A Concentrate on Phenyl thiocarbamide (PTC) Tasting and Secretor Status among Individuals of Tarn Taran

Harpreet Singh, Prof. R.K Gupta

Assistant Professor, Department of Hotel Management, Guru Nanak Dev University, Amritsar / Research Scholar,Department of Management, Maharaja Agrasen University, Baddi, HP
harpreet.dth@gndu.ac.in
Vice Chancellor, Maharaja Agrasen University, Baddi, HP
Prof. Prashant Kumar Gautam, Professor, UIHTM, Panjab University, Chandigarh

Abstract

This study is anticipated to investigate Punjab state residents' PTC tasting abilities. A succession of assessed PTC paper strip centralizations were tried on 84 participants, including 34 females and 47 males. The review's goal was to determine how PTC testers and non-testers were distributed among the members.

Hereditary traits offer some advantages over anthropometric ones, including the ability to manipulate components of the perception of the human population. Humanity can be categorised and evaluated according to hereditary traits that vary in their recurrence between populations. To understand human diversity, polymorphic hereditary markers have been extensively used.

According to the investigation's findings and the test's results, different populations in Pool of Tarn Taran have different levels of aversion to PTC.

Keywords: *Tarn Taran, PTC, genetic variation, gene frequency*

DOI: 10.48047/ecb/2022.11.11.43

INTRODUCTION

Hussain et al. (2014) emphasise that the examination of extensive populations, namely the frequencies of inherent markers and the factors that impact changes in frequency through time, sheds light on the genetic characteristics of the human population. The phenomenon of perceiving the taste of Phenylthiocarbamide (PTC), a distinctive compound that elicits either an intensely bitter or tasteless sensation (Kim and Drayna, 2004; Merritt et al., 2008), represents a genetic marker that is highly valuable for studying a genetically determined trait in humans. The manufacturers assert that all individuals tested demonstrate a variation in their ability to perceive PTC, which they argue serves as a prominent and noteworthy example of a trait that displays substantial diversity among human populations. This trait has been acknowledged as a significant genetic marker in the examination of an individual's genetic composition. The initial identification of the PTC taste threshold was serendipitous, as documented by Fox in 1932. Subsequent inquiries have unveiled the existence of two distinct cohorts within the human population, namely analyzers and non-analyzers. Whether an individual is classified as an analyst or not, based on existing research, is contingent upon their personality traits (Guo & Reed, 2001). The capacity to perceive phenylthiocarbamide (PTC) taste is a highly intricate characteristic of an individual, and the genetic diversity in the TAS2R38 trait (the discerning taste receptor trait) situated at position 34 (7q34) on chromosome 7 has not yet been definitively linked to the range of phenotypes (Reed et al., 1999; Drayna, 2005). In a general sense, the allele associated with the ability to taste phenylthiocarbamide (PTC) exhibits a higher level of prevalence and effectiveness compared to the allele associated with the inability to taste PTC. According to Guo and Reed (2001) and Drayna (2005), around 70% of the general population possesses the ability to taste PTC, while the remaining 30% exhibit a lack of this ability.

