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PTC Taste Sensitivity and Red Green Colourblindness in Three Endogamous Populations of Andhra Pradesh

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ABSTRACT The ability to taste Phenylthiocarbamide (PTC) and the incidence of colourblindness were investigated in three endogamous caste populations namely Arya Vysya, Kalinga Vysya and Thrivarnika of Visakhapatnam, Vizianagaram and Srikakulam districts of Coastal Andhra Pradesh. The non taster allele *'t'* is lower in Kalinga Vysya compared to the other two populations. The percentage frequency of red green colurblindness in males is in the decreasing order (Kalinga Vysya > Arya Vysya > Thrivarnika). Interestingly in Kalinga Vysya two females were also found to be colourblind.

INTRODUCTION

A genetic polymorphism exists among human populations with regard to the ability to taste PTC. Different individuals taste PTC at different concentrations. It varies in different populations and is used as genetic marker to study human diversity.

Variant colour vision is a congenital, incurable defect. It is used as genetic marker to study human diversity. Colour vision variations result from inherited alteratrions in the genes encoding the cone pigments.

Nathans (1989) with the help of DNA hybridization confirmed that the genes for red-green deficiency are on X-chromosome and found that the gene coding for blue pigment is on seventh chromosome.

MATERIALS AND METHODS

The ability to taste was determined by the serial dilution method described by Harris and Kalmus (1949). Sample included a total of 612 unrelated individuals of both sexes (Arya Vysya =254, Kalinga Vysya = 270 and Thrivarnika = 88).

Ishihara plates (1972) were used to test for colourblindness. Sample included a total of 654 unrelated individuals of both sexes (Arya Vysya = 270, Kalinga Vysya = 284 and Thrivarnika = 100).

RESULTS AND DISCUSSION

The antimode distribution of PTC taste thresholds in the present study falls at 4 and 5 for Arya Vysya males and females, respectively and at 2 for both males and females in Kalinga Vysya and at 2 for Thrivarnika males and 3 for females. The mean threshold value is 6.58 for Arya Vysya, 7.08 for Kalinga Vysya and 6.56 for Thrivarnika.

The frequency of phenotypes and alleles are presented in table 1. The frequency of non tasters is lower in Kalinga Vysya (12.22%) when compared to other two populations which is 27.56% in Arya Vysya followed by Thrivarnika (27.27%). The difference between males and females is not statistically significant. The *'t'* allele frequency is in the decreasing order. Arya Vysya (52.50%) ≃ Thrivarnika (52.22%) > Kalinga Vysya (34.96%).

It is appropriate to mention here that Vysyas studied by Chandraiah and Bahadur (1979) records 41.9% of *'t'* allele which is lesser than that found in the present study Arya Vysyas.

The distribution of red green colourblindness phenotype frequency in the present study population is given in table 2. The percentage frequency of colourblindness is in the decreasing order from Kalinga Vysya (1.76%) to Arya Vysya (1.48%) to Thrivarnika (1.01%). In Arya Vysya the 4 cases observed are of deutan type. In Thrivarnika the observed 1 case is of protan type whereas Kalinga Vysya showed both protan (3) and deutan type (2) of colourblindness. Interestingly in Kalinga Vysya 2 females (1 deutan + 1 protan) also showed colourblindness.

The frequency of colourblindness in Arya Vysyas is compared with those of five earlier reports on Arya Vysyas (Ramachandraiah, 1960)

Table 1: Frequency of tasters and non-tasters among Arya Vysya, Kalinga Vysya and Thrivarnikas

Population	*N*	*No. and % of phenotype*		*Allele frequency*	
		Tasters	*Non-tasters*	*T*	*t*
Arya Vysya					
Male	114	82 (71.93)	32 (28.07)	0.4702	0.5298
Female	140	102 (72.86)	38 (27.14)	0.4790	0.5210
Total	254	184 (72.44)	70 (27.56)	0.4750	0.5250
Kalinga Vysya					
Male	122	107 (87.70)	15 (12.30)	0.6494	0.3506
Female	148	130 (87.84)	18 (12.16)	0.6513	0.3487
Total	270	237 (87.78)	33 (12.22)	0.6504	0.3496
Thrivarnika					
Male	48	33 (68.75)	15 (31.25)	0.4410	0.5590
Female	40	31 (77.50)	9 (22.50)	0.5257	0.4743
Total	88	64 (72.73)	24 (27.27)	0.4778	0.5222

Table 2: Frequency of Colourblindness among Arya Vysya, Kalinga Vysya and Thrivarnikas

Population	*N*	*Normal*	*Colourblind*	*Protan*	*Deutan*
Arya Vysya					
Male	112	108 (96.43)	4 (3.57)	0 (0.00)	4 (3.57)
Female	158	158 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)
Total	270	266 (98.52)	4 (1.48)	0 (0.00)	4 (0.00)
Kalinga Vysya					
Male	127	124 (97.64)	3 (2.36)	2 (1.57)	1 (0.79)
Female	157	155 (98.73)	2 (1.27)	1 (0.64)	1 (0.64)
Total	284	279 (98.24)	5 (1.76)	3 (1.06)	2 (0.70)
Thrivarnika					
Male	53	52 (98.11)	1 (1.89)	1 (1.89)	0 (0.00)
Female	47	47 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)
Total	100	99 (99.00)	1 (1.01)	1 (1. 01)	0 (0.00)

– 1.41%, Chakravartti et al., 1971 – 2.86%, Murty and Vijayalaxmi, 1974 – 0%, Gopalam, 1980 – 0.69% and Ramaswamy, 1984 – 4.74%. The present study Arya Vysyas with a frequency of 3.57% fall on the higher side of the range i.e., 0 – 4.74%.

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