

# Distribution of ABO blood groups and Rh(D) factor among the Brahmin and Kushwaha populations of Jhansi District(U.P)

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## Abstract:

The distribution of ABO blood groups and Rh(D) factor has been studied among the Brahmin and Kushwaha populations of Jhansi Uttar Pradesh. The A,B,O and AB blood group percentage in Brahmins was recorded as 20.88%, 36.64%, 37.02% and 10.44% .The Rh(D) positive percentage was 96.20% and Rh(d) negative 3.79%. In Kushwaha population the percentage of A,B,O and AB was recorded as 25.65%, 30.26%, 31.25% and 12.82% respectively. The Rh (D) positive was recorded as 97.36% and Rh(d) negative as 2.63%. The allele frequency of ABO among Brahmins was 0.198, 0.266, 0.536 and in Kushwaha the allele frequency of ABO was recorded as 0.251, 0.278, and 0.471 respectively. So the prevalence of the ABO from the area under study can be shown with a general formula as O>B>A>AB.

## Introduction:

The ABO blood groups and Rhesus (Rh) D blood group antigens are the most frequently studied genetic markers in a large no. of populations worldwide. The ABO blood group distribution varies in different geographical and ethnic groups. An elite historical, demographical and socio-cultural contour makes Indian populations a melting pot for the study of genetic variation and differentiation. The history of blood groups dates back to 1900 century, when an Australian

Scientist Karl Landsteiner discovered the ABO system and Decastrello & Sturli discovered the fourth type of blood group i.e. AB in 1902. Landsteiner in 1901 found that the blood is not similar in all persons and that blood transfusion are successful only when blood of donor and recipient resembles with each other, he also discovered that in case of incompatible blood transfusion the RBC's of donors blood clump (agglutinate) as soon as it reaches into the blood of recipient and blocks the blood circulation in the capillaries causing instantaneous death of patient. ABO blood system was the first genetic polymorphism defined in human beings so blood groups are useful in the study of human polymorphism because of its classification into different phenotypes, single mode of inheritance and different frequencies in different populations. Blood groups are useful genetic markers in family, population and in linkage analysis. In the present study the efforts were taken to find out the blood group profile of the Gateway of Bundelkhand (Jhansi). As all human populations share the same blood systems, although they differ in the frequencies of specific types. The distribution patterns of ABO and RH systems are complex around the world, variations may even occur in different areas within one small country (Kolmakova and Kononova 1999).

The distribution study of ABO blood groups and Rh systems contributes towards the evolutionary history of human populations. It is immense that such studies have pointed out the evolutionary closeness of apes and monkeys to our species because some of them share a no. of blood typing systems with us as well (Amjad et al 2002). Medically such studies provide us the prevalence of some disease with some specific blood groups e.g. the increased odds of stomach cancer among subjects with blood group type A have been reported in epidemiological studies (You et al 2000), while as a loss of blood group A antigen expression has been reported in Bladder cancer caused by the allelic loss or methylation of ABO gene (Chihara Y et al 2005). A significant deficit of group O has suggested that there may be susceptibility to develop osteoarthritis in normal hip joint and spinal osteochondrosis (Lourie J.A 1983, Nevropatol Z.P 1979). Besides population profiling and medical importance of ABO and Rh blood groups, these are of great value in detection of crime and determination of paternity in Forensic Cases. Numerous studies have been carried out on distribution of blood groups and genetic composition of various endogamous populations in India (Bhasin et al 1992, 94) and ABO blood groups and Rh were not found in equal numbers. Similarly the present studies were carried out to find out the variations and the blood group profile of Jhansi region which can be used as a reference by health planners while making efforts to face future health challenges in this region and for investigators in order to aid criminal investigations.

## Material and Methods:

A total of 620 subjects of both sexes from both populations were included in this study. The blood samples were collected fresh without any anti-coagulant by finger prick with sterile lancet.

Before pricking the bulb was sterilized with alcohol swab, compressed and pricked slightly with the help of lancet, the oozed blood was placed at three places over a glass slide and to each blood drop placed at separate places a drop of anti-sera (anti-A, anti-B and anti-D) was added and separately observed for the agglutination. The grouping was done by antigen-antibody agglutination test. The present study for the determination of blood groups was based on forward method of typing i.e. detection of antigen on RBC's using standard anti-sera. The anti-sera used was obtained from Span Diagnostics Ltd. Surat (India ). The clone anti-A monoclonal and B monoclonal IgM antibodies are produced by Murine hybridoma cell lines grown in tissue culture. While clone anti-D (Rh) specific monoclonal antibody is produced in vitro culture of a human lymphoblastoid cell line obtained after transformation of B lymphocytes by the Epstein-Barr viruses (EBV). The allele frequency was completed by the application of the Hardy-Weinberg Law on the basis of the number of subjects with different blood groups.

