

A Study of Taste Sensitivity of Phenylthiocarbamide (PTC) and Colour Blindness Among the Rajputs of Kasauli, Himachal Pradesh

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INTRODUCTION

Human population genetics enables the anthropologists to study the distribution of genes within a population, the difference in the frequency of their alleles, which characterize one population and distinguish it from another. The ability to taste phenylthiourea and the perception of colour by an individual are useful and important tools in the study of human diversity. The ability to taste is controlled by a single pair of autosomal alleles 'T' and 't' and is inherited as a simple Mendelian trait, the taster allele being dominant over non taster (tt) allele. The mechanism of colour blindness and its anomalies depends entirely on the spectral sensitivity of the colour vision pigments and the cones that contain them. While total colour-blind person is incapable of discriminating any colour, partial colour-blind can see only two parts in the spectrum; if yellow and blue then it is called a case of red-green colour-blindness. Red and green pigment genes are present at the tip of the long arm of the X chromosome Xq28. It is inherited as a sex-linked trait, so that the normal vision is dominant over the colour-blindness.

MATERIALS AND METHODS

The data for the present study was collected from the village Kasauli, district Solan, Himachal Pradesh. Kasauli is a multicasite village with caste affiliation being the most important criteria for division of people in various stratified groups. Rajputs are in majority and have subcastes viz. Thakurs, Raghuvanshi, Panwars, etc.

For PTC tasting ability, serial dilution method was used following the technique of Harris et al. (1949) with slight modifications (Seth, 1961).

The colour vision test for red green colour deficiency was carried out by using Ishihara Chart in sufficient day light.

RESULTS AND DISCUSSION

As regards PTC tasting ability the data on Rajputs exhibits a bimodal distribution of the threshold. The modal value lies at solution number 10. The number of individuals who could not taste even the highest concentrated solution number > 1 showed a high percentage (12.71).

Table 1 shows the percentage and gene frequency distribution of tasters and non tasters. The Rajputs of Kasauli have a 't' frequency of 0.54 and approximates that of Rajputs of Shimla (0.511) and equals that of Rajputs of Kullu (0.54). In Table 2, the mean threshold value, standard deviation, D/s index of Penrose are shown. The Penrose index value in the present sample is 4.245 implying a perfect bimodal distribution.

Chi-square (χ^2) test for comparison of Rajputs of Kasauli with other Rajputs of near by area show interesting results. Rajputs of Kullu, Garhwal, Shimla, Palampur and Narendernagar show nonsignificant differences with Rajputs of Kasauli. Even within Himachal Pradesh, Rajputs of area near to Kasauli like, Shimla, Kullu, etc. show nonsignificant differences. But the areas which are a little farther like, Kinnaur, Kumaon hills show significant differences.

Table 1: Distribution of PTC tasting ability among Rajputs of Kasauli

Population	No. tested	Tasters		Non-tasters		Gene frequency	
		N	%	N	%	T	t
Rajputs	274	194	70.8	80	29.2	0.46	0.54

Table 2: Mean, S.D and D/S values among Rajputs of Kasauli

Population	Mean $\pm$ S.D		D/S
	Tasters	Non-tasters	
Rajputs	8.56 $\pm$ 0.94	2.62 $\pm$ 0.97	4.25

Table 3: Incidence of Colour blindness among Rajputs of Kasauli

Population	Sex	No. tested	Normal		Colour blind		Protan	Deutan
			No.	%	No.	%		
Rajputs	Male	126	121	96.03	5	3.97	2	3
Rajputs	Female	148	148	100	-	-	-	-

For colour blindness out of total 126 males, 5 were found to be colour blind. Thus, the percentage of incidence of colour blindness in males was 3.9%. No female was found to be colour blind. Table 3 shows the percentage of incidence of colour blindness in the Kasauli Rajputs.

Gene frequency of non-tasters is quite variable in different populations of India. Among the Rajputs, the frequency of 't' allele varies from 0.2889 (Rajputs of Uttar Pradesh) to 0.6753 (Rajputs of Bilaspur). The Rajputs of hilly terrain show similarity in their gene pool as compared to the Rajputs of plains like those of Uttar Pradesh which show significant difference with the Rajputs of Kasauli.

Percentage of colour blindness among Rajputs in India varies from being as low as 0.9% in Rajputs of Tirthan valley to as high as 7.2% in Dogra Rajputs of Tawi Valley (see Bhasin et al., 1994; Bhasin and Walter, 2001).

In the present sample the percentage of both non tasters and colour blind individuals is

relatively high.

KEYWORDS PTC. Colour Blindness. Variation. Rajputs.

ABSTRACT PTC taste sensitivity among 274 Rajputs of Kasauli was tested. The frequency of 't' allele was 0.54. Among the males tested, 3.97 percent were colour blind. None of the females tested was found to be colour blind.

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