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## TASTE-SENSITIVITY DETERMINATION AMONG THE PADHARS OF GUJARAT, INDIA

**ABSTRACT** — A PTC taste sensitivity of 200 Padhars of Surendranagar district of Gujarat has been presented in the present paper. Padhars are one of the tribal population of Gujarat numbering 9193 according to 1981 census.

It is revealed from the present result that the frequency of female tasters is 76% and non-tasters 24% and of male tasters is 72% and non tasters 28% among the Padhars. Highest percentage of tasters (54%) is in the female age-group of 15 years or below and lowest (3 %) tasters is in the female age-group 31 years or above. The sexual differences are observed to be statistically non-significant.

Further, the results of the present study have been compared with other tribal and caste populations of Western India.

**KEY WORDS:** Taste sensitivity — Gujarat India — Homogeneity test — *t*-gene frequency — Sex difference.

### INTRODUCTION

The name phenylthiocarbamide or P.T.C is synonymous with the chemical compound known as phenylthiourea. It is now well accepted that the

specific linkage  $\text{N} - \underset{\text{S}}{\underset{\text{C}}{\parallel}} -$  is responsible, in some

unknown way, for the dual taste perception of this compound. Other compounds possessing C.N.S. grouping also behave in a similar way. However few compounds of this group fail to exhibit this trend due to their relative insolubility in water and for that matter in saliva (Das, 1956).

It is now well established from numerous studies (Fox, 1932; Snyder, 1932; Blackeslee & Salmon, 1931; Blackeslee, 1932) that the physiological response of the taste to the P.T.C is a genetically controlled polymorphism and taste sensitivity to phenylthiocarbamide (P.T.C) is inherited as an autosomal dominant character.

Although this character is genetically controlled it is influenced by the age and sex of the individual.

Females are found to be more sensitive than males to the physiological response to P.T.C taste. Difference between the two sexes is more often than not found to be statistically significant in population samples (Hartmann, 1939; Falconer, 1947; Harris & Kalmus, 1949).

The taste sensitivity to phenylthiourea is at maxima in the younger age-groups. With the advance in age, the taste response deteriorates and there is a slow but gradual decline of the taste perception at the higher age group levels. The influence of age upon P.T.C taste threshold was investigated by Harris & Kalmus (1949).

To study the genetic structure of the populations, taste response to P.T.C offers another opportunity alongwith studies of other polymorphic characters. In view of the great diversity occurring in respect of taster-nontaster alleles in different population groups in different parts of the world, among major races of mankind, the studies of P.T.C taste character among population groups living in India, had become much more relevant (Das, 1966).

In India and outside India many tribal popula-

tions were investigated in respect of P.T.C taste dimorphism character viz. in India — Khasis (Miki et al. 1960; Das 1971, Jeswal, 1981); Toda (Buchi, 1961); Koli, Dubla, Dhanka, Gamit, Bhill (Vyas et al. 1962) etc. and outside India — Bantu of Kenya and Arabs (Allison, 1951); Tibetans (Bhalla, 1972) etc.

Sexual variation in tasting ability is sometimes apparent but not significant in different populations (Hartmann, 1939; Falconer, 1947; Harris & Kalmus 1949 and others).

Few earlier studies have tried to distinguish the caste populations occupying distinct positions in the caste hierarchy in terms of P.T.C taste phenotype characters (Deb & Shukla, 1981). Others were also investigating the application of individual taste difference towards P.T.C considering genetic characters (Das et al. 1963; Buchi, 1955; Lugg & Whyte, 1955).

For the present study the author has undertaken a study of P.T.C taste character among the Padhar, a schedule tribe population residing in the district Surendranagar, Gujarat and efforts are made to compare the results with the other available tribal and caste populations with special reference to Western India.

Padhar is one among the five primitive groups of Gujarat and third largest primitive tribe in the state. They are mainly concentrated in the eleven villages of Nalkantha region of Gujarat i.e. in the Surendranagar and Ahmedabad districts having 9193 populations according to 1981 census (Naik, 1984–85), of which 100 male & 100 female have been studied.

Linguistically Padhars are Indo-Aryan group of people in Gujarat. The word 'Padhar' means 'Pujari' and they represent themselves as the worshippers of 'Mata Hingal'. They have close resemblance with the Kolis of Nalkantha area in their physical structure, skin colour and also in their culture, religion, dress and food habits (Shah, 1968).

Padhars are economically backward and live below the poverty line. They are basically food gatherers. Newly they are engaged either in agriculture or in earth digging activities for which they migrate from place to place throughout the state. They are expert in Kyari-making, making of narrow elevation in the agricultural field.

MATERIAL AND METHOD

A sample of 200 unrelated individuals were tested for the P.T.C taste sensitivity. The study was carried out at Ranagarh village of Limbdi tehsil of Surendranagar district of Gujarat.

In the performance of the P.T.C taste of Padhar an attempt was made to exclude the related persons.

