

PREVALENCE OF TASTE BLINDNESS TO PHENYLTHIOCARBAMIDE IN PUNJAB

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Background: This study was carried out to find out the prevalence of taste blindness to phenylthiocarbamide (PTC) in healthy, young adults of Punjab Province in Pakistan. **Methods:** Out of total number of about 1250 students, six hundred students (315 males, 285 females) from Nishtar Medical College, Multan participated in the study. Their age was ranging between 18 to 23 years. One centimeter square filter paper, impregnated with 0.5% solution of PTC was given to the subjects and they were asked to chew the paper and to state the taste perceived. They were asked to spit out the chemical and rinse the mouth with water. Among 600 subjects, 18.6% were found taste blind for PTC. **Results:** Among males 23% and among females 14% were found non-taster to PTC. When analyzed on regional basis, all regions of Punjab were shown to have both tasters and non-tasters in about the same proportion. More non-tasters were found among males as compared with the females. **Conclusion:** So in Punjab, the ratio of non-tasters to PTC (18.6%) is more than the ratio in China (10%) and in Turkey (11.2%) but their ratio is less than those in the USA (30%).

Key words: Prevalence, taste blindness, phenylthiocarbamide.

INTRODUCTION

Taste and smell play a relatively unimportant role in the life of an individual. Nevertheless, loss of taste and smell may serve to identify a number of intra cranial and systemic disorders.¹ As taste threshold increases with age, abnormality in taste function may contribute to poor dietary intake in the elderly.² Forty five percent of postmenopausal women reported alteration in dietary habits especially preference of sweeter foods although no difference of taste sensation on tongue was noted.³

Bitter taste perception is a conserved chemical sense against the ingestion of poisonous substances in mammals.⁴ Without being the dominant taste sensation, bitter taste contributes to the complexity and enjoyment of beverages and foods. Recent studies have shown that humans possess a multitude of bitter taste receptors.⁵ Studies of sensitivity to the bitter tasting anti thyroid compound, phenylthiocarbamide (PTC) have shown this to be an inherited trait and non-taster status has been linked to a variety of medical disorders.⁶

The present study was designed to find out the percentage of non-tasters to PTC among normal, healthy, adult population of Punjab province in Pakistan.

MATERIAL AND METHODS

This study was carried out in the Department of Physiology, Nishtar Medical College, Multan, Pakistan during July 2005 to February 2006. Out of a total number of about 1250 students, only 600 students consented to participate in the study. Among them 315 were males and 285 were females. The age of study population ranged between 18-23 years.

Geographically District Multan is located in the middle of Punjab Province. Students admitted in Nishtar Medical College, Multan were from all parts of Punjab i.e. some areas being in the north of Multan and some in the South of Multan so we divided the study population into the following regional groups:

Multan District: Two Hundred and Twenty four students

Upper Punjab: One Hundred and Eleven students belonged to

Lower Punjab: One Hundred and Ninety Nine students

Out of Punjab: Sixty six students belonged to areas outside Punjab.

Subjects having a history of recent respiratory tract infection, drug abuse, history of head trauma or loss of consciousness or any other neurological disorder were excluded from the study.⁶

Personal information about the subjects was entered into a specially designed proforma. Methodology was simple i.e. a one centimeter square strip of filter paper impregnated with a 0.5% solution of PTC was used. The subjects were asked to chew the filter paper and to state the taste perceived.⁷ The subjects were asked to spit out the filter paper afterwards and rinse the mouth with water. The study population was divided into tasters and non-tasters according to their taste sensitivity. Taster and non-taster status was also entered into the proforma. Percentage of non-taster population among males, females, total population and in various regions of Punjab were calculated and presented in the form of tables.

RESULTS

Table 1 shows the percentage of non-tasters in the study population. Among the 600 subjects studied 112 (18.6%) were non-tasters and 488 (81.4%) were tasters to PTC. Among 315 males, non-tasters were 73(23%) and among 285 females, 39(14%) were non-tasters to PTC. Proportionately more males were seen to be non-tasters to PTC as compared with females.

Table 2 shows region wise distribution of study population. Out of 224 subjects from Multan region, 18.30% were non-tasters. From upper Punjab 19.81%, Lower Punjab 18.95% and out of Punjab group 18.18% population was shown to be non-taster to PTC.

Table – 1: Tasters and Non-tasters in Study Population

Population	Tasters (%)	Non-tasters (%)
Total (n=600)	488 (81.33%)	112 (18.6%)
Males (n=315)	242 (77%)	73 (23%)
Females (n=285)	246 (86%)	39 (14%)

Table - 2 : Region-wise Distribution of Study Population

Regional Groups	Non-tasters (%)	Tasters (%)
Multan (n=224)	41 (81.7%)	183 (18.30%)
Upper Punjab (n=111)	22 (80.19%)	89 (19.81%)
Lower Punjab (n=199)	37 (81.41%)	162 (18.59%)
Out of Punjab (n=66)	12 (81.82%)	54 (18.18%)

DISCUSSION

In 1931, Arthur L. Fox was synthesizing a compound called phenylthiocarbamide (PTC), when some of it blew into the air. A colleague who inhaled the PTC dust commented on the terrible bitter taste, but Fox tasted nothing. This sparked early research by Fox on PTC tasting test.⁸

The ability or inability to taste the PTC is a classic inherited trait that has long been known to vary in human population. This trait is of genetic, epidemiologic and evolutionary interest and has been shown to correlate with a number of dietary preferences and thus have important implications for human health.⁹⁻¹¹

In our study, 18.6% of the population was found to be non-taster to PTC. In China, the frequency of the non-tasters was estimated to be about ten percent.¹² In Turkey, Bokesoy and Togan (1987) investigated a group of 366 medical students. They found the incidence of non-tasters to be 11.2

percent.¹³ In America non-taster population was estimated to be 30 percent.^{6,14,15} So, in Punjab Province, percentage of non-tasters to P.T.C is more than in China and Turkey and less than in America.

We found 23% of males and 14% of females as non-tasters in the study population. Naqvi et al (1991) showed 48 percent of male population to be non-taster to PTC at Faisalabad, Pakistan.¹⁶ Faisalabad is a district in upper Punjab. We found 19.81% non-tasters in our upper Punjab Group (Table 2). Our findings are significantly lower than those mentioned by Naqvi et al.¹⁶

In our study population, the ratio of non-tasters among males (23%) was more as compared with the females (14%). Our findings are comparable with the findings of Bokesoy et al in Turkey, who also showed more non-tasters among males as compared with the females.¹³ By reviewing early PTC studies, Bartoshuk et al also showed a lower percentage of non-tasters among females.¹⁷

In our study, all areas of Punjab showed almost a similar frequency of non-tasters. Naqvi et al showed that each caste in Faisalabad was having taster and non-taster population¹⁶. All populations tested to date contain some people who can and some people who can not taste PTC⁷. In this respect our findings are in total conformity with findings of other workers.

Genetic approaches are rapidly yielding new information about our sense of taste. Our understanding of bitter taste has increased considerably by the discovery and study of T2R family of taste receptor genes, their genetic linkage and positional cloning studies and from studies on inherited variation in the ability to taste phenylthiocarbamide (PTC). Sweet and Uma mi tastes are mediated by T1R receptors and are being studied actively. Salty and sour tastes are still poorly studied in genetic terms and represent opportunities for the future research¹⁸.

So we conclude that 18.6% of the general population in Punjab, Pakistan is non-taster to PTC. More males are non-tasters as compared with females. All areas of Punjab have almost similar frequency of non-tasters.

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