COMPARISION OF TASTE THRESHOLD PARAMETERS ON PREGNANT AND NON-PREGNANT WOMEN

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Abstracts: **Background & objectives:** Many physiological and behavioural changes take place during pregnancy, including changes in taste and an increase in food intake. These changes are necessary to ensure growth and development of a healthy fetus. Taste changes during pregnancy may be induced by sex hormones oestrogen and progesterone that are increased during pregnancy. The objective of this study was aimed at comparing testing ability in pregnant and non-pregnancy women for taste parameters like sweet, sour, salty and bitter. **Material and Methods:** The present study included 30 pregnant women from Obstratics and Gynaecology department, civil hospital, Ahmedabad. The taste sensitivity for each solution was carried out as per Harris & Kalmus method. Serial half dilutions for each taste type were made using de-ionized distilled water. Each taste modality had seven different test tubes. Subjects were tasted from lower to higher concentration until a definite taste was identified. **Results:** There was significantly decreased testing ability for salt and bitter solutions in pregnant women as compared to non-pregnant control group. **Conclusion:** Pregnancy seems to affect gustatory sensations like sweet, sour, salty, and bitter.

Key Words: Gustatory parameters, Pregnancy, sweet, salty, bitter, sour

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Introduction:

Many diseased states like thyroid disorders, zinc & sodium deficiency, diabetes, and conditions like pregnancy are known to alter the taste sensation in humans. Taste dysfunction is a disturbing problem to many individuals as it can affect the health of the individual by altering the food preferences and food habits of the person[1].Changes in the perception of taste are associated with majority of pregnant women[2-6]. Why some foods taste different during pregnancy is not known. Hook[2] suggested that possible factors mediating the development of food aversions and craving may be changes in taste and olfactory sensitivity or hormonal changes accompanying pregnancy. Consistent results have been found for bitter and salt taste. Various studies have reported a decreased threshold or increased liking for salty taste during human pregnancy as compared with non-pregnant women[7].The decreased taste for salt may be necessary since pregnancy women have an increased salt requirement[8]. Similar result have been found in rats, Pregnant rats ingest more salt during pregnancy and show an increased preference for salt[9] suggesting that taste threshold form salt is also decreased in pregnant rat[10].A few studies have shown that the sensitivity form bitter taste is increased during human pregnancy[11-12].This may be adaptation for pregnancy in order to avoid intake of bitter testing toxic compounds. To address the question whether gustatory function change during the course of pregnancy the respective study was performed in 30 samples of pregnant women and non-pregnant women controls.

Material and Methods:

This cross-sectional study included 30 pregnant taken from the Obstratics and Gynaecology department, Civil Hospital, Ahmedabad and 30 non-pregnant control subjects were chosen randomly with age group 20-40 years. The subjects were selected after ruling out hypertension, cardiac disease and factors that could alter the taste sensations. The tests were carried out in the morning time between 9 am to 11 am. The subjects were asked not to eat or drink anything except water at least for one hour before the threshold measurement (table).

The taste sensitivity for each solution was carried out as per Harris & Kalmus method. All the solutions for sweet, salt, sour & bitter were made by weighing the agents on Electronic Balance Scale for accuracy of results. Serial half dilutions for each taste type were made using de-ionized distilled water.

Each taste modality had seven different test tubes. Molar concentrations of different taste substances in different test tubes were as follows:

Taste sensation	**Substance used**	**molecular weight**
Sweet	Glucose	180.16
Sour	Citric acid Monohydrate	210.14
Salty	Sodium chloride	58.44
Bitter	Quinine Sulphate	789.21

Test tube number	Glucose Conc. in Moles (Sweet)	Sodium chloride Conc. in Moles (Salty)	Citric acid Monohydrate Conc. in Moles (Sour)	Quinine Sulphate Conc. in Moles (Bitter)
1	2.0	1.0	0.05	0.005
2	1.0	0.50	0.0250	0.0025
3	0.5	0.25	0.0125	0.00125
4	0.25	0.125	0.006	0.00062
5	0.125	0.0625	0.003	0.00031
6	0.0625	0.03125	0.0015	0.000015
7	0.03125	0.0156	0.00075	0.000075

Subjects were tasted from lower to higher concentration until a definite taste was identified. Distilled water was used in between to rinse the tongue. The test tube number and actual threshold concentration was determined. T test is applied to compare the taste ability between two groups. P value < 0.05 is considered as significant.

Result:

The observations of various taste parameters i.e. sweet, salt, sour & bitter tasting ability in pregnant and non-pregnant women were noted with reference to the test tube numbers indicating the threshold concentration of substances at which taste was perceived.