A stock solution was prepared containing 1.3 gms of phenylthiocarbomide in 1000 cc of boiled water. Plain water was used as blanks in between tests.

Among the 200 individuals tested, there were only two or three females who perceived a taste

expressed sour and other than bitter. Earlier this observation have been made by other researchers also (Blackeslee, 1932, Boyed & Boyed, 1937).

Calculation of frequency of the non-taster allele (t) the square root method has been used,  $t = \sqrt{\text{proportion of nontaster in sample and } T = 1 - t}$ .

The standard error has been calculated by  $\sqrt{1 - \frac{t^2}{4G}}$  where G = the total number tasted and it is also the taster gene frequency (T), (Ghosh, 1956).

RESULTS AND DISCUSSION

The distribution of taster — nontaster phenotypes alongwith their gene frequencies calculated for Padhar tribe of Gujarat are represented in the Table 1. It has been observed from Table 1 that the Padhar females show apparently higher frequency of taster (76.00%) than the males (72.00%) but non-taster (28.00%) is higher in males than the females (24.00%). The homogeneity test shows statistically non-significant (NS) value ( $\chi^2 = .416$ ). Among the Padhar non-taster (t) gene frequency is higher ( $0.5099 \pm 0.001$ ) than the taster (T) gene frequency ( $0.4901 \pm 0.001$ ).

P.T.C taste sensitivity covering the major three age groups (below 15, 16–30, 31 + above) among the Padhars have been shown in Table 2. Highest frequency of taster have been reported in the age group below-15 among both sexes, whereas highest nontaster frequency among the females of the same

TABLE 1. P.T.C Taste phenotypes and gene Frequencies in Padhars

Popula- tion	Taster	Non- taster	Total	Gene frequency
Male	No. 72 % 72.00	28 28.00	100 100.00	$T = 0.4901 \pm 0.001$ $t = 0.5099 \pm 0.001$
Female	No. 76 % 76.00	24 24.00	100 100.00	
Com- bined	No. 148 % 74.00	52 26.00	200 100.00	

Sexual Homogeneity  $\chi^2 = 0.416$ ; d.f. = 1, .50 > p > .30 (NS)

TABLE 2. Percentile occurrence of the Taste sensitivity age Groupwise among the Padhars

Age group	Male			Female		
	Taster	Non- taster	Total	Taster	Non- taster	Total
Below 15	43.00	14.00	57.00	54.00	21.00	75.00
16–30	17.90	7.00	24.90	19.00	2.00	21.00
31 + above	12.00	7.00	19.00	3.00	1.00	4.00
Total	72.00	28.00	100.00	76.00	24.00	100.00

age group. Apparently in the total Padhar population high frequency of taster is found among the female but high frequency of non-taster is prevalent among the male population.

Sexwise comparison of present study for P.T.C taste with some available Indian populations (Table 3) indicates that females show higher taster (T) percentage than males only with some exceptions viz. Konda Kammaras (Sudhakarbabu et al. 1984), Paren Gadaba, Ollaro Gadaba (Das & Mukherjee, 1964). The apparent sex difference among the Padhars is like in other tribals as some caste populations

studied so far has been mentioned in the Table-3. But it would not be possible on the basis of the present experimental results available so far to accept or to reject the hypothesis of the greater male non-taster than female (Falconer, 1947). Considering this hypothesis Stern (1950), Leguebe (1963) have also tried to evaluate the sex-differences among the world populations available so far in respect to P.T.C. tasting.

From the Table 4 it has been observed that the tribal population of Western India shows higher t-gene frequency ranging from 61% to 75% (Vyas

