

## TASTE SENSITIVITY IN PREGNANCY

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**Abstract :** Taste sensitivity to Phenyl-thio-Carbamide (PTC) and glucose were studied in 150 females during the 3 trimesters of their pregnancy periods. The taste sensitivity to PTC was determined by Harris and Kalmus method. For taste intensity and hedonic evaluation, 7 concentrations of glucose solutions were used. Taste sensitivity to both PTC and glucose increases during the 1st trimester of pregnancy. In comparison to non-pregnant females (from previous study) taste thresholds and hedonics decreases in pregnancy.

### INTRODUCTION

Taste is a sensory cue, it is modified by a variety of physiological and pathological factors ranging from genetic, cultural, ageing and hormonal factors (1, 2). Gonadal hormones influence palatability and spontaneous ingestion of a number of sweet solutions is thought to be caused by the stimulatory influence of ovarian hormones on the taste regulatory mechanism (3). Absolute thresholds for visual and auditory sensations in females have been observed to vary systematically through menstrual cycle (4, 5). Broverman et al (6) suggested that hearing sensitivity may also be affected by estrogen secretion.

Biologically taste is mainly determined by the genetic component (7) and in this regard phenyl-thio-carbamide (PTC) has been widely used to study the taste responses related to the Mandelian factors. Earlier studies, which were conducted in females in different phases of menstrual cycle, revealed that in the ovulatory phase there is an increase in taste sensitivity to PTC and glucose (8).

Recently, Tandon et al (9) suggested that in women during pregnancy there is an increase in evoking wave V threshold, and neural conduction process in brain-stem auditory pathway is delayed, as compared with non-pregnant states. As in preg-

nancy various neuro-endocrinal changes occur, it was of interest to study whether taste sensitivity also changes during pregnancy.

### METHODS

Taste sensitivity to PTC and glucose was studied in 150 pregnant females (50 females in each trimester of pregnancy) attending prenatal clinic of the hospital. The tests were performed between 9 am to 12 noon (before lunch).

The taste sensitivity to PTC was investigated as per the method of Harris and Kalmus (10). PTC solutions, prepared in serial dilutions from solution 1 (concentration 0.13%) to solution 13 (0.00003%), were given to the subjects starting with No. 13 solution and following these with other concentrated solution upto No. 1. The mouth was rinsed with water in the beginning and before each test. Tasters were able to detect PTC in solution Nos. 5 to 13 (0.008-0.00003% concentrations) and non-tasters were considered to be those who were able to detect PTC in solution Nos. 1-4 only (0.13-0.016% concentration), or not at all. Subjective reliability was checked by intermingling distilled water with test solutions.

For taste intensity and hedonic evaluation for glu-

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cose, 7 concentrations of glucose solutions (starting with concentration of 2.0 M with 6 successively halved dilutions) were used (11). The order of presentation of solutions was randomized to prevent the effect due to the order of concentration. The subjects were asked to rate taste intensity on 0-6 scale (0-no taste, 6-extremely strong taste). The ratings for pleasantness were provided on a 1-6 category scale (1-extremely disliked, 6-extremely liked). No neutral point was provided to denote indifference, so that the subjects were required to state whether they liked or disliked the stimulus.

### RESULTS

The percentage of PTC tasters and non-tasters in pregnant and non-pregnant females is shown in Table I. Tasters were more (86%) in 1st trimester of pregnancy, whereas non-tasters were more in II<sup>nd</sup> trimester (36%). PTC taste sensitivity for different solutions is shown in Fig. 1 in pregnant and non-pregnant females. Bimodel distribution of tasters and

