being genetically inherited, thus maintain hereditary pattern typical to these caste groups.

Key words: ABO blood group, agglutinins.

Received: 2 December, 2019

Accepted: 28 January, 2020

Corresponding author: Dr. Gunjeet Singh Sandhu, Senior Resident, Department of General Surgery, Government Medical College and Hospital, Patiala, Punjab

This article may be cited as: Kaur G, Sandhu GS. Distribution of ABO Blood Groups in Population of Uttar Pradesh: A Randomized Study. J Adv Med Dent Scie Res 2020;8(3):23-30.

INTRODUCTION

Like other physical characteristics, blood groups can be used to divide mankind into races. Blood provides an ideal opportunity for the study of human variation without cultural prejudice. Once blood groups were regarded to be non-adaptive traits unaffected by any type of selection. The frequency of blood groups differ in different geographical areas but the geographical gradients of A and B genes give an indication that the blood groups are affected by environmental selection. Human erythrocyte membrane contains over 300 antigenic determinants and 21 blood group systems are currently recognized^[1].

Most accepted among all ABO blood group system that was first recognized in 19th century by Landsteiner.^[2] Immediately after birth the quantity of agglutinins in the plasma is almost zero reaches to maximum titre at 8 to 10 years of age and this gradually declines throughout the remaining years of life.^[3] The distribution of blood groups is variable in different parts of India. This distribution varies according to different races, population and geographical conditions.^[4] The aim of present study was evaluate the distribution of ABO blood groups in different caste groups in the population of Uttar Pradesh.

MATERIALS AND METHODS -

Present study was conducted in Govt. Medical College/Rajindra Hospital, Patiala. The total of 1842 subjects from the population of Uttar Pradesh were randomly included in the study. Venous blood samples were collected from the subjects in the sterile vials containing an anticoagulant (EDTA). These were stored at 2-8⁰C upto maximum of 48 hours. Haemolysed samples were discarded and the rest centrifuged at 1000-3000 rpm for 3 minutes. The method performed in

the study was Tube Method at room temperature as had been standardized by Saran and Makroo in 1991. It comprises of: Cell grouping or Forward grouping and Serum grouping or Reverse grouping. Antisera used are Anti-A, Anti-B, Anti-AB monoclonal antibodies manufactured by Mitra International. Materials used were-Reagent cells (A, B and O cells), Normal saline, Test Tubes 75x12 mm and Pasteur pipettes, Table top centrifuge, Microscope, Marker pen/pencil. Cell grouping was done afterwards.

Observation

Caste Groups	Blood Groups				Total Cases
	A	B	O	AB	
Brahmin					
Bhardwaj	9 (24.32%)	11 (29.73%)	14 (37.84%)	3 (8.11%)	37
Tiwari	9 (21.95%)	13 (31.74%)	16 (39.09%)	3 (7.32%)	41
Kaushal	6 (21.43%)	9 (32.14%)	11 (39.28%)	2 (7.14%)	28
Kshatriya					
Thakur	31 (21.68%)	55 (38.46%)	45 (31.46%)	12 (8.39%)	143
Yadav	25 (23.36%)	41 (38.31%)	33 (30.84%)	8 (7.47%)	107
Bania					
Jaiswal	21 (22.34%)	36 (38.29%)	29 (30.85%)	8 (8.51%)	94
Aggarwal	16 (23.18%)	26 (37.68%)	21 (30.45%)	6 (8.69%)	69
Others					
Ahir	29 (22.83%)	48 (37.79%)	40 (31.49%)	10 (7.88%)	127
Agariya	29 (23.48%)	49 (37.98%)	10 (31.0%)	11 (8.52%)	129
Badi	24 (22.86%)	40 (38.09%)	33 (31.42%)	9 (8.62%)	105
Barwar	25 (22.52%)	42 (37.83%)	35 (31.53%)	9 (8.11%)	111
Bosia	34 (22.97%)	56 (37.83%)	46 (31.08%)	12 (8.11%)	148
Gadria	30 (22.55%)	51 (38.34%)	41 (30.83%)	11 (8.27%)	133
Gond	25 (22.72%)	42 (38.18%)	34 (30.90%)	9 (8.18%)	110
Rawat	28 (22.58%)	47 (37.90%)	39 (31.45%)	10 (8.06%)	124
Pasi	32 (23.35%)	52 (37.96%)	42 (30.65%)	11 (8.02%)	137
Kol	27 (22.31%)	46 (38.01%)	38 (31.40%)	10 (8.26%)	121
Kewat	18 (23.07%)	30 (38.46%)	24 (30.77%)	6 (7.69%)	78
Total	418 (22.69%)	694 (37.68%)	581 (31.54%)	149 (8.08%)	1842