TABLE 3. Sex difference for P.T.C. taste among some available Indian populations

S. No. Populations	Sex	No.	Taster %	Non-taster %	Taster phenotype (T)	Reference
1. Padhar	M	100	72.00	28.00	O + > M	Present study
	F	100	76.00	24.00		
2. Charan	M	82	57.32	42.68	O + > M	Mukherjee, 1985
	F	73	61.64	38.36		
3. Baren Paroja	M	205	43.41	56.59	O + > M	Das et al. 1963
	F	204	49.51	50.49		
4. Konda Paroja	M	220	46.36	53.64	O + > M	Das, Mukherjee, 1964
	F	218	46.79	53.21		
5. Bado Gadaba	M	225	48.89	51.11	O + > M	Das et al. 1963
	F	214	51.40	48.60		
6. Padmaraj	M	136	71.32	28.68	O + > M	Ghosh, 1956
	F	133	73.68	26.32		
7. Paren Gadaba	M	217	48.85	51.15	M > O +	Das, Mukherjee, 1964
	F	222	45.50	54.50		
8. Ollaro Gadaba	M	213	47.89	52.11	M > O +	Das, Mukherjee, 1964
	F	219	47.03	52.97		
9. Mahar	M	229	44.98	55.02	O + > M	Das, et. al. 1961
	F	204	48.04	51.96		
10. Rieng	M	202	80.69	19.31	O + > M	Kumar et al. 1961
	F	199	86.93	13.09		
11. Bagdi	M	114	70.18	29.82	O + > M	Ghosh, 1956
	F	94	72.34	27.66		
12. Rashi Brahmin	M	277	67.51	32.49	O + > M	Das, 1956
	F	212	69.81	30.19		
13. Khyntian Khasis	M	150	88.66	11.33	O + > M	Jeswal, 1981
	F	150	90.66	9.33		
14. Koya Doras	M	252	69.84	30.16	O + > M	Sudhakarbabu et al. 1984
	F	253	73.12	26.88		
15. Konda Kammaras	M	215	72.56	27.44	M > O +	Sudhakarbabu et al. 1984
	F	198	54.55	45.45		
16. Gadaba	M	350	48.00	52.00	O + > M	Deka, Pattojoshi, 1975
	F	220	49.55	50.45		
17. Dhurwa	M	104	32.7	67.3	O + > M	Negi et al. 1982
	F	109	68.8	31.2		
18. Dorla	M	115	51.3	48.7	O + > M	Negi et al. 1982
	F	100	71.0	29.0		
19. Bhadra	M	110	67.3	32.7	O + > M	Negi et al. 1982
	F	101	72.3	27.7		
20. Rashi Brahmi	M	75	69.33	30.67	O + > M	Deb, Shukla, 1981
	F	75	74.67	25.33		
21. Barendra Brahmin	M	75	72.00	28.00	O + > M	Deb, Shukla, 1981
	F	75	73.33	26.67		
22. Kayastha	M	150	68.67	31.33	O + > M	Deb, Shukla, 1981
	F	150	71.33	28.67		

TABLE 4. Frequencies of non-taster phenotype and t-gene among some western indian population

Populations	No	Non-taster %	Non-taster t-gene %	Reference
<b>A. Tribals</b>				
1. Bhill	188	45.22	67.24	Vyas et al., 1962
2. Charan	155	40.65	63.75	Mukherjee, 1985
3. Dhanka	211	56.40	75.09	Vyas et al., 1962
4. Dhodia	83	42.17	64.93	Vyas et al., 1962
5. Dubla	207	44.41	67.38	Vyas et al., 1962
6. Gamit	200	53.50	73.14	Vyas et al., 1962
7. Koli	128	38.28	61.87	Vyas et al., 1962
8. Naika	78	46.16	67.94	Vyas et al., 1962
9. Talavia Dubla	206	44.17	66.46	Vyas et al., 1958
10. Rabari	118	42.37	65.09	Mukherjee, 1983
11. Padhar	200	26.00	50.99	Present Study
<b>B. Non-Tribals</b>				
Desath Rigvedi Brahman	98	36.70	60.58	Sanghvi et al., 1949
Desath Yaj Brahman	98	33.60	57.96	Sanghvi et al., 1949
Kokanasth Brahman	197	35.00	59.16	Sanghvi et al., 1949
Vednagar Nagar Brahman	199	26.60	51.57	Sanghvi et al., 1949
Audichi Brahman	198	37.37	67.13	Vyas et al., 1958
Kopal Vania	200	51.50	71.76	Vyas et al., 1958
Cutuchi Lohana	198	39.39	62.76	Vyas et al., 1958
Leva Patidar	199	32.66	57.15	Vyas et al., 1958
Chandra Senia Kayasth	200	46.50	68.19	Sanghvi et al., 1949
Bangi Harijan	195	44.10	66.41	Vyas et al., 1958

et al. 1958, 1962). But Padhar tribe (present study) shows quite a lower t-gene frequency (51%) than that of the other tribal populations of Western India studied so far. The low caste non-tribal populations of Gujarat show the same results like tribal populations regarding this P.T.C taste sensitivity i.e. above 60%. Rabari, Charan (Mukherjee, 1983, 1985), Dhodia, Bhill, Naika, Dubla (Vyas et al. 1962) of Gujarat tribe show similar non-taster t-gene frequency and Gamit, Dhanka (Vyas et al. 1962) show quite higher (73% to 75%) t-gene frequency in comparison to Padhar t-gene frequency (51%).

#### CONCLUSION

From the above discussions it has been concluded that Padhar female show higher taster percentage (76%) than males (24%), but sex differences are found to be statistically non-significant. Further in the lower age-group (below-15) high frequency of tasters is observed in both sexes (43% & 54%). Like other tribal populations of Gujarat, Padhar also follow the same line of Falconer's hypothesis where greater non-taster t-gene frequency among the males is represented.

#### ACKNOWLEDGEMENTS

I am grateful to the Director, Anthropological Survey of India, for the facilities provided to conduct this study. My thanks are due to Dr. Gopal Krishan for his suggestions, comments and for going through this paper.

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