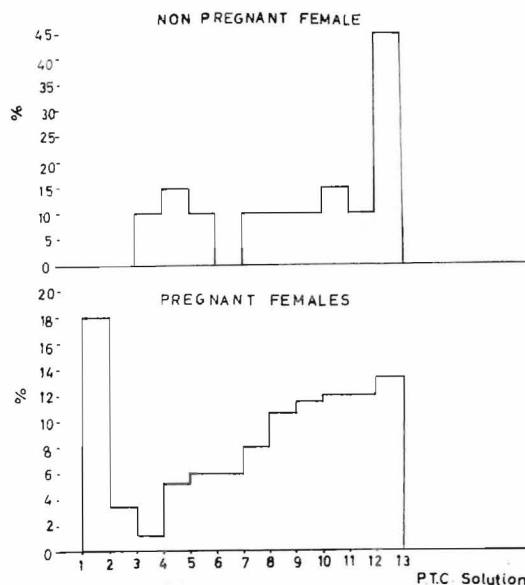


Fig. 1: PTC taste sensitivity in pregnant and non-pregnant females.

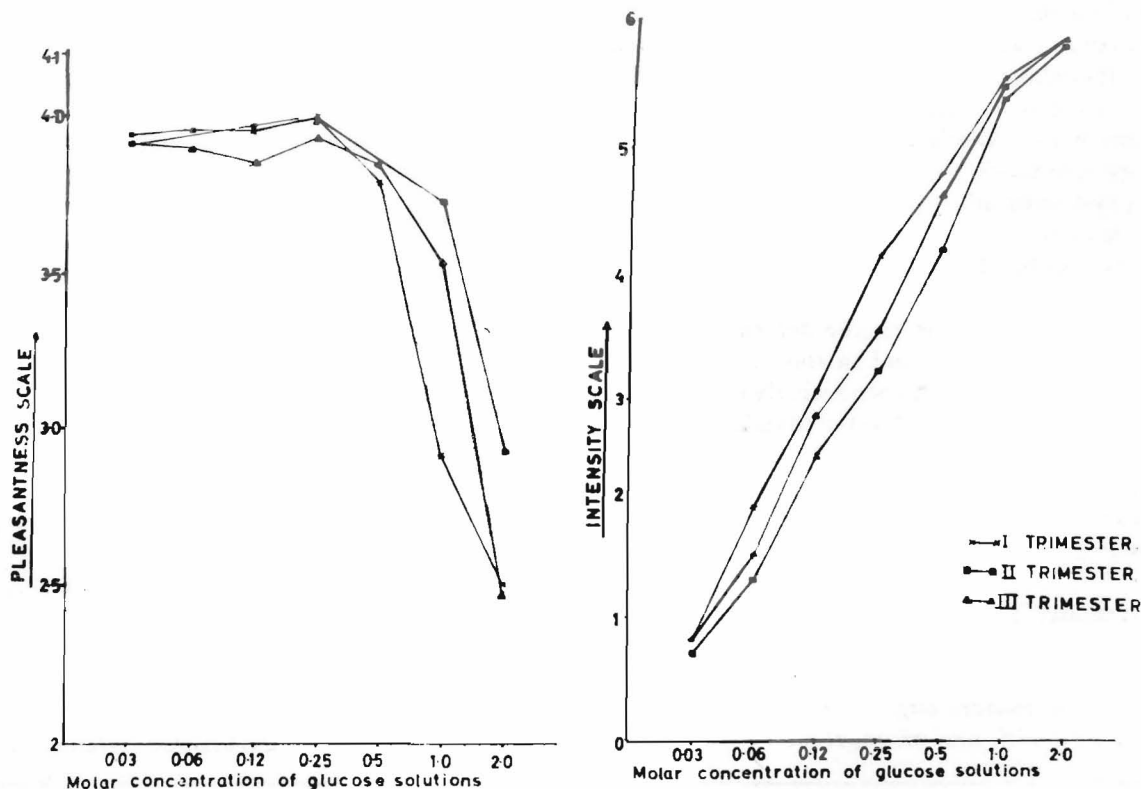


Fig. 2: Taste intensity and pleasantness for glucose in different trimester of pregnancy.

