



**COMPARATIVE STUDY OF TASTE SENSITIVITY TO
PHENYLTHIOCARBAMIDE IN NORMOGLYCAEMICS
AND IN DIABETES MELLITUS TYPE 2**

DR.MOMI BARUAH*¹ AND DR.ANJALI JOSHI²

¹Department of Physiology, Lokmanya Tilak Municipal Medical College, Mumbai, India

²Department of Physiology, Seth G.S. Medical College and K.E.M. Hospital, Mumbai, India

ABSTRACT

Taste drives appetite and protects us from poisons. Taste is a sensory cue which is modified by a variety of physiological and pathological factors ranging from genetic, cultural, aging and hormonal factors. This study was done to find out the distribution of tasters and non-tasters in normoglycaemics and those with diabetes Mellitus Type 2 and also find out the predisposition to Diabetes in PTC tasters and non-tasters. 100 Diabetic and 100 non-diabetic subjects were tested for their taste sensitivity to PTC.

KEYWORDS: Phenylthiocarbamide (PTC), diabetes mellitus, tasters, non-tasters.



DR.MOMI BARUAH

Department of Physiology, Lokmanya Tilak Municipal Medical College, Mumbai, India

INTRODUCTION

The sense of taste is a powerful predictor of food selection. It has been found that some people have more than the normal taste papillae. They are distinguished by the increased density of fungiform papillae and their extra sensitivity to the chemical n-propylthiouracil¹. They are called as supertasters. The ability to taste phenylthiocarbamide (PTC) is inherited as a dominant factor. Earlier studies have shown association of non-tasters to phenylthiocarbamide with different diseases. Shivaprasad² had found increased number non-tasters in hypothyroids as compared to euthyroids. The number of non-tasters were significantly more in epileptics than in control group in study done by Pal et al⁽³⁾. Both humans and animals are conditioned to obtain preferred taste stimuli as pleasant experience or to escape aversive taste stimuli as unpleasant⁽⁴⁾. Recent studies show that the ability to detect the bitter taste of P.T.C. has been used to indicate the presence of certain diseases. Earlier studies done have found that the proportion of non-tasters is higher among the Diabetics. Terry and Seagull have shown that the proportion of non-tasters was higher among Diabetics⁽⁵⁾. The present study is aimed at finding the distribution of tasters and non-tasters of PTC in the normoglycaemics and in those with Diabetes Mellitus type 2. This will also help to find the predisposition to Diabetics in P.T.C tasters and non-tasters.

MATERIALS AND METHODS

The taste sensitivity was done using the chemical Phenylthiocarbamide (P.T.C.). With this P.T.C. powder, different concentrations of solutions were prepared with distilled water as per Harris and Kalmus Method⁽⁶⁾. The study was done in the department of Physiology in collaboration with Department of Endocrinology in one of the tertiary hospitals of Mumbai. The study was started after obtaining the consent of ethics committee of the hospital. The study subjects were selected randomly from apparently normal adults and adult patients of recently diagnosed Non Insulin Dependent Diabetes Mellitus within last

6 months. Equal number of male and female subjects were included in the age group of 30-60 years. The control group consisted of 100 normoglycaemic people and the study group consisting of 100 patients of Type 2 Diabetes Mellitus. Exclusion Criteria: Chronic smokers, tobacco chewers, alcoholics, subjects having stomatitis, coryza, apparent vitamin B12 and zinc deficiency and those taking drugs altering taste like captopril, metronidazole etc. After explaining the procedure of the test in detail, oral and written consents were taken. Detailed medical history of consenting subjects were taken regarding their diet, food preferences, personal habits, drug use or any significant medical history. Then detailed physical examination of the subjects were performed including for the clinical evidence of neuropathy. Precautions taken: Subjects were asked not eat or drink except water at least one hour before the testing. Testing solution of PTC was made by Harris and Kalmus method. A stock solution was prepared by using P.T.C. powder and distilled water. The serial dilutions of this solution were made upto the strength of 0.32 mg / l. In this way 13 solutions were prepared with concentrations in a decreasing manner. Solution no.1 had strongest concentration of 13,00 mg/l and solution no.13 with the weakest concentration of 0.32 mg/l. Starting with 10 ml of solution number 13 (the weakest concentration) and successively solutions of increasing concentrations till solution number 1 was given to each subject till a definite bitter taste was identified. The subject was asked to rinse their mouth with water in between tasting each sample. In this way the subjective feelings of the taste of all solutions was taken and tasters and non-tasters were identified.