Table 1: no. of women according to different taste sensations

Sensation felt to Test tube no.	Sweet		Salty		Sour		Bitter	
	Pregnant (30)	**Non-pregnant (30)**	**Pregnant (30)**	**Non-pregnant (30)**	**Pregnant (30)**	**Non-pregnant (30)**	**Pregnant (30)**	**Non-pregnant (30)**
1	**2**	**3**	**0**	**0**	**0**	**1**	**0**	**0**
2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
3	**5**	**4**	**0**	**0**	**0**	**0**	**0**	**2**
4	**9**	**5**	**1**	**4**	**3**	**4**	**1**	**3**
5	**7**	**5**	**4**	**7**	**9**	**6**	**1**	**5**
6	**5**	**9**	**8**	**10**	**16**	**13**	**14**	**15**
7	**2**	**4**	**17**	**9**	**2**	**6**	**14**	**4**
Chi square	**3.597**		**8.85**		**4.053**		**12.257**	
P value	**0.608**		**0.03***		**0.398**		**0.0314***	

***P value < 0.05, significant**

Table 1 showed that the pregnant women decreased taste sensitivity for salty and bitter taste parameters. For sweet taste, p value was 0.608 and for sour taste p value was o.398 (p>0.05) which showed that the result for sweet and sour taste was not significant.

Figure 1 showed that the threshold of salty sensation was higher in pregnant women than non-pregnant women.

Figure 2 showed that the threshold of bitter sensation was higher in pregnant women than non-pregnant women.

Discussion:

It is generally accepted that taste changes during human pregnancy. The cause of decreased gustatory function in pregnancy has not been clarified. Nevertheless a number of factors have

been investigated including the need for increased intake of salt and calories in course of pregnancy [1, 3, 5, 13].

Change in serum concentrations of trace elements[14, 15] or oestrogen and progesterone levels[3, 16].

Both Kuga et al[14] and Duffy et al[11] proposed that taste changes in pregnancy ware due to fluctuation in sex hormones.

Others suggested that changes during gustatory function are due to the proximity of gustatory and uterine representations within the insular neocortex, while unsubstantiated by experimental data, it was hypothesized that 'menstrual or pregnancy stimulation of uterus might shift that locus of neuronal activity within the insula to include adjacent gustatory, nervous and consequently alter taste experiences'.