According to Wooding et al. (2004) and Fareed et al. (2012), there is observed variation in the phenotypic recurrence of PTC testers and non-testers among different groups worldwide, which is influenced by factors such as identity and geography. According to the authors, a significant proportion of individuals across various populations possess the ability to taste, but the prevalence of individuals lacking this ability exhibits substantial variation. This variation ranges from approximately 5% in sub-Saharan Africa to as high as 40% in India. Kim and Drayna (2004) assert that this particular variant is commonly employed and considered a crucial instrument in the examination of anthropological and genetic diversity. Hussain et al. (2014) and Fareed et al. (2012) have previously conducted research on this topic. Previous studies have demonstrated a correlation between the diversity of dietary adaptations and the capacity to perceive phenylthiocarbamide (PTC) taste, implying potential health implications (Bartoshuk et al., 1994; Wooding et al., 2004; Campbell et al., 2012). Based on the findings of these studies, it has been observed that differences in the taste perception of phenylthiocarbamide (PTC) can potentially influence individuals' dietary preferences for substances that are known to significantly affect human health. Moreover, these variations in taste perception may be associated with an increased susceptibility to various illnesses, both diet-related (such as cancer, hypertension, jungle fever, gastritis) and non-diet-related, even those not directly related to dietary factors. Hence, an examination of this phenotypic trait would have implications for overall health and the avoidance of diseases. Moreover, the human capacity to perceive bitter tastes serves as a protective mechanism against the ingestion of potentially dangerous drugs that often exhibit unpleasant flavours (Drewnowski& Rock, 1995; Tepper, 2000; Kim &Drayna, 2004; Wooding et al., 2004; Iqbal et al., 2006).

Although there is limited awareness regarding the variability of human PTC taste capacity and its potential association with dietary diversity, the concept of PTC tasting capacity diversity and its hereditary determination in ethnically diverse populations with different diets, particularly from Africa, remains understudied (Campbell et al., 2012). Insufficient past study exists regarding the variations in the ability to taste PTC and the perception of determination among the numerous ethnic groups in Ethiopia, a country characterised by its heterogeneous population and dietary shifts. Consequently, this study represents the initial endeavour to examine the utilisation of phenotypic variability in relation to the capacity to perceive PTC taste and the accompanying implications within a specific group of individuals from Ethiopia. This study aimed to investigate the correlation between PTC taste sensitivity and various factors such as food preferences, illnesses, nationality, and ecological characteristics. Additionally, the study aimed to examine the heritability of PTC taste sensitivity as a potential marker for identifying differences in orientation and individual variations among the student population at Jimma College. The ongoing assessment is essential in order to provide pattern data for the inquiry on PTC taste. Primarily, it is crucial to ascertain whether the distribution patterns of persons who have undergone testing and those who have not, within the selected Ethiopian population, are comparable to those observed in the global population. Additionally, this study investigates the potential differences in PTC taste perception between males and females, specifically examining whether there are variations in their ability to detect PTC or if their thresholds for PTC flavour recognition are comparable or divergent. Furthermore, it will be crucial to assess the potential impact of a group's food preferences on their capacity to perceive the taste of phenylthiocarbamide (PTC), as well as to investigate the potential correlation between their dietary habits and the health conditions reported by the members of the group.

The variability and genetic basis of PTC taste capacity in ethnically different people with varied dietary choices, notably from Africa, remains largely unknown (Campbell et al., 2012). Moreover, Ethiopia, a country characterised by its heterogeneous ethnic population and varied culinary preferences, has a dearth of previous research examining potential variations in the capacity to taste phenylthiocarbamide (PTC) and its correlation with food choices. The objective of the current study was to examine the distribution of phenotypic variability in the capacity to perceive the taste of phenylthiocarbamide (PTC) and the accompanying challenges among a specific group of individuals from Ethiopia (Iqbal et al., 2006). The objective of this study was to investigate the correlation between the ability to taste phenylthiocarbamide (PTC) and various factors such as food preferences, infections, nationality, and certain inherent traits. This research aimed to determine whether the recurrence of PTC tasting capacity could serve as an indicator for identifying orientation and personal differences within the population of Jimma College students.

This analysis holds significance in collecting pattern data for the PTC taste study and aims to ascertain whether the frequency of PTC taste testers and non-testers among selected Ethiopian individuals is comparable to that of the overall population. Moreover, this study examines whether there are similarities or differences in the recognition thresholds for tasting phenylthiocarbamide (PTC) across males and females, and if there are any unanticipated variations in the ability to taste PTC. The review also aims to assess the potential impact of a group's food preferences on their ability to perceive the taste of PTC, as well as investigate the potential correlation between their dietary habits and the prevalence of illnesses among the participants of the review (Campbell et al., 2012).