TABLE I : Percentage distribution of PTC tasters and non-tasters in pregnant and non-pregnant females.

	Tasters %	Non Tasters %
I Trimester	86	14
II Trimester	64	36
III Trimester	76	24
Non-Pregnant	67	33

non-tasters was present in both groups. In pregnancy 14% of tasters are able to detect PTC in solution No. 13, whereas 45% of non-pregnant females were able

to detect lowest concentration (8). Amongst pregnant females who were non-tasters, 18% were able to detect PTC in solution 1 (conc. 0.17%), in comparison to non-pregnant non-tasters in whom 15% were able to detect PTC in solution 4.

Taste intensity and pleasantness responses to glucose solution in pregnancy are shown in Fig. 2. Taste intensity ratings increased with increase in glucose concentrations in all trimesters of pregnancy. Taste ratings were higher in the 1st trimester and lowest in the II<sup>nd</sup> trimester of pregnancy. Responses are statistically significant in concentrations of 0.06 to 0.05 M glucose solutions. Maximum pleasantness peak was at 0.25 M concentration in all the three trimesters of pregnancy and then declined sharply. In 3<sup>rd</sup> trimester of pregnancy, hedonic ratings were significantly lower for 0.03 to 0.025 M glucose concentration. For higher concentrations (0.05-2.0 M) subjects in the 1st trimester of pregnancy showed the lowest ratings.

Gustatory responses to glucose have been compared in pregnant and non-pregnant females in Fig. 3. Intensity ratings were higher throughout during pregnancy for all the concentrations of glucose. For pleasantness response pregnant females have a likeness for lower glucose concentrations and dislike higher concentrations of glucose. In pregnancy pleasantness peak was at 0.25 M concentration Whereas it was 1.0 M in non-pregnant females.

## DISCUSSION

The present results indicates that during the 1st trimester of pregnancy taste sensitivity increases for PTC (tasters 86%).

Taste responses to glucose also show decreased taste thresholds (increased taste sensitivity) during the 1st trimester of pregnancy, as compared to late pregnancy. Schiffman (2) had reported that taste and smell sensitivities are decreased in late pregnancy. As regards pleasantness for glucose, likeness for lower concentrations is observed in all the trimesters of pregnancy and dislikeness for higher glucose concentrations.

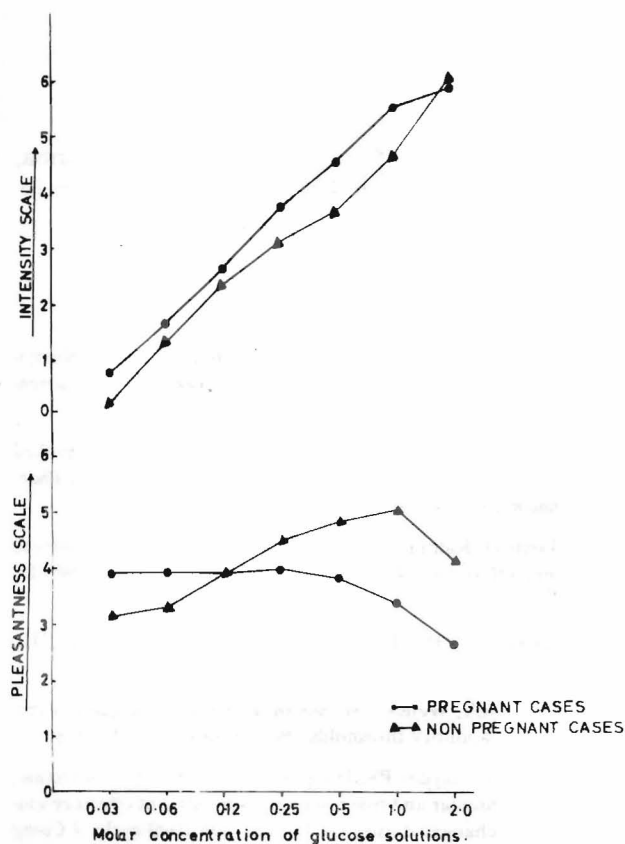


Fig. 3: Taste responses to glucose in pregnant and non-pregnant females.

