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Research Article

EFFECT OF CHLORHEXIDINE MOUTHWASH ON TASTE ALTERATION

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ABSTRACT

Objective: Chlorhexidine (CHX) mouthwash is used as an antibacterial mouthwash since it is active against Gram-positive and Gram-negative organisms, anaerobes, aerobes, and yeast. It helps in reduction of dental plaque and is used to help treat gingivitis. Adverse effects of chlorohexidine are increased staining of teeth, burning sensation and most importantly taste alteration. This study will be based on the change of taste perception after rinsing with 0.2% CHX. To study the effect of 0.2% CHX mouthwash on taste perception.

Methods: Patients were exposed to different tastes using four samples-sweet, sour, bitter and saltiness and using a visual analog scale the intensity of taste perception was noted before and after CHX rinses. This study was performed on 100 patients from Saveetha Dental College.

Results: Sweet taste was the same for 59% of the cases while 31% of them had mild decrease in sweetness. In the case of sourness, 76% had same while 17% had mild reduction in sour sensation. For bitterness 2% of the cases had same, 25% had mild decrease, 63% had moderate decrease and 4% had severe decrease for the taste. While in saltiness, 9% of the cases had same, 58% had mild decresase and 26% had severe decrease.

Conclusion: It was found that 0.2% CHX has reduced the intensity of bitterness and saltiness quite drastically while sweetness and sourness had shown very less to no reduction in an intensity of taste perception.

Keywords: Chlorhexidine, Mouthwash, Taste, Dysguesia.

INTRODUCTION

The tongue is a muscular organ attached to the floor of the mouth. It is the principal organ of taste, an aid in chewing and swallowing and in humans, an important organ of speech. Taste is a primary sense, conveying important chemical information from the oral cavity to the brain to regulate ingestion [1]. The taste system consists of several anatomical and functional components including a distributed array of taste buds within the oral and pharyngeal cavities [2]. Taste buds are multicellular end organs of roughly 50-100 fusiform cells, which transduce rapid stimuli into electrochemical signals. These taste-responsive cells serve one particular taste modality such as sweet, sour, bitter, umami, or salty [3,4]. Most of the taste buds are found on elevated structures on the surface of the tongue which are called papillae. There are four types of lingual papillae present in the human tongue, which are fungiform, filiform, circumvallate, and foliate papillae (Fig. 1). Taste buds are found on the circumvallate, fungiform, and foliate papillae [5] and surfaces of the palate but not on the filiform papillae. Each taste bud consists of almost 50-100 neuroepithelial cells found within the epithelium of the oral cavity [6] (Fig. 2).

Chlorhexidine (CHX), a cationic bisbiguanide antiseptic with low mammalian toxicity and broad-spectrum antibacterial [7] activity, was first described in 1954 (Fig. 3). CHX is a broad-spectrum antimicrobial agent with effect on Gram-positive and Gram-negative bacteria as well as on fungi and some viruses [8]. There are reports that chronic use of the topical oral disinfectant and anti-gingival agent, CHX (at 0.12-0.2%), reduces the salty taste [9] and the bitter taste [10]. This study is done to verify the results of the previous reports and check whether bitterness and saltiness reduce their intensity of taste (dysgeusia) in human taste perception.

METHODS

The study was conducted in Saveetha Dental College on 100 patients (50 males and 50 females). Four different types of components mixed in distilled water were given to patients-coffee powder (bitter), lemon juice (sour), sucrose (sweet), and sodium chloride (saltiness). The "sip and spit" method was used where the patient takes a sip and after the intensity of taste is perceived, the person spits it out and is given distilled water to clear the taste for the perception of the next taste. The intensity of taste is measured using a visual scale given to them in their questionnaire which was to be circled by the patients. This is followed by giving them 5 ml of 0.2% chlorohexidine mouthwash to rinse before exposing the patient to the different samples, and distilled water was given to rinse after each exposure to ensure no overlapping of tastes occur after rinsing with it. The taste intensity is marked on an another visual scale provided in the questionnaire. The visual scale is number from 1 to 10 and is marked immediately. The taste samples were replaced timely to maintain a standard taste exposure. Precautions were taken to ensure that the samples were in the best condition before ingestion and in the same concentration for all the patients.