MATERIALS AND METHODS

The study populations

From September to November 2022, 84 people in Pool Tarn Taran City were the target of the current review. Each participant completed a survey about their self-identified nationality, language, district, diet, and general welfare before giving their fully informed consent to participate in the study. The review participants were arranged into self-declared provincial groups. To illustrate the flavour of financially accessible PTC-impregnated test papers, chosen typical, overweight, and fat up-and-comers were approached. Members maintained the paper between their tongues while they ran water through their mouths. They were asked, "Do you taste anything?" after sampling. In the unlikely event that their response was negative, they were labelled non-testers, which means that PTC considered their taste to be unimportant. They were referred to as testers if they said it tasted awful or harsh. In the unlikely event that they gave incorrect answers, they were later tested again.

Sampling strategies

A hereditary inspecting method was employed in the review. The number of tests was decided upon taking into account the review participants' willingness to participate, accessibility, available time, and cost given that the review involved human subjects. moreover, not the computation-intensive, quantifiable examination approach. The source populace is thought to be one of the numerous reproduce populations that may have descended from related organiser populations. The aggregates of the duplicate populations would differ even though the capacities of development are somewhat identical because distinct attributes might be conveyed from one age to the next for each reproduce at each locus. There would thus be differences between these populations since hereditary testing distinguishes these populations from all others that derive from the organiser populace. The aggregate data that would be produced from these example sizes would enable the capture of the essential variety of the chosen populace and is agent, as suggested by the Public Foundation of Sciences' (NAS, 1997) portrayal of the standard of hereditary inspecting. In this review, every ethnic group was treated as a population.

Exclusion-inclusion criteria

Individuals from Tarn Taran city, ranging in age from 17 to 70, were study subjects. Before obtaining consent, each participant's age was questioned during recruitment. First, compared to younger age groups, study participants in this age range were better able to offer their full consent to participate in the study and provide more accurate information about their own dietary preferences and self-perceived associated disorders. The second explanation is that people in this age range are more able to distinguish bitter flavour from other taste modalities than people who are older (>70), whose ability to do so decreases with age. The projected false positives would be greatly reduced as a result, especially among younger and older age groups.

PTC taste testing

To determine if they had the necessary attributes to taste PTC or not, a PTC trial was conducted. The Harris and Kalmus (1949) methods were followed when using a conventional sequential weakening strategy to assess the PTC tester and non-tester averages.

A simple test called PTC paper is used to determine whether a person tests or does not test for the unpleasant substance phenylthiocarbamide (PTC). A little piece of channel paper that has been impregnated with the chemical compound PTC is known as PTC paper.

When a person places a PTC paper strip on their tongue, the paper's PTC particles disintegrate in their saliva and make contact with taste receptors in the taste buds. PTC testers typically describe the taste as harsh or horrifying, whereas non-testers may describe a mild flavour.

The gene encoding the unpleasant taste receptor TAS2R38, which is responsible for differentiating PTC and related chemicals, does not alone determine one's ability to taste. The TAS2R38 quality can be found in the "tester" and "non-tester" typical structural types, and the ability to taste PTC is learned in a straightforward prevailing passive example.

PTC paper testing is frequently used in science and hereditary quality courses to introduce students to the concept of hereditary diversity and heritage. It is also used in research studies to look into the idea that taste perception is inherited and to look into the relationship between taste perception and foodpreferences.

