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## REVIEW ARTICLE

# Taste Disorders and Their Diagnosis - A Basic Approach

Ravi Sehrawat,<sup>1</sup> Poonam Malik,<sup>2</sup> Manu Rathee<sup>3</sup>

## ABSTRACT

Taste and smell disorders pose difficulty in diagnosing and treatment this occurs often because of a lesser knowledge and understanding of their senses and disease states. Also diseases related to them are often overlooked even though these disorders can have a substantial impact on quality of life. This paper describes in brief about the various taste disorders and their evaluation in patient as the improvement in the food flavour and appearance can improve quality of life in patients with irreversible dysfunction.

**Key words:** Taste perception, Taste buds, Salivary hypofunction

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## INTRODUCTION

Taste is mainly a function of the taste buds in the mouth, but it is common experience that one's sense of smell contributes strongly to taste perception, as persons with cold or allergies sometime complain that they cannot taste their

food although their taste sensation may be operating normally, but the olfactory sensations are not. This shows that much of what we think of a taste is actually smell. Odors from foods pass upward into the nasopharynx and nasal cavity to stimulate olfactory receptor. Thus, a given concentration of odors stimulates the olfactory system thousands of times more strongly than it stimulates the gustatory system.

Taste buds appear very early in the tongue of human as it features at 7 to 8 weeks of gestation and mature appearing taste buds are not observed until later in gestation. Development is not complete at birth and taste bud numbers continue to increase. Aging has very little effect on the taste system. Counts of taste buds in carefully controlled experiments have revealed little or no reduction in taste bud numbers.<sup>1</sup> Behavioral studies have also shown that in a healthy population of individuals, decline in taste<sup>2</sup> sensitivity is small and relatively insignificant. So thus the peripheral taste system is maintained structurally and functionally across the life span. This paper describes in brief about the various taste disorders and their evaluation in patient.

## CLASSIFICATION OF TASTE DISORDERS

**They are mainly classified into<sup>1</sup>**

1. Gustatory – olfactory confusion in patients with hyposmia.
2. Secondary dysgensia and paragensia.
3. Transport disorders.
4. Idiopathic taste abnormality.

**Gustatory – olfactory confusion in patients with hyposmia:** Following upper respiratory tract infection or any multiple causes of olfactory loss, individual experience smell and taste loss on report that particular food no longer tastes the same.

Most of such problems are due to decreased transport of volatile substances to olfactory receptors on a result of heavy nasal mucous or sneezing of the sinus mucosa. So in either, examination of patients reveal abnormal or loss or altered olfactory function rather than taste.

**Secondary dysgensia and paragensia:** The causes include, retained food in and around maxillary and mandibular arches, heavy dental plaque and calculus across the gingival and proximal surfaces, carious tooth, defective dental restorations, acute and chronic gingivitis and periodontitis and also poorly cleaned bridges or dentures.

Some are eliminated by standard dental treatments like restorative periodontal therapy. But chronic dysgensia due to metallic cations released from corrosion of dissimilar metallic dental restorations and prosthesis remains in question.

**Transport disorders:** It includes

- a. Salivary hypofunction and xerostomia: Taste bud cell function is dependent on specific soluble molecules access to the cell membrane followed by transport of the molecule across the membrane. In patients with reduced salivary flow the concentration of taste stimuli and salivary electrolytes of sodium, calcium and bicarbonates may be greatly reduced unless the stimulus is provided in liquid form.
- b. Blocking of taste buds by micro organism or dentures: Salivary hypofunction and radiotherapy to the head and neck also are after accompanied by overgrowth of oral bacteria and yeasts. The upper denture also blocks the palatal taste buds. Though the posterior part is not covered by denture because of gag reflex but covering by upper denture significantly reduces the taste sensation. This is because diminished touch and pressure sensation and retention of food particle and bacterial plaque on the surface of denture. More than 10 percent of edentulous patients complaints of taste loss initially after

wearing denture.<sup>4</sup>

**Idiopathic taste abnormality:** It Includes

- a. **Inherited disorders:** Several inherited disorders have been associated with abnormal taste sensation. Abnormalities of taste receptors can be congenital or acquired. Common disorders inherited includes: Familial dysautonomia, Turner's syndrome. Pseudohyperparathyroidism, facial hypoplasia syndrome and cleft palate.
- b. **Loss of taste bud or taste bud functions:** Any damage to the taste bud field lingual palatal or pharyngeal fields are caused by variety of lesions and neuropathic disorders affecting the taste nerves. The dorsum of tongue is affected by wide range of inherited developmental and atrophic lesions that conceivably reduce the number of taste buds. E.g.: Glossitis (Vit B, iron, medication), White lesions of tongue (Lichen planus and leukoplakia), Salivary hypofunction (xerostomia), Fissured tongue and benign migratory Glossitis. Hairy tongue causes blocking of taste pores by desquamated epithelial cells.