Table 1- Distribution of blood groups on the basis of caste groups in the state of Uttar Pradesh

The above table shows that the distributional sequence of blood groups (B>O>A>AB) in 1842 subjects belonging to the State of UP is followed by the various caste groups except the Brahmin caste groups which shows the following pattern:

O > B > A > AB

Caste Group	Sex	Blood Groups				Total Cases
		A	B	O	AB	
Brahmin						
Bhardwaj	M	8 (24.24%)	10 (30.30%)	12 (36.36%)	3 (9.09%)	33
	F	1 (25%)	1 (25%)	2 (50%)	-	4
	Total	9 (24.32%)	11 (29.73%)	14 (37.84%)	3 (8.11%)	37
Tiwari	M	8 (22.22%)	11 (30.55%)	14 (38.88%)	3 (8.33%)	36
	F	1 (20%)	2 (40%)	2 (40%)	-	5
	Total	9 (21.95%)	13 (31.71%)	16 (39.02%)	3 (7.32%)	41
Kaushal	M	5 (20%)	8 (32%)	10 (40%)	2 (8%)	25
	F	1 (33.33%)	1 (33.33%)	1 (33.33%)	-	3
	Total	6 (21.43%)	9 (32.14%)	11 (39.28%)	2 (7.14%)	28
Kshatriya						
Thakur	M	23 (21.49%)	38 (35.51%)	36 (33.64%)	10 (9.34%)	107
	F	8 (22.22%)	17 (47.22%)	9 (25%)	2 (5.55%)	36
	Total	31 (21.68%)	55 (38.43%)	45 (31.46%)	12 (8.39%)	143
Yadav	M	18 (23.68%)	29 (38.15%)	23 (30.26%)	6 (7.89%)	76
	F	7 (22.58%)	12 (38.70%)	10 (32.25%)	2 (6.45%)	31
	Total	25 (23.36%)	41 (38.34%)	33 (30.84%)	8 (7.48%)	107
Jaiswal	M	15 (22.72%)	25 (37.88%)	20 (30.30%)	6 (9.09%)	66
	F	6 (21.43%)	11 (39.28%)	9 (32.10%)	2 (7.14%)	28
	Total	21 (22.36%)	36 (30.20%)	29 (30.85%)	8 (8.51%)	94
Aggarwal	M	12 (23.07%)	19 (36.53%)	16 (30.76%)	5 (9.61%)	52
	F	4 (23.53%)	7 (41.17%)	5 (29.41%)	1 (5.88%)	17
	Total	16 (23.16%)	26 (37.68%)	21 (30.43%)	6 (8.69%)	69
Others						
Ahir	M	23 (22.23%)	45 (43.68%)	27 (26.21%)	8 (7.77%)	103
	F	6 (25%)	3 (12.5%)	13 (54.17%)	2 (8.33%)	24
	Total	29 (22.83%)	48 (37.79%)	40 (31.49%)	10 (7.88%)	127
Agariya	M	23 (22.15%)	45 (43.27%)	27 (25.96%)	9 (8.65%)	104
	F	6	4	13	2	25

