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The Impact of Aging and Medical Status on Dysgeusia

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ABSTRACT

Disorders of taste and smell can cause an aversion to food in a sick patient and therefore affect his/her ability to maintain optimal nutrition. This can lead to a reduced level of strength, muscle mass, function, and quality of life. Additionally, reduced ability to differentiate between various intensities or concentrations of a tastant can result in increased intake of salt and sugar and exacerbation of chronic diseases such as heart failure and diabetes. These implications can be heightened in the elderly, who are particularly frail and are challenged by polypharmacy and multiple comorbid conditions. In this article, we will review the prevalence, etiology, and management of taste disorders. Additionally, we will review the association between taste and smell disorders and how disorders of smell can affect perception of taste.

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KEYWORDS: Dysgeusia; Hospitalized elderly; Long-term care; Oral care; Polypharmacy; Weight loss

CLINICAL SCENARIO

Ms. Edwards is an 89-year-old female nursing home resident admitted to an inpatient medicine service for failure to thrive, severe malnutrition, loss of appetite, and a 25-pound weight loss in the past 6 months. Past medical history is significant for osteoporosis, congestive heart failure, chronic renal insufficiency, and hypothyroidism. She has been hospitalized twice during the past 6 months for exacerbation of heart failure, with resultant adjustment of her heart failure medication regimen. She notes a persistent loss of appetite and lack of taste in her food for the past 6 months, preventing her from enjoying her food. She denies any difficulty swallowing, nausea, vomiting, or abdominal pain on eating. She also denies being depressed. Basic blood work indicated acute renal insufficiency due to dehydration, which was corrected with intravenous fluids. Other blood work including electrolytes, liver function, and thyroid function labs were unremarkable. She underwent an upper gastrointestinal endoscopy and a colonoscopy, which failed to show any ulcers or evidence of malignancy.

TERMINOLOGY AND DEFINITIONS

Taste disorders (dysgeusias) can be classified into qualitative and quantitative disorders. The qualitative disorders include parageusia (inadequate or wrong taste perception elicited by a stimulus) and phantogeusia (presence of a persistent, unpleasant taste in the absence of any stimulus). The quantitative disorders include ageusia (a complete loss of the ability to taste), hypogeusia (a partial loss of the ability to taste), and hypergeusia (enhanced gustatory sensitivity).[1] Burning mouth syndrome (BMS), also referred to as glossodynia or stomatodynia, is a sensation of spontaneous, continuous burning pain felt in the tongue or oral mucosa, commonly seen in postmenopausal women.

Impairment in sense of smell is called dysosmia and complete loss of sense of smell is called anosmia.

PREVALENCE

The National Health and Nutrition Examination Survey (NHANES) 2011-2012 reported that more than 5% of the over 142 million US respondents experienced taste disorders, and more than 10% experienced smell disorder in the past 12 months. Sex was not associated with the prevalence of either disorder, but increasing age was associated with increasing

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prevalence of both taste and smell disorders.[2] Additionally, taste disorders are more prevalent in hospitalized and institutionalized older adults compared with those living in the community.[3,4] Glazar et al[5] reported taste disturbance in 13.9% of institutionalized individuals, compared with 3.2% of community-dwelling individuals.[5] Aging can affect gustatory function, as observed by increasing of electrogustometry thresholds and reduction in density of fungiform papillae.[6] Numerous medication conditions and surgeries (summarized in **Table 1** and elaborated below in the article) are also associated with dysgeusia.

CLINICAL SIGNIFICANCE

- Dysgeusia is fairly prevalent in older adults, especially those admitted to hospitals or residing in long-term care facilities.
- Dysgeusia can impact a patient's enjoyment of food, overall nutritional status, and management of chronic diseases.
- Review of medications and attention to oral health should be prioritized in patients presenting with dysgeusia.

ANATOMY

Gustatory receptor cells are present in the taste buds on the dorsal and lateral surfaces of the tongue, the soft palate, uvula, larynx, pharynx, epiglottis, and esophagus. These receptor cells are innervated by afferent neurons and are able to regenerate with a half-life of about 15 days. Transduction of the 5 taste stimuli—acid, salt, bitter, sweet, and umami (a pleasant savory taste imparted by glutamate)—occurs by different chemical transmission systems. Taste sensations are transported via 3 cranial nerves: cranial nerve VII innervates the anterior third of the tongue and the palate; cranial nerve IX innervates the back of the tongue; and cranial nerve X innervates the oropharynx and the pharyngeal portion of the epiglottis. Additional taste receptors are found in the small intestine. The trigeminal nerve (cranial nerve V) is also involved in the transfer of sensations such as the temperature, texture, and spiciness of food. The brain stem, thalamus, and the anterior insula play a key role in the processing of the taste information by the central nervous system.[7] Due to involvement of multiple nerve tracts, it's rather difficult to completely lose the sense of taste.

Olfaction, on the other hand, relies only on the olfactory nerve, and its axons pass through the cribriform plate of the ethmoid bone prior to dissemination on the surface of the olfactory bulb. This makes it highly vulnerable to injury during head trauma. In this situation, a complete loss of sense of smell is more common.

Table 1 Chronic Medical Conditions Contributing to Dysgeusia

Sinusitis/upper respiratory infections
Chronic hepatitis C
Chronic kidney disease
Diabetes mellitus
Heart diseases
Thyroid disorders, esp. hypothyroidism
Cognitive disorders/dementias
Parkinson disease
Malignancies
Dental/oral: periodontal disease, dental caries, oropharyngeal candidiasis
Mental health disorders and epilepsy

ETIOLOGY

Impairment in Sense of Olfaction and its Effect on Taste

Because the taste sensations are conducted by 3 major nerves, a complete loss of taste (ageusia) is very rare and occurs in only 3% of all patients with dysgeusia.[1] Among those patients presenting for evaluation of loss of taste and smell, 70% report loss of smell alone or in addition to loss of taste. Less than 10% report an isolated loss of taste, while only 4% have a solitary measurable loss in gustation.[1,7] Therefore, olfactory symptoms should be explored and olfactory function be evaluated in patients presenting with a complaint of loss of taste.

Genetic

In a study involving patients with phantogeusia, there was increased expression rate of some of the T2R taste receptor genes compared with controls, hinting that increased expression of taste receptor genes may be involved in the pathogenesis of phantogeusia.[8]

Postoperative

Middle ear surgeries with resultant transection of the chorda tympani nerve can result in gustatory impairment.[9] Additionally, tonsillectomies, dental procedures such as extractions and treatment of abscessed teeth, and wearing dental prostheses can contribute to phantogeusia and glossodynia.[1] There have been case reports of ageusia after the use of laryngeal mask airways for surgery, and compression of the lingual nerve has been hypothesized as the cause. Local anesthetic injected near the inferior alveolar nerve during dental procedures has been reported to cause ipsilateral loss of taste and atrophy of fungiform papillae. However, these symptoms have been noted to resolve in a few months.[10]

Medications

Numerous medicines are excreted in saliva by carrier-mediated transport or passive diffusion.[11] They can affect sense of taste by various mechanisms including drug—receptor interaction, disturbance of action potential propagation in cell membranes of afferent and efferent neurons, and alteration of the neurotransmitter function. Additionally, limiting the access of taste chemicals to sensing receptors due to mucosal dryness, closing