*Stomatitis secondary to radiation.* The condition will get improved after the subside of stomatitis provided the taste sensory nerves are not damaged. The traditional method of treating radiation stomatitis is coating the mucosa with glycerine, frequent rinsing with topical analysis and using artificial saliva.<sup>5-7</sup>

Many antimicrobial medication like captopril, Amphotericin B, clorehexidine, metrainidazole, pencillamine, sodium lauryl sulfate have associated with taste dysfunction. Burning mouth syndrome, is an intraoral pain condition occurring primarily in postmenopausal females. Although oral cavity appears normal, there is an apparent change in sensory perception. Malignancy, the patient become anorexic and their food intake declines, so that they lose weight, this results increased mortality. The hypothesis is that this anorexia is possibly caused by alterations in taste sensation because taste is important in guiding food intake.<sup>8</sup>

Vitamin A deficiency increases keratinization of the tongue, including the pore area of the taste buds, and adjacent epithelial and glandular tissue,

loss of gustatory sensitivity from vitamin A deficiency is due to blocking of the taste pore with keratin plugs, which prevents access of stimuli to the receptor membrane.

**Damage to taste nerves:** It includes Lingual nerve, Chordatympani nerve and Glossopharyngeal nerve.

- a. **Lingual nerve:** Usually results from surgical trauma like extraction of molar (mandibular), jaw fractures, accidental laceration of tongue during dental treatment, orthognathic surgery as these fibres carry general sensory and gustatory fibres to the anterior 2/3 of tongue, the pain and burning sensation caused by damage to the general sensory fibres overshadow any dysguesia symptom. The patient complains of unilateral numbness and altered gustatory sensation. Such damage to the nerve is resolved within 6 months to 1 year.<sup>9-11</sup>
- b. **Chordatympani nerve damage:** Chronic inflammation, tumors of the middle ear, damage to petrous temporal bone, Bell's palsy of facial nerves and parotid gland may also impinge on the chordatympani and produce unilateral anterior dysguesia. Dysfunction of salivation and lacrimation may also accompany the damage to the 7<sup>th</sup> cranial nerve.
- c. **Glossopharyngeal nerve damage:** Usually results from pharyngeal tumours and repeated tonsillectomy or cauterization of the tonsillar bed. Dysguesia to one side of the posterior 2/3 of tongue is unusual but not impossible.

The lesions of the nerve near its point of origin in the facial canal or in the region of geniculate ganglion are accompanied by a paralysis of motor, gustatory and autonomic functions of the nerve. In case of any lesions present between geniculate ganglion and the point of separation of chordatympani it produces the same dysfunction as produced that of injury in the geniculate ganglion, without dysguesia.<sup>12</sup>

## LESIONS AFFECTING CENTRAL TASTE PATHWAY

The common CNS lesions affecting the taste abnormality are Head trauma, vascular disease, brain tumors, cerebrovascular lesions and neurodegenerative diseases. There is simultaneous loss of gustatory and olfactory sensations in patients with head trauma due to damage to temporal lobe, which may damage the greater wing of sphenoid bone. The tumors, vascular lesions and other destructive lesions of pons, thalamus and cerebrum may cause focal neurological abnormality in orofacial region. These lesions are rarely associated with isolated sensory or motor deficit and dysguesia symptoms are usually accompanied by pain of other sensory loss.

Gustatory hallucination is sensory perception in absence of stimulus are sometimes reported by patient with epilepsy. The hallucination is reported as 'The taste was bitter and dry.' – 'I tasted something in my throat; The taste starts in stomach, it rises and falls. The taste is usually not described in detail but rather in more general terms, such as bitter, Unpleasant, or a taste.'<sup>3-15</sup>

## EVALUATION OF TASTE ABNORMALITY

This includes thorough evaluation of: Presenting complaint, General medical history, Physical examination, Taste testing, Laboratory tests and Craniofacial imaging.<sup>16-20</sup>

- a. **Presenting complaint:** This should include the recording: does the patient have complete loss of taste, diminished perception for one or more of the four standard taste quantities or a persistent abnormal taste. Distinction made whether abnormal taste is only for some time, or is if severe enough to prevent normal tasting or is it continuous. History should also include the past and present experience of olfactory sense. The change in olfaction is measured by the ability of the patient to distinguish between a hot chocolate from hot sweetened coffee. The response of patient to strongly visiting volatile compounds like onion

etc., are also measured. The loss of lacrimation and loss of sneezing and nasal irritability for stimulus suggests diminished trigeminal function which may cause abnormality of taste perception. In patients with Bells palsy the taste abnormality (unilateral) is accompanied by paralysis of facial muscles on the same side.