		(24%)	(16.9%)	(52%)	(8%)	
	Total	29 (22.48%)	49 (37.98%)	40 (31.80%)	11 (8.52%)	127
Badi	M	20 (23.53%)	36 (42.35%)	22 (25.88%)	7 (8.23%)	85
	F	4 (20%)	4 (20%)	11 (55%)	1 (5%)	20
	Total	24 (22.86%)	40 (38.09%)	33 (31.42%)	8 (7.62%)	105
Barwar	M	21 (22.82%)	39 (42.39%)	24 (26.09%)	8 (8.69%)	92
	F	4 (21.05%)	3 (15.79%)	11 (57.89%)	1 (5.26%)	19
	Total	25 (22.25%)	42 (37.83%)	35 (31.53%)	9 (8.11%)	111
Bosia	M	26 (22.60%)	50 (43.48%)	30 (26.09%)	9 (7.82%)	115
	F	8 (24.24%)	6 (18.18%)	16 (48.48%)	3 (9.09%)	33
	Total	34 (22.97%)	56 (37.83%)	46 (31.08%)	12 (8.11%)	148
Gadria	M	25 (23.15%)	46 (42.59%)	28 (25.92%)	9 (7.33%)	108
	F	5 (20%)	5 (20%)	13 (52%)	2 (8%)	25
	Total	30 (22.55%)	51 (38.84%)	41 (30.83%)	11 (8.27%)	133
Gond	M	21 (23.86%)	39 (44.32%)	21 (23.86%)	7 (7.95%)	88
	F	4 (18.18%)	3 (13.63%)	13 (59.09%)	2 (9.09%)	22
	Total	25 (22.72%)	42 (38.18%)	34 (30.90%)	9 (8.18%)	110
Rawat	M	24 (23.76%)	44 (43.56%)	25 (24.75%)	8 (7.92%)	101
	F	4 (17.39%)	3 (13.04%)	14 (60.87%)	2 (8.69%)	23
	Total	28 (22.58%)	47 (37.90%)	39 (31.45%)	10 (8.06%)	124
Pasi	M	27 (23.89%)	48 (42.48%)	29 (25.66%)	9 (7.95%)	113
	F	5 (20.83%)	4 (16.67%)	13 (54.16%)	2 (8.33%)	24
	Total	32 (23.35%)	52 (37.96%)	42 (30.65%)	11 (8.02%)	137
Kol	M	23 (22.77%)	43 (42.57%)	27 (26.73%)	8 (7.92%)	101
	F	4 (20%)	3 (15%)	11 (55%)	2 (10%)	20
	Total	27 (23.31%)	46 (38.01%)	38 (31.4%)	10 (8.26%)	121
Kewat	M	14 (23.33%)	27 (45%)	14 (23.23%)	5 (8.33%)	60
	F	4 (22.22%)	3 (16.67%)	10 (55.55%)	1 (5.55%)	18
	Total	18 (23.07%)	30 (38.36%)	24 (30.77%)	6 (7.69%)	78
Grand Total		418 (22.69%)	69 (37.68%)	581 (31.54%)	149 (8.08%)	1842 (100%)