## Result :

The phenotypic and allele frequencies of the ABO blood groups of both populations are presented in the table 1. The most frequently occurring blood group in Brahmin population is O (37.02%) followed by B (31.64%), A (20.88%) and AB (10.44%) and in Kushwaha population the blood group O was found to be the most frequent (31.25%) followed by B (30.26%), A(25.65%) and AB(12.82%). These gene frequencies with respect to ABO among both populations can be shown with a general formula  $O > B > A > AB$ . In Rhesus blood grouping system 96.20% individuals were Rhesus (D) positive among Brahmins and 97.36% among Kushwaha. With respect to the ABO and Rh system, in Brahmins prevalence of group O along with Rh(D) positive was 35.12%, group B along with Rh(D) positive 30.69%, group A along with Rh (D)positive 20.5% and group AB along with Rh(D) positive 9.81%. while as prevalence of group O along with Rh negative was 1.89%, group B along with Rh negative 0.94%, group A along with Rh negative 0.31% and group AB along with Rh negative is 0.63%. In Kushwaha, the prevalence of O group along with Rh(D) positive is 30.59%, along group B is 30.26%, along group A is 25% and 11.51 with AB. While as prevalence of AB group with the Rh negative was 1.31%, group O along with Rh negative was 0.65%, group A along with Rh negative was 0.65% and no Rh negative subject was found along with group B. The allelic frequency of ABO alleles among the Brahmins was 0.198, 0.226 and 0.536 respectively. In Kushwaha the allelic frequency of ABO alleles was 0.251, 0.278 and 0.471 respectively. The frequency of D and d alleles among the Brahmins was 0.805 & 0.195 and in Kushwaha the frequency was 0.838 and 0.162 respectively.

BRAHMINS					KUSHWAHA			
ABO Phenotypes	O	A	B	AB	O	A	B	AB
No. of individuals	117	66	100	33	95	78	92	39
Phenotypic %age	37.02	20.88	31.64	10.44	31.25	25.65	30.26	12.82
Allele frequencies	0.536	0.198	0.266		0.471	0.251	0.278	

**Table 1**-Phenotypic and Allele frequencies of ABO blood groups among Brahmins and Kushwaha Population of Jhansi District (U.P)

BRAHMINS			KUSHWAHA	
Rh(D) Phenotypes	+ve	-ve	+ve	-ve
No. of individuals	304	12	296	8
Phenotypic %age	96.20	3.79	97.36	2.63
Allele frequencies	0.805	0.195	0.838	0.162

**Table2**- Phenotypic and Allele frequencies of Rh(D) blood groups among Brahmin and Kushwaha population of Jhansi District (U.P)

## Discussion:

Demographical and socio-cultural contour makes Indian populations a melting pot for the study of genetic variation and differentiation. Gene frequencies with respect to ABO system for the present study can be shown with a general formula as  $O > B > A > AB$  which does not seem to deviate from the studies carried out previously in the different regions of India and nearby region namely Jaunpur District of Uttar Pradesh. The Rh positive frequency is higher with O (32.90%) followed by B (30.48%), A (22.74%) and AB (10.64) and Rh negative frequency is higher with O (1.29%) followed by AB (0.96%), while A and B have same frequency of (0.48%). In a study on the distribution of ABO and Rh from the Jaunpur Uttar Pradesh the prevalence recorded is  $O > B > A > AB$  (Pradeep et al). In Telegu speaking fishing community of Andra Pradesh the studies showed the frequency of ABO blood groups as  $O > B > A > AB$  (A.Papa Roa et al). in scheduled caste populations of Punjab the frequency of the ABO blood groups was designated as  $B > O > A > AB$ . Distribution of ABO among four endogamous groups of Andra Pradesh showed a general trend of O greater than B greater than A (Reddi et al). Studies among the Banjara backward caste of Maharashtra reported the frequency of the ABO blood groups as  $B > O > A > AB$ . McArthur and Penrose estimated ABO blood group frequency at the level of global earth populations of the United states, Asians, Syrians, Arabs and Palestinians, group O is dominant with AB being rarest which shows similarity with the present study, while in Saudi Arabia the prevalence of A blood group is higher as compared to Pakistan populations where blood group B is more prevalent. The sharp differences among the blood group distribution are due to geographical variations, migration, external environment and genetic factors. The data generated in the present study may be useful for the Forensic investigations and health planners.

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