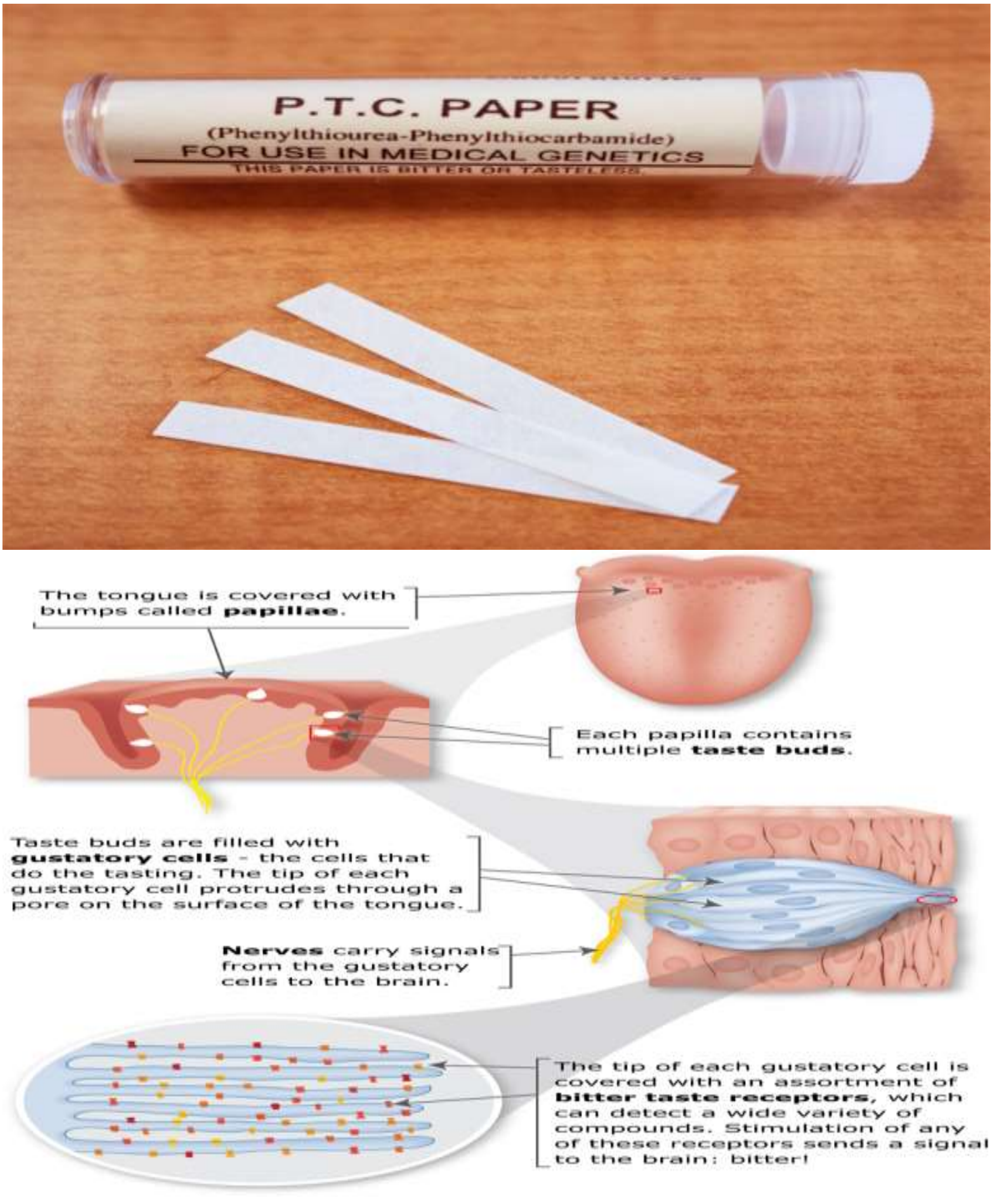

Figure - 1

Source- https://learn.genetics.utah.edu/content/basics/ptc

STATISTICAL METHODS AND DATA ANALYSIS

Every person's aggregate was kept track of for PTC taste capacity. Using SPSS (Measurable Bundle for the Sociologies, SPSS Inc., IBM SPSS measures) version 20.0 for Windows, the phenotypic recurrence transmission of non-testers and testers' persons in the review populations was evaluated. The degree of correlation between PTC taste capacity, dietary preferences, and self-announced diseases in the review populations was determined using the T-test and ANOVA testing. The bootstrap method, which compares observed values against predictions, was used to determine the real meaning of these characteristics (Excoffier et al., 2002). The Tough Weinberg method was used to determine the genotype and allele frequencies (Mourant et al. 1976).