Statistical Analysis

Comparison	Blood Group	χ^2	p	Significance
Bhardwaj	A	0.001	>0.05	NS
	B	0.048	>0.05	NS
	O	0.282	>0.05	NS
	AB	-	>0.05	NS
Tiwari	A	0.012	>0.05	NS
	B	0.187	>0.05	NS
	O	0.402	>0.05	NS
	AB	-	>0.05	NS
Kaushal	A	0.282	>0.05	NS
	B	0.002	>0.05	NS
	O	0.164	>0.05	NS
	AB	-	>0.05	NS
Thakur	A	0.008	>0.05	NS
	B	1.560	>0.05	NS
	O	0.933	>0.05	NS
	AB	0.503	>0.05	NS
Yadav	A	0.014	>0.05	NS
	B	0.002	>0.05	NS
	O	0.041	>0.05	NS
	AB	0.066	>0.05	NS
Jaiswal	A	0.019	>0.05	NS
	B	0.016	>0.05	NS
	O	0.03	>0.05	NS
	AB	0.095	>0.05	NS
Aggarwal	A	0.001	>0.05	NS
	B	0.117	>0.05	NS
	O	0.011	>0.05	NS
	AB	0.224	>0.05	NS
Ahir	A	0.078	>0.05	NS
	B	8.053	>0.01	S
	O	7.049	<0.01	S
	AB	0.008	>0.05	NS
Agariya	A	0.041	>0.05	NS
	B	6.362	<0.01	S
	O	6.409	<0.01	S
	AB	0.011	>0.05	NS
Badi	A	0.014	>0.05	NS
	B	3.851	<0.01	S
	O	6.369	<0.01	S
	AB	0.240	>0.05	NS
Barwal	A	0.028	>0.05	NS
	B	4.737	<0.05	S
	O	7.379	<0.01	S
	AB	0.249	>0.05	NS
Bosia	A	0.038	>0.05	NS
	B	6.976	<0.01	S
	O	6.005	<0.01	S
	AB	0.115	>0.05	NS
Gadria	A	0.115	>0.05	NS
	B	4.382	<0.05	S
	O	6.472	<0.01	S
	AB	0.049	>0.05	NS
Gond	A	0.424	>0.05	NS
	B	7.019	<0.01	S
	O	10.227	<0.01	S
	AB	0.118	>0.05	NS
Rawat	A	0.475	>0.05	NS

	B	7.414	<0.01	S
	O	11.334	<0.01	S
	AB	0.015	>0.05	NS
Pasi	A	0.103	>0.05	NS
	B	5.600	<0.05	S
	O	7.565	<0.01	S
	AB	0.003	>0.05	NS
Kol	A	0.070	>0.05	NS
	B	5.386	<0.01	S
	O	6.192	<0.01	S
	AB	0.095	>0.05	NS
Kewat	A	0.313	>0.05	NS
	B	4.969	<0.05	S
	O	6.488	<0.01	S
	AB	0.211	>0.05	NS

The above table shows that the distribution of blood groups according to sex is found statistically significant in Ahir, Agariya, Badi, Barwar, Boria, Gadia, Gond, Kewat, Kol, Pasi and Kewat caste groups of the State of UP. It is observed that blood group B is significantly more in males as compared to female ($p > 0.01$) while the blood group O is significantly more in females as compared to males ($p > 0.01$).

However in Bhardwaj, Tiwari, Kaushal, Thakur, Yadav, Jaiswal, Aggarwal caste groups the results are not statistically significant ($p > 0.05$).

DISCUSSION

Hindus in the Indian subcontinent show characteristic physical and cultural differences on the basis of the region, language and endogamous caste and tribal groups. These differences provide an opportunity for the study of genetic variations in the subdivisions of a major caste unit which may help to reveal the variation due to migration of the people in the different areas.^[5]

In the present study, maximum number of subjects (n 1842) were hailing from the State of Uttar Pradesh. Out of these 1465 (79.53%) were males and 377 (20.46%) were females. The distribution of ABO blood groups in these was :

Group B (37.68%) > Group O (31.54%) > Group A (22.69%) > Group AB (8.08%).