Tasters

Those who were able to detect the bitter taste of PTC in solution no.13 to solution no.5.

Non-tasters : Those who were able to detect the bitter taste only in solution no. 1 or who could not detect the taste in any solution.

RESULTS

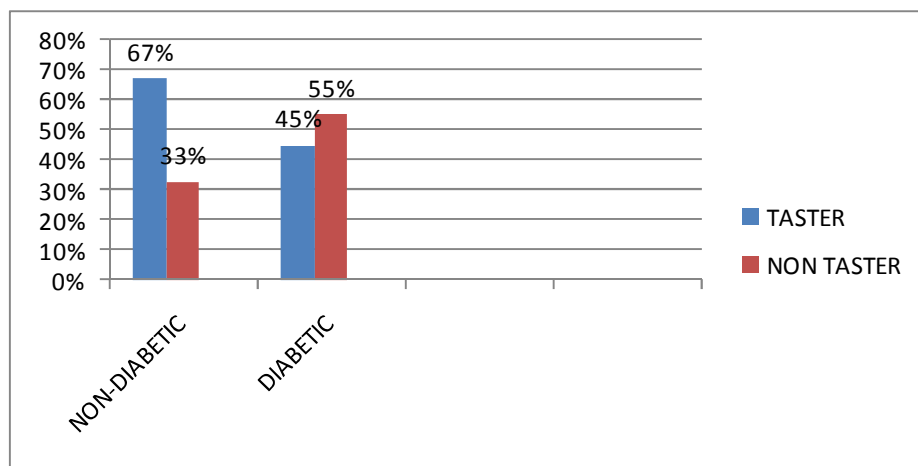
The taste threshold was identified for each subject and recorded. Statistical Analysis was done by using the Chi – Square test. A p- value less than 0.05 indicated the statistical significance of the result.

TABLE
Taster status in Diabetic and Non- diabetic

Group	Diabetic	Non- diabetic	Total	Percentage
Taster	45	67	112	56
Non- tasters	55	33	88	44
Total	100	100	200	

p-value < 0.01

According to this table there were significantly more number of tasters among non - diabetics and more number non - tasters among the diabetic group. P - value less than 0.01. This indicates that Diabetics had decreased taste sensitivity to PTC as compared to non - diabetics.



DISCUSSION

1. Tasters and non- tasters of PTC in non-diabetic subjects

Our study prevalence of tasters and non-tasters in normoglycaemic is 67% and 33% respectively. Similar results were reported by Bhatkar⁷ (Tasters 63.7% and Non-tasters 36.26%), Das⁸ (non-tasters 33.7%), Ghosh⁹ (non-tasters 33.57%) and Bhatia¹⁰ (non-taster 33.43%). Higher percentage of non- tasters were reported by Sanghvi¹¹ (42.50%). Lower percentage of non- tasters were reported by Lugg and White¹² (24%). This shows that the prevalence of the gene for non- tasters is not rare in Maharashtrian population exactly as in Indians elsewhere. Besides studies done by Rao et al show a definite and racial preponderance of PTC tasters and non-tasters among general population.

2. Tasters and non-tasters of PTC in Diabetics (Table 2&3)

In our study PTC tasting ability showed higher percentage of non- tasters (55%) in the Diabetic group as compared to the control group (33%). So Diabetic subjects were more likely to be non- tasters as compared to the Control group. These findings were consistent with the findings of Terry and Seagull et al (1947). Similar findings were also found by Rao¹³, Ali and Uhan¹⁴ (1994) also found increased number of non-tasters in newly diagnosed Diabetics but was not statistically significant. However Harris and Kalmus (1949) did not find any specific preponderance of tasters and non- tasters in either Diabetic and Non- diabetic (ref). Similarly K.Sriram¹⁵ (1974) did not find any association with Diabetic and taste blindness to PTC. In Our study 10 ml of PTC solution was used instead of only 1

ml was done in earlier studies by K. Sriram. So the accuracy of taste perception to PTC was more in our study.

CONCLUSION

Diabetic patients are more likely to be non-tasters to Phenylthiocarbamide (PTC) as compared to normal people. Since non-tasters are associated with many disease conditions like disease of thyroid, cystic fibrosis, epilepsy, depression, therefore detecting them at an early age, can be used to

create awareness among the subject as well as help them to take measures to delay its onset. More research work with larger population studies are required to establish the association of non-tasters of Phenylthiocarbamide having predisposition to Diabetes.

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