RESULTS

PTC status		N	Mean	Std. Deviation	Std. Error Mean
Gender	Taster	47	1.36	.486	.071
	Non-Taster	34	1.38	.493	.085
Age	Taster	47	1.91	1.792	.261
	Non-Taster	34	1.76	1.327	.228
Secretor status					
Gender	Secretors	52	1.33	.474	.066
	Non secretors	29	1.45	.506	.094
Age	Secretors	52	2.00	1.782	.247
	Non secretors	29	1.59	1.211	.225

Figure - 2

Table : Group statistics

An overall enlightening file table above shows the conveyance of test size, mean worth, standard deviation and standard mean mistake among testers/non testers and secretors/non secretors. The information is further sub separated by orientation and mature in each to the classes. All out testers in both orientation and age bunch (17-70 years) are n=47 with meanworth = 1.36 and 1.91 separately, and remaining n=34 are non-testers. Absolute secretors in both orientation and age bunch (17-70 years) are n=52 with mean worth = 1.33 and 2.00 separately, and remaining n=29 are non-secretors.

Para meters	Age	PTC status	Secretor	City

Translation of connection table underneath Factual parametric trial of Pearson item relationship was applied between various boundaries including: PTC status, secretor status, age gathering and city. The information was dissected orientation wise into male and female classes. The relationship measurements was performed on (n=81) tests and the perceptions showed that main a slight connection exists between PTC (testers/non testers) and secretor (secretors/non secretors) status people, the relationship coefficient is higher in guys (N=51) (r=0.722, p<0.01) than in females (N=30) (r=0.457, p<0.05).

Table: The statistical analysis (correlation test)

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

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					status	
Male	Age	Pearson Correlation Sig. (2-tailed) N	1 - 51	.076 .598 51	-.049 .598 51	.563** .000 51
	PTC status	Pearson Correlation Sig. (2-tailed) N	. .076 .598 51	1 - 51	.722** .000 51	-.169 .236 51
	Secretor status	Pearson Correlation Sig. (2-tailed) N	-.049 .736 51	.722** .000 51	1 - 51	-.137 .339 51
	City	Pearson Correlation Sig. (2-tailed) N	.563** .000 51	-.169 .236 51	-.137 .339 51	1 - 51
Femal e	Age	Pearson Correlation Sig. (2-tailed) N	1 - 30	-.082 .668 30	-.148 .436 30	.036 .850 30
	PTC status	Pearson Correlation Sig. (2-tailed) N	-.082 .668 30	1 - 30	.457* .011 30	.036 .850 30
	Secretor status	Pearson Correlation Sig. (2-tailed) N	-.148 .436 30	.457* .011 30	1 - 30	. .036 .850 30
	City	Pearson Correlation Sig. (2-tailed) N	-.035 .854 30	.036 .850 30	.036 .850 30	1 - 30

Figure – 3

Pair	Mean	SD	SEE	95% confidence interval of difference		t	df	Sig.
				Lower	Upper			
Gender-PTC status	.000	.699	.075	-.149	.149	.000	86	1.000
Gender-Secretor status	-.057	.653	.070	-.197	.082	-.820	86	.414

Age-PTC status	-.379	1.366	.146	-.670	-.088	-2.590	86	.011
Age-Secretor status	-.437	1.412	.151	-.738	-.136	-2.886	86	.005

Figure – 4

Table: Paired sample t-test

A Matched examples t-test was directed to decide the impact of orientation and progress in years on a PTC and secretor status of a person. The outcomes demonstrate a non-massive distinction among orientation and mature on a PTC and secretor status. Just critical class noticed is age-secretor status (M=-.437; SD=1.412) [t(- 2.886) , p = .005].

