Original Article

Effect of Age on Taste Perception: A Survey

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Abstract

Background: Taste, gustatory perception or gustation is one of the five traditional senses that belongs to the gustatory system. Taste is the sensation produced when a substance in the mouth reacts chemically with taste receptor cells located on taste buds in the oral cavity, mostly on the tongue. The different kinds of taste include sweetness, sourness, bitterness and so on. It has been noted that the intensities depreciate with age. **Objective:** To observe and analyse how the taste intensities differ with respect to age in the Indian Population.**Materials and Methods:** 20 candidates in the age group of 18-25, 26-40, 40-50, 50 years and above where given different substsnaces to taste and asked to score the substance based on the intensity of taste. **Results and Conclusion:** The perception of sweet taste was higher in the 18-25 age group. The perception of bitter sensation was more above 40 years. There is a change in the perception of taste with age although the results were not found to be statistically significant. (P = 0.0892).

Keywords: *Age, age changes, gustation, taste*

Received: June, 2017.
Accepted: June, 2017.

Introduction

Taste or gustation is one of the five traditional senses that belong to the gustatory system. Taste is the sensation produced when a substance in the mouth reacts chemically with taste receptor cells located on taste buds in the oral cavity, mostly on the tongue. Taste, along with smell (olfaction) and trigeminal nerve stimulation (registering texture, pain, and temperature), determines flavors of food or other substances. Humans have taste receptors on taste buds (gustatory calyculi) and other areas including the upper surface of the tongue and the epiglottis.[1,2] The gustatory cortex is responsible for the perception of taste. The sensation of taste includes five established basic tastes: sweetness, sourness, saltiness, bitterness, and umami.[3,4] Scientific experiments have proven that these five tastes exist and are distinct from one another. Taste buds are able to differentiate among different tastes through detecting interaction with different molecules or ions. Sweet, umami and bitter tastes are triggered by the binding of molecules to G protein-coupled receptors on the cell membranes of taste buds. Saltiness and sourness are perceived when alkali metal or hydrogen ions enter taste buds, respectively.[5] The basic tastes contribute only partially to the sensation and flavor of food in the mouth – other factors include smell, detected by the olfactory epithelium of the nose[6] texture,[7] detected through a variety of mechanoreceptors, muscle nerves,[8] temperature, detected by thermoreceptors; and "coolness" (such as of menthol) and "hotness" (pungency), through chemesthesis.

As taste senses both harmful and beneficial things, all basic tastes are classified as either aversive or appetitive, depending on the effect the things they sense have on our bodies.[9] Sweetness helps to identify energy-rich foods, while bitterness serves as a warning sign of poisons.[10]

Among humans, taste perception begins to fade around 50 years of age because of loss of tongue papillae and a general decrease in saliva production.[11] Furthermore, not all mammals share the same taste senses: some rodents can taste starch (which humans cannot), cats cannot taste sweetness, and several other carnivores including hyenas, dolphins, and sea lions, have lost the ability to sense up to four of their ancestral five taste senses.[12] This study was done to obtain a relation as to which tastes are mildly affected and which tastes are affected at large.

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Access this article online

Quick Response Code:

Website: www.ijofb.org

DOI: 10.4103/ijofb.ijofb_10_17

How to cite this article: Krishnaa PK, Jayaraj G. Effect of age on taste perception: A survey. Int J Orofac Biol 2017;1:35-8.

Materials and Methods

The candidates for the study were selected for the study. A total of twenty candidates were selected for the purpose of the study. They were grouped into four age groups, such as 18-25 years of age, 26-40 years of age, 41-50 years of age, >50 years. The participants did not have any known systemic disease. Systemic diseases as it would affect their perception of taste.[13-15] The candidates that were selected for the survey were initially blinded, and they were given five different substances with primarily different tastes. The different samples comprised of all major tastes of sweet, sour, spicy, and bitter. Before the first sample was administered to the candidate, they were asked to rinse their mouth thoroughly and then the first sample was given. Once the first sample was administered the candidate was given water to cleanse the taste of the previous substance so that the taste of the second substance does not interfere with that of the previous one. The candidates were then asked to score the substance on the basis of its sweetness, bitterness, sourness, and spiciness. The food substance was placed on the posterior portion of the tongue. The score was the same in a particular age group having a margin score of 1. The acquired data were then analyzed using and the Kruskal–Wallis test appropriate results were obtained as discussed in the following.