The above representation clearly showed that, group B occupied the dominant position closely followed by group O. The results obtained could be compared with a study done on the ABO and Rh blood groups in certain caste groups of U.P. and Punjab by Shivaraman et al.^[6] The U.P. caste groups gave the same frequency order as observed in the present study i.e. B > O > A > AB. Another study by Jain et al done in Kanpur (U.P) also compares well with our study.^[7]

On the other hand Garg et al while analysing the blood group frequency in a scheduled tribe of U.P, the Bhoksas, reported a high A blood group frequency (33.33%).^[8]

Analysing the sex wise distribution of ABO blood group in subjects belonging to U.P it has been observed that ABO distribution in female population followed the same as seen in males. The data was further analysed based on different caste groups like Brahmin group (Bhardwaj, Tiwari, Kaushal) Kshatriya

group (Thakur, Yadav), Bania group (Jaiswal, Aggarwal) and 'other' caste groups (Ahir, Agariya, Badi, Barwar, Bosia, Gadia, G-ond, Kol, Kewat, Pasi and Rawat).

It was observed that only the Brahmin group (comprising of Bhardwaj, Tiwari and Kaushal) deviated significantly from the overall trend of blood group distribution. The frequency pattern observed among them was O > B > A > AB. In the rest of caste groups viz Kshatriyas, Banias and others, the pattern observed was B > O > A > AB. Jaiswal, Ahir caste groups have also been analysed by Shivaraman et al (1971) and the results reported are comparable with the present study. The deviation observed within the Brahmin group in the present study is supported by observation made by Shivaraman et al (1971) showing group O (35%) > B (32.14%).^[6]

Analysing the sex-wise distribution of ABO blood groups of subjects belonging to various caste groups, it was observed that in the category of 'other' caste groups namely - Ahir, Agariya, Badi, Barwar, Bosia, Gadia, Gond, Kol, Kewat, Pasi and Rawat, group B was significantly high in males and group O significantly high in females. However since there is inequality in the number of male and female subjects, the results cannot be compared to draw any significant conclusions.

CONCLUSION

Initially the caste system in India was according to hereditary professions and status in society. But this is not true nowadays. People change professions and also leave their hometowns for earning their livelihood. But there is still endogamy observed in the different caste

groups. Blood groups being genetically inherited, thus maintain hereditary pattern typical to these caste groups. The vast caste system in India and certain observations were made. Brahmin caste group in U.P. deviated significantly from the general pattern shown by U.P. subjects. The frequency pattern seen in them was $O > B > A > AB$. The observations within individual caste groups were more akin to each other than outside the caste groups.

REFERENCES

1. Sinha A, Singh CK and Singh HP : Prevalence of blood group ABO and Rh in Scheduled tribes (ST) of South Bihar Region. *Indian J Physiol Pharmacol* 1999 ; 43(1) : 141-142.
2. Saran RK and Makroo RN : ABO blood group system ; The Rh blood group system. *Transfusion Medicine Technical Manual WHO, Directorate General of Health Services*, 1991 ; 38, 45-48, 56, 60, 62-67.
3. Guyton AC and Hall JE . Blood groups, Transfusion ; Tissue and Organ transplantation. *Textbook of Medical Physiology*.Harcourt Asia PTE Ltd and WB Saunders Company Publications.Eigth Edition 1991 ;1925-7.
4. Mishra SC, Mohanta KD and Praharaj KC : Distribution of blood groups in Western Orissa. *J Indian Med Assoc* 1968 ; 51(8) : 390-391.
5. Bhatia HM, Shanbagh SR, Baxi AJ, Bapat JP, Sharma RS. Genetic studies among the endogamous groups of lohanas north and west India. *Human Heredity*. 1976; 26: 298-305
6. Shivaraman EK, Saran RK and Bhatia HM. The distribution of ABO and Rh blood groups in North Indian populations. *Human Heredity* 1971 ; 21 : 326-333.
7. Jain PC, Singh SN and Rajvanshi VS : Naturally occurring ABO antibodies in Kanpur (U.P.). *J Indian MA* 1981 ; 76(4) : 53-55.
8. Garg SK, Negi RS and Sankhyan AK : A serological analysis of the Bhoksa : A scheduled tribe of Uttar Pradesh. *Acta Anthropogenet* 1981 ; 5(3) : 157-68.