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INCIDENCE OF P.T.C. TASTE SENSITIVITY AND THRESHOLD IN KASHMIRI POPULATION

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Abstract : Taste sensitivity and threshold of Phenylthiourea (PTC) was determined in 800 individuals of Kashmir who form a distinct ethnic group. Correlation, if any, with age, sex, blood group, pH of Saliva, or smoking habits was investigated.

The taste sensitivity of P.T.C. increased with advancing age. The percentage of non-tasters was more in blood group 'B' & 'O'. However, no correlation was observed as far as sex, pH of saliva and smoking habits were concerned.

Key words: tasters sensitivity non-tasters threshold P.T.C. blood groups pH of saliva

INTRODUCTION

The sensation of taste is evoked by receptors located in taste buds. It serves to make man's life more pleasurable. Secondarily, it helps the individual to distinguish nonedible and harmful foods from edible ones. In adults the sensation is confined to the dorsal surface of the tongue, the soft palate, the epiglottis and the begining of the pharynx. It has been reported that salt and acid taste are concerned with environment and safety, whereas bitter and sweet tastes are concerned with nutrition. Total absence of taste has not been reported so far. However, taste deficiencies for some synthetic organic chemical substances particularly of the phenylurea group have been found.

Fox (1) was the first to demonstrate that not all the individuals can recognize the bitter taste of Phenylthiocarbamide (P.T.C.). Those who could taste are designated as "Tasters" and those who cannot as "Non-Tasters". Subsequently, it was established that the ability to taste the bitterness of P.T.C. is genetically determined and the frequency differs from one ethnic group to the other (2).

The present study was undertaken to find the incidence of the sensitivity to P.T.C. and the threshold concentration required to elicit the bitter taste in Kashmiri population which forms a distinct enhnic group. An attempt has also been made to find a correlation between taste sensitivity and reaction of the saliva, blood groups and smoking. The subjects were also tested for sensitivity to quinine to find out whether the non-tasters to P.T.C. were insensitive to quinine, which is also a bitter substance.

METHODS

Eight hundred normal individuals of both sexes in the age group of 12-45 years were examined. Most of the subjects were medical students. A short history was taken including name, age, sex and smoking habits. All the subjects were given a thorough general and systemic clinical examination to exclude any pathology.

The taste sensitivity to P.T.C. was determined by the method of Harris and Kalmus (3). A stock solution of P.T.C. (10.13%) was prepared in boiled tap water with pH adjusted to 7.0. Serial dilutions in decreasing concentration were made and stored in separate well stoppered bottles. The bottles were marked No: 1 to 14. A blank containing ordinary tap water was also set-up and marked as No: 15. The respective concentration of various solutions is shown in Table I.

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Quinine solution was prepared by dissolving quinine sulphate in ordinary tap water untill saturation.

In order to determine the sensitivity to P.T.C. two or three drops of the P.T.C. solution were placed on the back of the tongue, starting from solution No:15. The subject was requested to swallow the solution to ensure adequate stimulation of the taste buds. The procedure was repeated with other solutions in the descending order i.e from less concentrated solution to more concentrated ones till the person noticed the difference in taste. This point was taken as the threshold for the individual.

All the subjects were also tested with quinine solutions. 2-3 drops of this solution were put on the back of the tongue and their tasting ability to quinine was noticed. Besides the taste sensitivity, blood group, pH of saliva of all the subjects were determined. The blood group was examined by the slide agglulination technique using the corresponding antisera for ABO groups and Anti D for Rhesus typing (Ethnor Antisera Ltd., Bombay).

The reaction of saliva was determined by a full range (1-14) of pH strips (Waterman, B.D.H.).

RESULTS AND DISCUSSION

Anthropological studies have revealed that many physiological parameters such as the inheritance of blood group substances, abnormal hemoglobins are related to ethnic origin. Likewise, certain organic chemical substances especially of synthetic nature like P.T.C. have been shown to exhibit racial variations with regard to their ability to evoke a taste sensation.

In the present study the subjects were divided into two groups, namely, Tasters and Non-Tasters those who tasted P.T.C. from solution No: 14 to solution No:5 and those who could not taste P.T.C. respectively.

Our present study revealed a low frequency of non-tasters i.e 11.75%, which as reported in the literature is a characteristic feature of most of the mongoloid population (4,5,6). However, studies conducted by others (7,8,9) show high incidence of non-tasters. No explanation has been given by any of the authors to explain these wide differences in the results.

Sex: In the present study the incidence of non-tasters was more in females, but, when the total number of tasters was considered, it was noticed that the females were more sensitive to the P.T.C. than males. Similar results were reported by other workers (3,10,11,12). However, a few workers reported a low incidence of non-tasters in females (13,14).

Age : Age related changes for sensitivity to P.T.C. were observed in the present work. It was inferred that as age advances, the sensitivity to P.T.C. increases. This increased sensitivity to P.T.C. as the age advance could be explained on the following hypothesis (14,13).

1. The gustatory papillae reach their development at puberty and after the age of forty five, regressive changes set in.

2. Familiarity with a taste probably leads to a lower recorded threshold for the same sensation.

The observation that the younger age groups of ten have a difficulty in describing the taste of a substance, especially for bitter which is not used in day-to-day life (Blocksles, 1932) lends support to this hypothesis. As the age advances the taste receptors reach their full development and the perceptibility of taste also becomes accurate.

The increased sensitivity in elderly subjects of our study could also be explained on similar grounds as most of our subjects were below the age of forty-five.

The taste threshold in the present investigation had a wide range. Though it is known that the intensity of sensations cannot be accurately measured yet in the present study the index of taste acuteness and threshold was very definite, because the individuals were subjected to repeated tests.

Blood Groups : In the present study the incidence of non-tasters was more in blood group 'B' followed

by blood group 'O'. On statistical evalation the relationship was found to be highly significant ($P < 0.01$) as an autosomal dominant trait (15).

Saliva : In the present study no significant correlations ($P > 0.05$) with the reaction of saliva was observed. These observations have been supported by the other workers too (16,17,18,19).

Smoking : We did not observe any effect of smoking on the taste sensitivity to P.T.C. This is contrary to the findings of Ada and Blakeslee (20). Probably this difference is related to the duration of smoking in subject. Most of our subjects were young medical students with a history of only 2-4 years smoking whereas the subjects studied by the above authors were more than 8 years.

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