Results

The above charts show the results as a relation to age. The charts are shown such that if a person perceived a substance in the correct dominant taste, it was counted as a correct score. In the age group of 18–25 years [Figure 1], 80% of the participants identified the sweet substance correctly, 80% of the candidates identified the bitter taste correctly, and 70% of the participants identified the sour taste correctly. In the age group of 25–40 years [Figure 2], 80% of the candidates identified the sour taste correctly, and 70% of the candidates identified the bitter and sweet tastes correctly. In the age group of 40–50 years [Figure 3], 60% of the candidates identified the bitter taste correctly, 70% of the candidates identified the sour taste correctly, and 80% of the candidates identified the sweet taste correctly. In the age group of 50 years and above [Figure 4], 80% identified the sour taste correctly, and 50% identified the bitter taste correctly, and 60% identified the sweet taste correctly. The study reveals that there is a change in the perception of taste with age, although it is not statistically significant ($P = 0.0892$). However, there were certain trends which were observed in relation to the taste, above the age of 40 years the perception of bitter increased as a taste reduces. Similarly, the percentage of people who identified the sweet substance was higher in the 18–25 age groups (80%). The decrease in the taste intensities is because the number of taste buds decreases and the rest begin to shrink.

Discussion

Taste is the perception of various food substances by a particular person. In the present study, food was placed toward the posterior one-thirds of the tongue when the candidate was blinded. It has also been revealed that irrespective of where the food is placed on the tongue in the posterior one-third region the candidate is able to taste the food. The anterior two-thirds of the tongue majorly consist of filiform papilla; filiform papillae are the most numerous of the lingual papillae. They are fine, small, cone-shaped papillae covering most of the dorsum of the tongue. They are responsible for giving the tongue its texture and are responsible for the sensation of touch. Unlike the other kinds of papillae, filiform papillae do

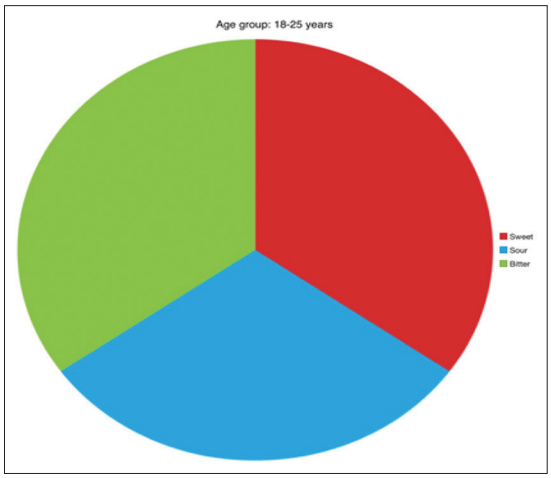

Figure 1: Graphical representation of accurate perception of taste in the age group of 18-25 years

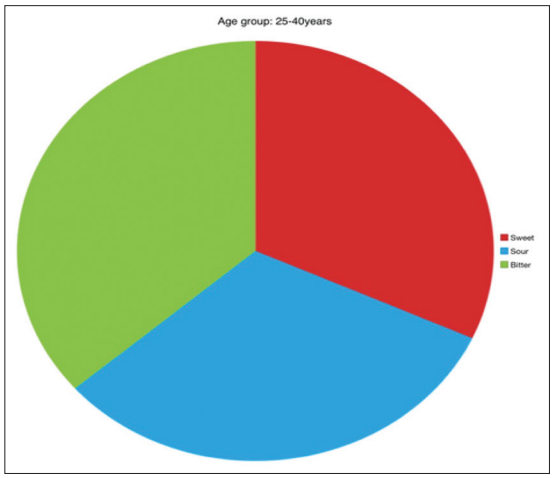

Figure 2: Graphical representation of accurate perception of taste in the age group of 26-40 years

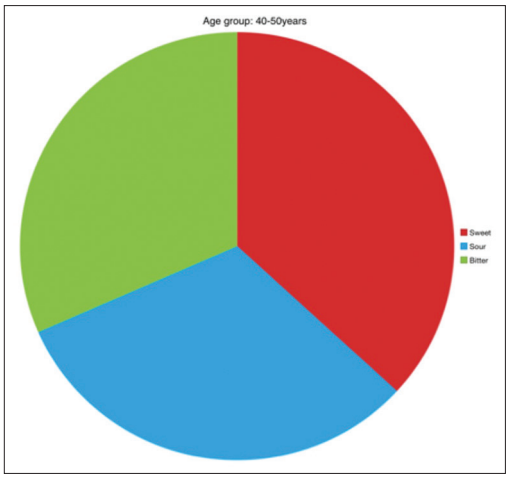

Figure 3: Graphical representation of accurate perception of taste in the age group of 41-50 years

