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A Study of Taste Sensitivity of Phenylthiocarbamide (PTC) and Colour Blindness among the Rajputs of Dadra and Nagar Haveli

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ABSTRACT This paper deals on taste sensitivity of PTC among 235 Rajputs of Dadra and Nagar Haveli studied in the age group of 10-60 years. The findings revealed a frequency of *'t'* allele as 0.44. and 2.4 percent coloured blind reported among the 125 tested males.

INTRODUCTION

Human population genetics is to study population in terms of gene frequencies of various genetic markers and the factors that determine the changes in gene frequencies over a period of time. The ability to taste phenylthiocarbamide (PTC) and the perception of colour by an individual is useful and considered as an important tool in the study of human diversity. Inability to clearly identify different colours of the spectrum is widely known as colour blindness. The difficulties can be mild to severe. Red green color pigments are present at the tip of the long arm of the X chromosome Xq28 (McKusick 1983).

MATERIALS AND METHODS

The taste sensitivity to PTC and Colour blindness was studied among 235 Rajputs (125 male and 110 female) in the age group of 10 to 60 year in which individuals related by blood had been avoided. The data were collected from Naroli village Panchayat of Dadra and Nagar Haveli. The Naroli village is mainly constituted by tribes and castes. Rajputs is a major caste population.

For PTC taste sensitivity, serial dilution method was used by following the technique of Harris and Kalmus (1949). The colour vision test for red green colour deficiency was carried out by using Ishihara Charts (1984). This test was conducted in day light in a room avoiding direct sunlight.

RESULTS AND DISCUSSION

As regard to PTC tasting ability, the data on Rajputs exhibit a bimodal distribution of the threshold. Mode and anti-mode value lies at threshold solution no. 9 and 4, respectively.

Table 1 shows the percentage and gene frequency distribution of tasters and non tasters. The frequency of 't' allele is 0.48 and 0.39 (altogether is 0.44) among the Rajputs males and females of Naroli village respectively. This suggests a high frequency of 't' allele in male, and approximates that of Rajputs of Narendra Nagar of Uttar Pradesh (male 43.7 and female 31.8) (Rani and Seth 1981).

Table 2 shows the mean value, standard deviation and $D\sqrt{S}$ index. These measures have been taken into account in order to minimize the amplitude of sampling error. The mean threshold values for males are calculated as 9.62±0.34 among the tasters and1.67±0.21 among the non tasters. Likewise, the mean threshold values for females are calculated as 10.02±0.21 among the tasters and 1.96±0.31 among the non-tasters. The mean threshold values for the testers and the non-tasters are almost similar in both males and females. The Penrose index ($D\sqrt{S}$) value of males and females are 5.35 and 4.84 respectively which imply a bimodal distribution.

Chi-square test for comparison of Rajputs of Naroli with other Rajputs show interesting results. Comparing with the present data, Rajputs of Simla (1.719) (Bhalla and Chopra 1979) and Rajputs of Garhwal (1.373) (Tiwari and Bhasin 1969) show non-significant differences. But the Rajputs of Kumaon hill (6.78) (Kapoor and Seth 1981), Narendra Nagar, Luckhnow Bilaspur district show significant differences.

For testing colour blindness, 3 individuals were found to be colour blind from the 125 male population (Table 3). The percentage of incidence of colour blindness in male was 2.4%, resembling the case of Chitpavan Brahmin of

Table 1: Distribution of PTC tasting ability among Rajputs

Sex	*No. Tested*	*Tasters*		*Non-tasters*		*Allele frequency*	
		No.	*%*	*No.*	*%*	*T*	*t*
Male	125	96	76.8	29	23.2	0.5183	0.4817
Female	110	93	84.55	17	15.45	0.6069	0.3931
Total	235	189	80.43	46	19.57	0.5576	0.4424

Table 2: Mean, S.D, standard error and D/S among Rajputs

	Mean ± SE		*S.D ± S.E*				
Sex	*Tasters*	*Non-tasters*	*Tasters*	*Non-tasters*	$\hat{S}$	*D*	$D\sqrt{S}$
Male	9.62±0.34	1.67±0.21	1.83±0.24	1.147±0.15	1.49	7.95	5.35
Female	10.02±0.21	1.96±0.31	2.03±0.15	1.29±0.22	1.66	8.06	4.84
Total	9.81±0.14	1.78±0.18	1.23±0.13	1.23±0.13	1.01	8.03	7.94

Table 3: Incidence of colour blindness among Rajput

Sex	*No. tasted*	*Colour blind*	*Type*				*Percentage*
			Protan		*Deutan*		
			Strong	*Mild*	*Strong*	*Mild*	
Male	125	3	1	-	2	-	2.4
Female	110	-	-	-	-	-	0
Total	235	3	1	-	2	-	1.3

Bombay (Mukherjee et al. 1979). No female was found to be colour blind. Table 3 shows the percentage of colour blindness among the Rajputs.

The frequency of defective colour vision of males in various Indian populations is 0.036 which varies from complete absence to 0.231 variables (Bhasin 2009). In west India, the least percentage of color blindness is absent among Dhodia (Vyas et al.1962) and 4.4% is found among Rajput of Gujarat (Kapoor et al. 1983), 5.2% among Hindu Gavda of Goa (Malhotra 1971), 8.0% among Gaud Saraswat Brahmin of Manipal (Bhatia et al. 1976b), 4.3% among Warlis of Dadar and Nagar Haveli (Joshi et al. 1978), the percentage varies till 10.0% among the Vadnagara Nagar Brahmins (Shuddha) of Bombay (Sanghvi and Khanolkar 1949).

Taste sensitivity to PTC is a genetically inherited trait. The frequency of taster and non-taster varies from population to population. In India, the frequency of the non-taster gene is quite varied. Among the Rajputs, the frequency of't' alleles varies from 0.2889 (Rajput of Uttar Pradesh) to 0.6753 (Rajput of Bilaspur). The Rajputs of Narendranagar of Uttar Pradesh is 0.437 which is similar with the present study of Rajput of Naroli village of Dadar and Nagar Haveli. The frequency of't' is quite high in west Indian population that is, 0.751 among the Dhanka of Broach district Gujarat (Vyas et al. 1962), 0.732 among Mahar of Indore, Kamptree, Mansar (Bhasin et al. 1992), and 0.447 among Chowgule Nandiwallas of Nagpur (Bhasin et al. 1992) is quite similar with the present study. The frequency among the various population of India varies from the Dhobis of Vishakhapatnam being the lowest (0.124) (Ranganayaki and Injeti 1979) to the highest incidence in the Mundas of Ranchi (0.897) (Shukla and Tyagi 1975). Comparison of allele frequencies of different populations with regard to their ability to taste reveals a geographical modality of its distribution.

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