- b. **General medical history:** It should include: Radiation to head and neck. Industrial metal poisoning. Other symptoms like altered cranial nerve function. E.g.: Headache, diplopia, seizures, dizziness, deafness, muscle weakness should be covered in the history, because taste abnormality may also occur as a results of neoplasia or other lesions of CNS.
- c. **Physical examination:** This include careful examination of cranial nerves particularly I, V, VII and IX. Especially for taste abnormality one should examine for nerves V and VII function. The confirmation should be done regarding gustatory and olfactory confusion or a trigeminal or a olfactory dysfunction. The oral examination should include the careful examination for retained food, heavy dental plaque, postnasal discharge, sinusitis, sinusitis with retention of nasal secretion. The dorsum of tongue should be examined for lesions, presence of normal papilla's damage to the lingual branch of V nerve. A pharyngeal surface of the tongue is inspected for the masses that may affect the lingual branch of IX cranial nerve. Salivary function estimation should be done in order to rule out the xerostomia.

### Taste testing

Testing at a single concentration for each stimulus may fail to detect an abnormality. So a concentration of high, medium and low are used. The test is done by asking the individual to have sucrose (sweet), sodium chloride (Salty)

hydrochloric acid (Sour) and quinine (bitter), for detection of loss of taste.<sup>20</sup>

### Regional or spatial taste testing

The four quadrants on dorsum of the tongue provide an accessible are for testing the right and left 5<sup>th</sup> and 7<sup>th</sup> nerve responses. This approach considerably helps where damage to a branch of a peripheral nerve or central taste pathway is suspected and can be achieved by application of individual taste solutions or electrogustatory.

According to recent investigation this approach has got limitation by concentration of fractional taste bud and in the area being tested. Many times there are not complaints from the patient even though there is fractional loss.<sup>21</sup>

E.g., in bells palsy there is unilateral loss of function of chordatympani but patient is unaware of it.

### Electrogustatory

The taste bud fields can be stimulated by low voltage anodal and cathodal currents applied by means of a battery or operated hand-held instrument referred to as Electrogutometer.

Anodal currents produce a sour metallic sensation and cathodal current produce indistinct bitter, sweet sensation. Full range basic taste experience cannot be achieved by this means.<sup>22-23</sup>

The advantages of Electrogustometis are: Portability, Lack of taste solutions or rinsing of tongue in between, Ability to stimulate defined areas of the tongue dorsum, palate, oropharynx precisely, Detection of localized taste loss.

### Laboratory tests

The lab tests that may indicate the presence of problems associated with dysguesia, that includes post prandial blood glucose level and glucose tolerance test, Serum triglycerides, Blood urea nitrogen and thyroid function test.

### Craniofacial imaging

This includes imaging of hard and soft tissues in a standard radiographic view. Like CT and MRI.

Occasionally it is found that there are suspected intracranial pathology in patients with only gustatory abnormality. This emphasizes the potential value of and need of craniofacial imaging in patients with unexplained electronic taste abnormality. Olfactory and gustatory complaints CT plays an excellent sole in evaluation of nasal obstruction mucosal thickening, polyposis, nasal and intracranial neoplasms.

## DISCUSSION

According to study conducted by Bromley SM<sup>3</sup> smell and taste disorders are commonly observed in the population and with smell loss more common. Although these disorders can have a substantial affect life but may also represent significant underlying diseases which are commonly overlooked by the clinicians medical community. And progress made ravelling the nutrient-sensing mechanisms of the tongue has triggered studies on the existence and role of chemosensory cells in the gut. Depoortere et al.<sup>6</sup> summarised that targeting the receptors involved in the sensing of nutrients by taste receptors along the gut which in turn plays a key role in the process of digestion should be used as first line of treatment of diseases of taste receptors Later Feng P et al.<sup>5</sup> further also concluded in their review study that, some regulatory factors of taste cell differentiation and degeneration have been identified, but their study had the limitation that in understanding of different aspects of taste bud homoeostasis remains limited.

## CONCLUSION

In conclusion the taste disorders are not uncommon and can be very debilitating. Individuals with abnormalities of taste and smell are unable to appreciate food and lose the ability to detect spoiled food, fumes, and gas leaks. Moreover, persons with certain occupation that uses the chemical senses such as perfumes, fire-fighters may be unable to continue their profession. So it is important to recognize that these patients do have disorder that once accurately diagnosed may be treatable.

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