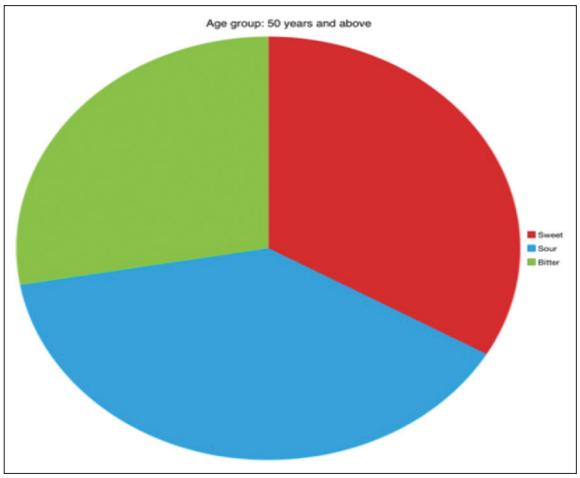

Figure 4: Graphical representation of accurate perception of taste in the age group of >50 years

not contain taste buds.[16] They cover most of the front two-thirds of the tongue's surface.[17] Foliate papillae are short vertical folds and are present on each side of the tongue. There are four or five vertical folds, taste buds, the receptors of the gustatory sense, are scattered over the mucous membrane of their surface.

Various studies propose that the sensory specific satiety decrease with age.[18] A general trend which was observed in the present study across all age groups is that the sweet taste was perceived in a better degree in comparison to the other tastes. Humans last shared a common ancestor with other great apes approximately 7–8 million years ago. If the wild feeding patterns of extant great apes reflect the diet of our last common ancestor, then, this species was an omnivore whose diet was rooted in tropical fruits, with leaves and insects.[19] Our closest relatives, the chimpanzees (*Pan troglodytes*),[20] derive the large majority of their calories from fruit.[21] A small part of their diet is also animal-based, ranging from monkeys to insects. Early hominids drifted away from the forest diet of the apes to more varied, open-terrain diets. Between 4.4 and 2.3 million years ago, the dietary habits and nutritional versatility of hominids expanded dramatically.[22] Despite this dietary expansion, we retained our ancestral fruit preference and fondness for sugars and acids, which we share with the other great apes. The principal attraction to fruit nutritionally is the sugars they contain, which are innately satisfying, and the Vitamin C, which is necessary for hominoids to sustain life, this would explain why the candidates always perceived the sweet taste at a good percentage.

In the present study, the ability to perceive bitter taste correctly and accurately decreased with age. There is a consistent decline with age. Sensitivity to bitter tastes provides an important means for animals and human beings to interact with their environment. By allowing the detection of various toxic compounds in food, as a, means of defense in herbivores, and to regulate their toxins for humans today, bitter taste sensitivity is probably less important to avoid poisoning, but their role still exists as the taste influences health. In addition, the perception decreased because of decreased stimulation of the taste buds.[23] On the contrary, to bitter and sweet taste there is no general trend with respect to sour taste. However, there is a consistent increase in its perception in the age group of 50 years and above.

Thus, as a conclusive element, it can be noted from the study that in the Indian population there is always affinity toward sweet irrespective of age and there is a decrease in bitter taste with respect to age.

Conclusion

From this study, it is clear that age has a clear relation with taste perception. This would help in improving various drugs and increase the taste sensation of different age groups in general. Thus with the above data, it is clear that taste changes with age thus people who are aged to have a better nutrition can focus on the tastes which they perceive better. As this would enable them to like the food they eat and hence stay more healthy. Sensory responses to the taste, smell, and texture of foods help determine food preferences and eating habits. However, sensory responses alone do not predict food consumption. The view that a "sweet tooth" leads to obesity through excess sugar consumption is overly narrow. In reality, there are multiple links between taste perceptions, taste preferences, food preferences, and food choices and

the amount of food consumed. Taste responses are influenced by a range of genetic, physiological, and metabolic variables. The impact of taste factors on food intake further depends on sex and age and is modulated by obesity, eating disorders, and other pathologies of eating behavior.[23]

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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