Figure 1 shows no of women according to test tube no. for salty taste sensation

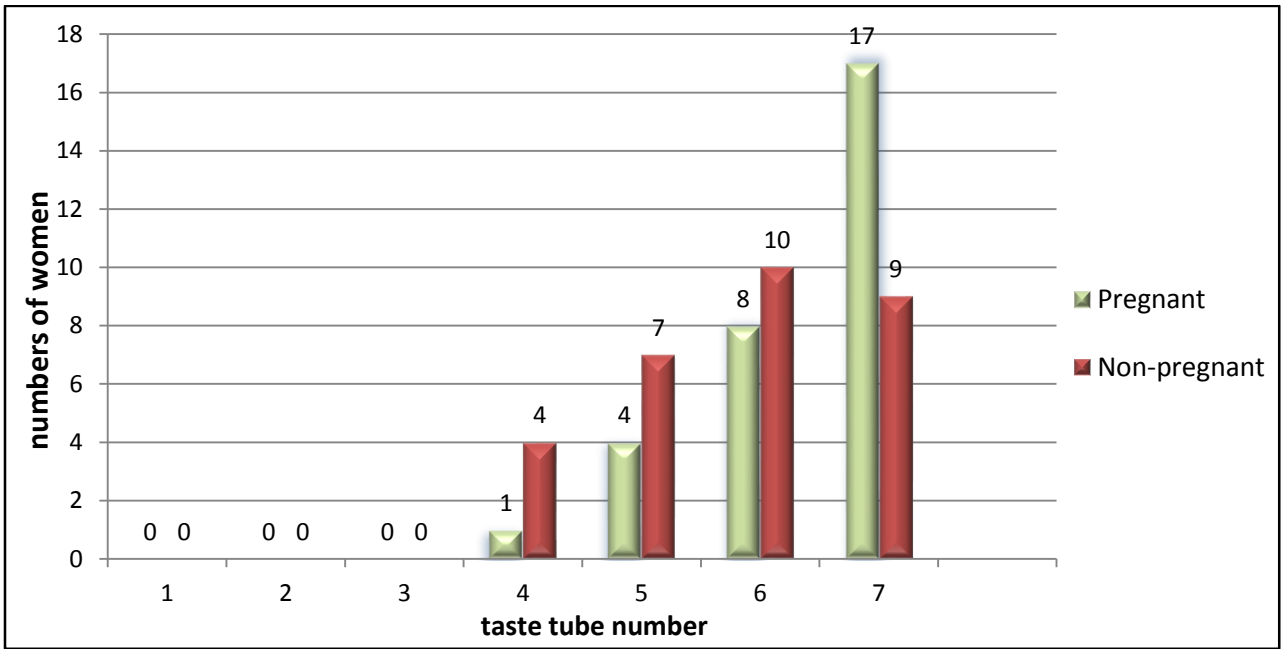
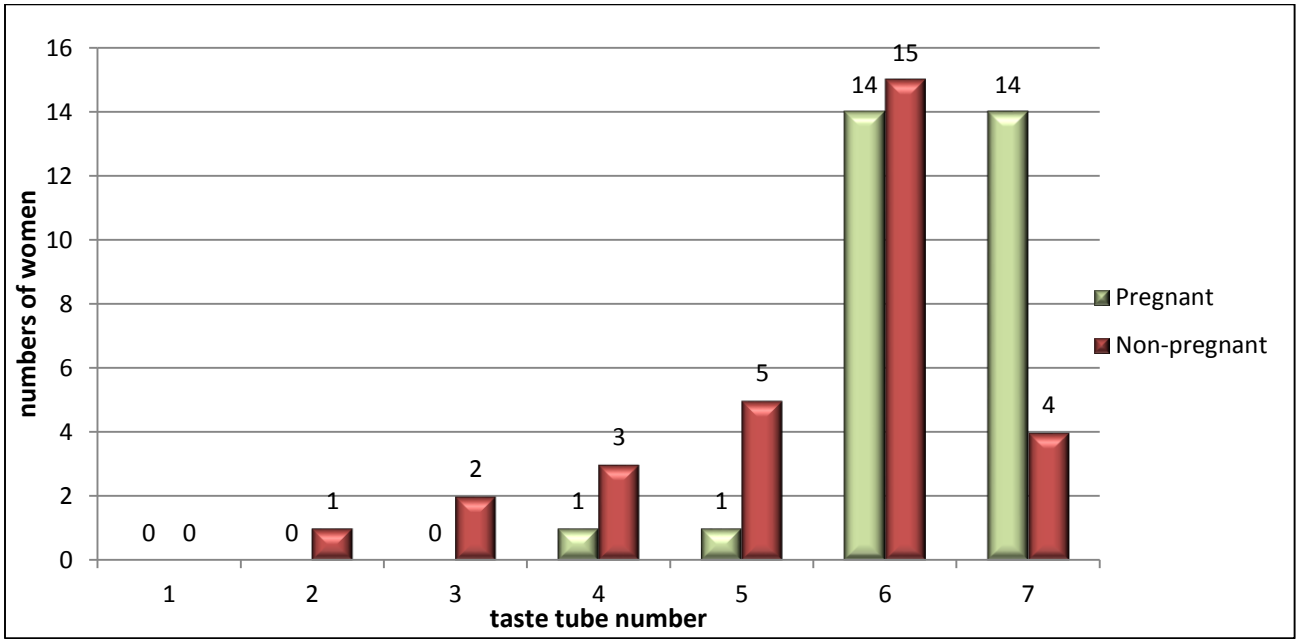


Figure 1 shows no of women according to test test tube no. for bitter taste sensation



Conclusion:

The advantage of an increase of pleasantness for saltiness in pregnancy as found in the present study seems to be obvious as an increased appetite for NaCl may facilitate increased intake of salts. A potential increased bitter sensitivity may help to avoid poisons in the critical phase of embryonic development. Interestingly, pregnant women describe abnormal taste function as increased 'bitter' sensitivity and decreased 'salt' sensitivity, but our data showed increase in both bitter and salt sensitivity. Because it is usually not expected to encounter potentially toxic compounds in the diet of humans, the evolutionary benefit of an increased bitter sensitivity is not easily applicable to pregnant women. Increasing the intensity of 'bitter' sensation would increase the risk of hyperemesis that can also harm both mother and foetus. Similarly decrease of liking of sweet and high fat food/beverages, may hamper sufficient nutrient intake in pregnancy. Thus we propose that adaptive processes underline the change in taste function during pregnancy may allow pregnant women to vary their diet in order to increase weight gain and support the child with all the necessary nutrients.

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