PHENYLTHIOCARBAMIDE (PTC) TASTE SENSITIVITY AND BLOOD GROUPS IN A STUDENTS AT BAHAWALPUR

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ABSTRACT

Background: Phenylthiocarbamide (PTC) taste sensitivity is a genetically controlled trait. ABO and Rh blood groups are also inherited traits. **Objectives:** We conducted this study to find out any epistatic relationship between the expression of the PTC-gene and the blood groups genes. **Patients and Method:** Among the 739 students, who had given informed consent, 286 were males and 453 were females. Each participant underwent a simple taste test in which a drop of freshly prepared, 0.5% solution of PTC was placed on the dorsum of tongue and the participant was asked to mention the taste perceived. After this he/she was asked to spit out the chemical and to rinse the mouth with water. To find out blood groups, we mixed a drop of blood with antisera i-e anti A, anti B and anti D on a glass slide. By examining for agglutination of RBC's, we determined the ABO and Rh blood type of the participants. **Results:** The percentage of blood group 'A' among the non-tasters is 22.16 %. Blood group 'B' is 37.11 % 'AB' 9.79 %; Blood group 'O' 30.92 %, Rh positive blood group 87.11 % and Rh-negative blood group 12.89 % among the non-tasters. There is no significant ($p>0.05$) difference between percentages of non-taster males (27.27 %) and non-taster females (25.66 %). **Conclusion:** There is no epistatic relationship between PTC gene and blood group genes in our population.

Key words: Phenylthiocarbamide taste sensitivity, blood groups, epistasis.

INTRODUCTION

The sense of taste is a powerful predictor of food selection. Human infants show an innate pleasure response to sweet taste, but dislike and reject bitter-tasting foods[1]. Phenylthio-carbamide (PTC) is a bitter tasting, harmless compound[2], which is a member of a class of compounds known as "thioureas." These compounds carry the chemical group N-C=S, which is responsible for their characteristic bitter taste.[3,4]

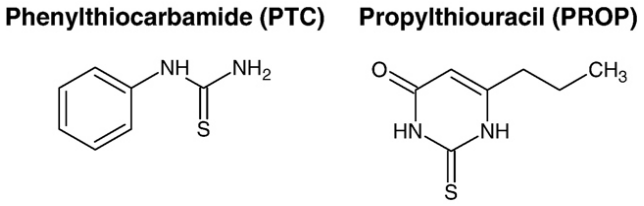

Fig.1: Chemical Structure of PTC and PROP

PTC taste sensitivity is a genetically controlled trait. The allele for the ability to taste PTC is dominant over the non-taster allele. Many workers have reported that human populations show a tremendous variation in the frequency of tasters which ranges from 10% to 98%.[5] Identification of PTC gene has provided the basis for a new, integrative investigation of PTC taste sensitivity.[6] ABO and Rh blood groups are also inherited traits and their genes are located on chromosome 9 and chromosome 1 respectively[7]. Research has shown that various phenotypes are more, or less, likely to suffer a variety of diseases. For example, those with type O blood group are the most susceptible to cholera, while those with type AB blood group are resistant.[8] Both are genetic markers and are very extensively studied in human populations.[9,10] We tried to find out any epistatic relationship between the expression of the PTC-gene and the blood group genes.

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PATIENTS & METHODS

This study was carried out, from March, 2009 to February, 2010, in the Department of Physiology, Quaid-e-Azam Medical College, Bahawalpur.

Participants

Out of about 1200 students, only 739 students consented to participate in the study. Among them 286 were males and 453 were females. The age of study population, ranged between 18-24 years. All the participants were apparently healthy, normal individuals. Any participant having ear, nose, and throat pathology or taking drugs such as captopril, penicillamine and drugs containing sulph-hydryl group,[11] was excluded from the study.

Participants were asked not to eat or drink anything one hour prior to coming for the taste test. We used

0.5 % PTC solution for the taste test, as it is difficult to taste PTC paper with a dry mouth.[12] Each participant underwent a simple taste test, in which a drop of freshly prepared 0.5% solution of PTC was placed on the dorsum of the tongue and the participant was asked to mention the taste perceived. After the test, the participant was asked to spit out the chemical and to rinse the mouth with water.

To determine the blood groups, we mixed a drop of blood with antisera i-e anti A, anti B and anti D on a glass slide. By examining for agglutination of RBC's, we determined the ABO and Rh blood type of the participants.

All the personal information and results of the taste test were recorded on a proforma. All the proformas were preserved and analyzed at the end of the data collection phase. Participants were divided into tasters and non-tasters on the basis of PTC taste test. Tasters and non-tasters were further subdivided according to their blood groups. The difference between the non-tasters in each blood group was statistically analyzed and compared with the general population. Significance of difference was found by using the Chi-square test.

RESULTS

Among the 739 students who participated in this study, 286 were male and 453 were female. Age of study subjects ranged from 18-24 years. Table I shows the gender wise distribution of tasters and non tasters among the study population. Out of 739 participants, 545 (73.75 %) were tasters and 194 were non-tasters (26.25 %). Among 286 males, 78 (27.27 %) were non-tasters and among 453 females, 116 (25.66 %) were non-tasters.

Table I: Gender wise distribution of tasters and Non-tasters among the study population. (N=739)

Gender	Taster to PTC (n=545)	Non-Taster to PTC (n=194) 26.25 %
Males (n=286)	208	78 (27.27 %)
Females (n=453)	337	116 (25.66%)

Table II shows the comparison of frequencies of blood groups between PTC non-tasters and the general population. It is evident from the results that the percentages of various ABO blood groups and Rh blood groups among the non-tasters are not significantly ($p>0.05$) different from the percentages among the general population. The percentage of blood group 'A' among the non-tasters is 22.16 %. Blood group 'B' is 37.11 % 'AB' 9.79 %; Blood group 'O' 30.92 % Rh positive blood group 87.11 % and Rh-negative blood group 12.89 % among the non-tasters.

Table II: Frequencies of blood groups among PTC Non-tasters

Blood Groups	Non-Tasters (n=194)
A	22.16 %
B	37.11 %
AB	9.79 %
O	30.92 %
Rh-Positive	87.11 %
Rh-Negative	12.89 %

DISCUSSION

Identification of gene-gene and/or gene-environment interaction is one of the most important and challenging topics in human biology. PTC taste sensitivity and blood group polymorphism were very extensively studied in humans separately. We tried to find out any epistatic relationship between the PTC gene and blood group genes. Epistasis is the study of phenotypic interaction of non-allelic genes.[13]

Our results, in table 1, reveal that there is non-significant ($p>0.05$) difference between percentages of non-taster males (27.27 %) and non-taster females (25.66 %). These findings are different from those of Tehseen Iqbal et al (2006)[14] and Gul Afshan et al (2009)[15] who showed that the percentages of non-tasters in males and females were significantly ($p<0.05$) different (23 % versus 14 % and 20 % versus 13.5 %, respectively).

In our study the frequency of blood groups in PTC non-tasters has the same order, i.e. B>O>A>AB, as in the general population.[16] This finding is supported by Bhatkar et al (1989), who reached a similar result in their study, ie. There is no significant relation between the ability to taste PTC and the blood groups.[17] Findings of Parveen et al (1990) are different from our study, which showed that the

different from our study, which showed that the percentage of non-tasters was more in blood group 'B' and 'O'.[18]

So, with the help of our study, we can say that although PTC taste sensitivity is a genetically controlled trait, no major link with gender and blood group was noticed in our population (study sample).

CONCLUSION

Our study suggests that there is no epistatic relationship between PTC gene and the blood group genes in our population.

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