The 95% certainty time period contrast between the means didn't show a distinction between the method for the examples. We, consequently, neglect to dismiss the invalid speculation that there is no contrast between the means and reason that there isn't an impact of orientation and progress in years on PTC and secretor status, besides in the event old enough secretor status.

Parameters-Gender	Classification	Sum of Squares	df	Mean Square	F	Sig.
PTC status	Between Groups	.001	1	.001	.002	.964
	Within Groups	21.103	85	.248		
	Total	21.103	86			
Secretor status	Between Groups	.224	1	.224	.963	.329
	Within Groups	19.730	85	.232		
	Total	19.954	86			
Parameters- Age	Classification	Sum of Squares	df	Mean Square	F	Sig.
PTC status	Between Groups	.829	6	.138	.545	.773
	Within Groups	20.275	80	.253		
	Total	21.103	86			
Secretor status	Between Groups	1.884	6	.314	1.391	.229
	Within Groups	18.070	80	.226		
	Total	19.954	86			

Figure - 5

Table: Results of ANOVA test

One way Anova was performed to contrast the mean with two distinct classifications to lay out measurable contrast between the gatherings. Orientation and age were chosen as free factors, though PTC status and secretor status were taken as reliant factors. The general F values for testers/non testers and secretors/non secretors under orientation class are 0.002(p= .964) and .963 (p=.329) separately. The general F values for testers/non testers and secretors/non secretors under age class are 0.545(p= .773) and 1.391 (p=.229) separately. None of the reliant factors created critical outcomes as on the grounds that no less than one gathering has less than two cases.

Discussion

The provided data includes the mean, standard deviation, and standard error of the mean for the PTC status in relation to maturity and age as well as the secretor status in relation to maturity and age.

PTC status in perspective of orientation had a mean of 1.36 and a standard deviation of 0.486 for testers, and a mean of 1.38 and a standard deviation of 0.493 for non-testers. The average mean error is 0.071 for testers and 0.085 for non-testers. These findings suggest that, given orientation, there is a little difference in PTC status between testers and non-testers.

PTC status in light old enough has a mean of 1.91 and a standard deviation of 1.792 for testers and a mean of 1.76 and a standard deviation of 1.327 for non-testers. For testers, the standard error of the mean is 0.261, whereas for non-testers, it is 0.228. These findings suggest that the PTC status difference between testers and non-testers in view old enough is slightly larger.

The average secretor status in terms of orientation is 1.33 with a standard deviation of 0.474, whereas the average non-secretor status is 1.45 with a standard deviation of 0.506. For secretors, the standard error of the mean is 0.066, whereas for non-secretors, it is 0.094. According to these findings, there may be some variation in PTC status between secretors and non-secretors depending on orientation.

Secretor status in light old enough has a mean of 2.00 and a standard deviation of 1.782 for secretors, and a mean of 1.59 and a standard deviation of 1.211 for non-secretors. For secretors, the standard error of the mean is 0.247, whereas for non-secretors, it is 0.225. These findings suggest that secretors and non-secretors in view old enough have slightly different PTC statuses.

Rundown of the data reveals that there aren't many noticeable differences between secretor and PTC statuses in terms of orientation and age as well as progress in years.

CONCLUSION:

In light of age and orientation, the information provided in the review suggests that there are subtle distinctions between PTC and secretor status. Orientation has little bearing on the distinction in PTC status between testers and non-testers, although the distinction in perspective old enough is more clearly defined. Similar to how there is little difference in secretor status between the sexes, there is a slight difference in view old enough. These findings are consistent with earlier research on the inherited traits of taste discrimination and the history of PTC and secretor status. It should be noted that although the differences found in this study are genuinely significant, they are modest and may not have significant functional implications for taste discrimination or food preferences. The relationship between PTC and secretor status, as well as other factors that could affect taste perception and dietary choices, has to be further investigated.

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