In comparison with non-pregnant females, pregnant females show decreased taste threshold, and like lower concentrations of glucose solutions while disliking the higher concentration. In non-pregnant females however pleasantness increases with increase in glucose concentrations to the maximum peak value of 1.0 M.

The changes in taste responses during pregnancy may be due to the effect of changed hormonal milieu. It is not known whether the hormones which increase during pregnancy influence taste receptors. However, it has been reported that in adult women taste sensitivity changes through the menstrual cycle (8), with increased acuity at midcycle. The withdrawal of sex steroids during menstruation improves the auditory and visual thresholds. During pregnancy, with increased levels of some hormones, taste threshold is decreased. This is in agreement with the suggestion made by Baker & Weiler (12) that the circulating female sex steroids effect the functioning of the sensory nervous system.

Tandon et al (9) had observed that pregnancy increases auditory threshold and threshold for evoking wave V, further, neural conduction process in

brain-stem auditory pathways is also delayed during pregnancy, as compared with non-pregnant females. The present study shows decrease taste sensitivity in late pregnancy.

Bruce and Russell (13) had suggested that retention of water and sodium, due to variations in levels of sex steroids during menstrual cycle, may influence the process of axonal conduction time. Evidence suggests that such fluctuations may be independent of circulating levels of such gonadal hormones with that of oestrogen (13).

The present study thus suggests that raised levels of sex steroids during pregnancy affect the taste responses to PTC and glucose, and these changes may be due to changes in metabolism of sodium, potassium and water retention, which could affect the taste sensation also.

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#### REFERENCES

- Schiffman SS. Taste and smell in diseases. *N Eug J Med* 1983; Part I: 1275-79.
- Schiffman SS. Taste and smell in diseases. *N Eug J Med* 1983 b; Part II: 1337-43.
- Kanaka R, Dua-Sharma S, Sharma KN. Gustatory preferences during oestrous cycle in rats. *Ind J Physiol Pharmacol* 1979; 23(4): 277-84.
- Haggard M, Gastron JB. Changes in auditory perception in the menstrual cycle. *Br J Audiol* 1978; 13: 105-18.
- Diamond M, Diamond AL, Mast M. Visual sensitivity and sexual arousal levels during the menstrual cycle. *J New Ment Dis* 1972; 155: 170-76.
- Broverman DM, Klaiber EL, Kobayashi Y, Vogel W. Roles in activation and inhibition in sex differences in cognition abilities. *Psychol Rev* 1968; 75: 23-50.
- Harris H. An introduction to human biochemical genetics. *Eugen Lab Chem* 1953; 37.
- Bhatia S, Sharma KN, Mehta V. Taste responses to phenylthiocarbamide and glucose during menstrual cycle. *Current Science* 1981; 50: 980-83.
- Tandon OP, Misra T, Tandon I. Brain stem auditory evoked potentials (BAEPs) in pregnant women. *Ind J Physiol Pharmacol* 1990; 34: 42-44.
- Harris H, Kalmus H. The measurement of taste sensitivity to phenylthio-urea (PTC). *Annals of Human Genetics* 1949; 15: 24.
- Moskowitz HR, Kumaraiah V, Sharma KN, Jacobs HL, Dua-Sharma S. *Physiol Behav* 1976; 16: 471.
- Baker MA, Weiler EM. Sex of listener and hormonal correlates of auditory thresholds. *Br J Audiol* 1977; 11: 658.
- Doty RL, Sayder PS, Huggim GR, Loury LD. Endocrine, cardiovascular and psychological correlated of olfactory sensitivity changes during the human menstrual cycle. *J Comp Physiol Psychol* 1981; 95: 45-60.