



Genetic Variation of Blood Group Polymorphism among the Kshatriya, an Endogamous Human Population from Andhra Pradesh, India

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KEYWORDS

genetic polymorphism;
variation; blood groups;
Andhra castes; India

ABSTRACT

Genetic polymorphic markers such as blood groups are widely used genetic markers in human population genetic studies. This study reports the genetic variation in phenotype and allele frequencies of ABO and Rh (D) blood groups among the Kshatriyas, an endogamous population from Visakhapatnam district, Andhra Pradesh, India. Blood samples of 100 unrelated individuals were screened for ABO and Rh (D) blood groups. The order of occurrence of ABO phenotypes is O>B>A>AB. The corresponding allele frequencies of O, A and B are 0.420, 0.155 and 0.415, respectively. The allele frequency of D (0.990) is more than d (0.010). The present results are compared with the other populations to understand the population variations.

Introduction

ABO and Rhesus (Rh) blood group systems are hereditary in nature and are used widely in human population genetic studies. The knowledge of the distribution of ABO and Rh blood groups at local and regional levels are helpful in the effective management of blood banks and blood transfusion services. The blood group systems are useful to determine the genetic variation within and between the populations. During the last four decades, numerous studies have been conducted to understand the genetic composition of various endogamous population groups in India (Bhasin *et al.*, 1994, 2001). However, genetic studies among the Kshatriyas are very limited. Hence, this study reports the distribution of ABO and Rh blood groups among the Kshatriya, an endogamous caste population of the Visakhapatnam district, Andhra Pradesh, India.

Materials and Methods

The blood samples were drawn from 100 randomly sampled men and women of the Kshatriya population living in the Visakhapatnam district of Andhra Pradesh, India. That of the Kshatriya is one of the most predominant castes in Andhra Pradesh. Rajulu, Suryavamsa Rajulu and Chandravamsa Rajulu are the other names of the Kshatriya. Traditionally, it is a warrior and ruler community in Hindu society, and hierarchically, they are superior to many castes, except the Brahmin. Currently, the Kshatriyas are engaged in agriculture, industry, trade, and also government and private jobs.

Monogamy is the general pattern of marriage and joint families are the most common ones. They speak Telugu, a Dravidian language. The ethnographic profile of the Kshatriya is available elsewhere (Thurston, 1909). Blood samples were collected following the methods of Race and Sanger (1962). The samples were processed and tested for the ABO and Rh blood group systems using anti-A, anti-B and anti-D sera. Gene frequencies were computed according to Mourant *et al.* (1976).

Results and Discussion

ABO and Rh genes and their phenotypes vary widely across populations and geographical boundaries despite the fact that the antigens involved are stable throughout one's life. The resultant polymorphism is important in population genetic studies and in estimating the availability of compatible blood. Therefore, the present study is useful in providing information on ABO and Rh blood group distribution among the Kshatriya. The distribution of ABO blood groups is presented in Table 1. The group 'O' (42%) is the most frequently occurred phenotype in this population. This observation is in accordance with the findings of previous studies on caste populations in Andhra Pradesh (Parvatheesam *et al.*, 1999). With regard to the other phenotypes of ABO blood groups, the frequency of group 'B' is 40%, group 'A' is 13% and the 'AB' group is the least occurring phenotype with the frequency of 5%. The order of the ABO frequencies is O>B>A>AB. With regard to the distribution of the ABO allele frequencies, the allele O is observed with the highest frequency (0.420), followed by B (0.415) and A (0.155). Review of the ABO phenotype frequencies of caste populations in Andhra Pradesh revealed that a majority of populations recorded higher frequencies of the blood group O than either the B or A ones, while a few reported higher frequencies of the B (Parvatheesam *et al.*, 1997, 1999). Table 2 shows the frequencies of the Rh (D) phenotypes. The frequency of the Rh-D positive phenotype is 99% and frequency of the Rh negative is 1%. The allele frequencies of *D* and *d* are 0.99 and 0.01, respectively. This population is similar to other Andhra caste populations who reported low frequency of the Rh (D) negative gene (Sudhakar *et al.*, 1997). Several populations in Andhra Pradesh have reported the absence of this gene (Babu & Naidu, 1999).

Table 1: Distribution of the ABO blood groups and their allele frequencies among the Kshatriya caste, Andhra Pradesh, India

Phenotype	Phenotypic frequency	Allele Frequency
O	42.0	0.420
A	13.0	0.155
B	40.0	0.415
AB	5.0	

Table 2: Distribution of the Rh (D) blood groups and their allele frequencies among the Kshatriya caste, Andhra Pradesh, India

Phenotype	Phenotypic frequency	Allele Frequency
Rh (D) + ve	99.0	0.990
Rh (D) – ve	1.0	0.010

An earlier study on the genetic distance analysis of Andhra caste populations based on ABO and Rh blood group genetic markers revealed a pattern, discernible in clustering of castes of same hierarchy where upper-level castes formed close clusters with other upper-level castes, and lower-level artisan/occupational castes again formed close clusters with similar castes (Parvatheesam *et al.*, 1997, 1999). It is to be mentioned that each caste population has been endogamous from time immemorial which automatically rules out genetic admixture with other populations with a few possible exceptions. The initial differentiation of these communities is primarily based on occupations. In sum, many of the present day caste populations might have originated from a set of common ancestors, but this differentiation might have taken place long ago, after which, there was no significant genetic admixture.

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