RESULTS

According to the visual scale, the intensity of decrease in the taste perception of the liquid components was divided into four main categories: Same(s), low(l), moderate(m) and high(h). The sweet taste was the same for 59% of the cases while 31% of them had mild decrease in sweetness (Graph 1). In the case of sourness, 76% had same while 17% had mild reduction in sour sensation (Graph 2). For bitterness 2% of the cases had same, 25% had mild decrease, 63% had moderate decrease and 4% had severe decrease for the taste (Graph 3). While in saltiness, 9% of the cases had same, 58% had mild decresase and 26% had severe decrease (Graph 4).

The study shows a majority of patients had a moderate decrease in bitterness while mild decrease in saltiness. There were few variations such as increase in taste in some cases which are ignored on the basis of ps ychological state and situational pressure.

DISCUSSION

Treatment with CHX, a bisbiguanide antiseptic, produces a profound and lengthy alteration of the salty taste of all salty compounds. It reduces

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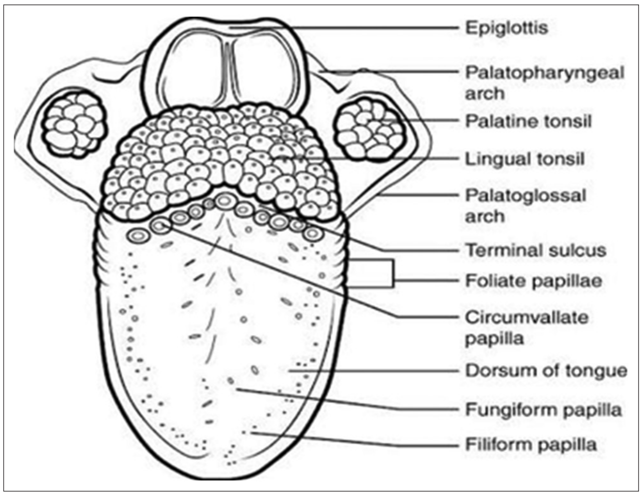


Fig. 1: Map of the human tongue. www.ehealthideas.com

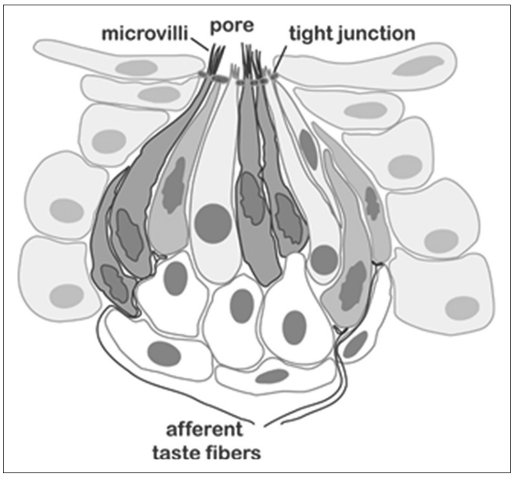


Fig. 2: Structure of a taste bud. taste perception, associated hormonal modulation, and nutrient intake. Hillary B. Loper, Michael La Sala, Cedrick Dotson, Nanette Steinle

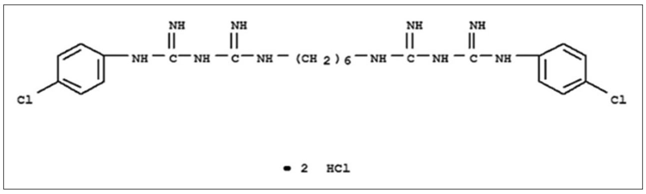
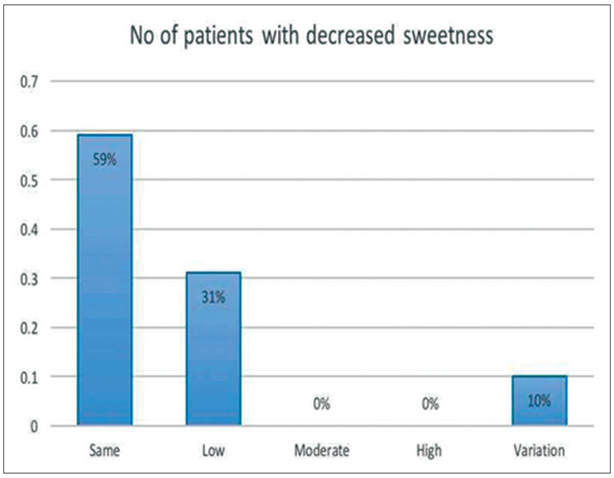
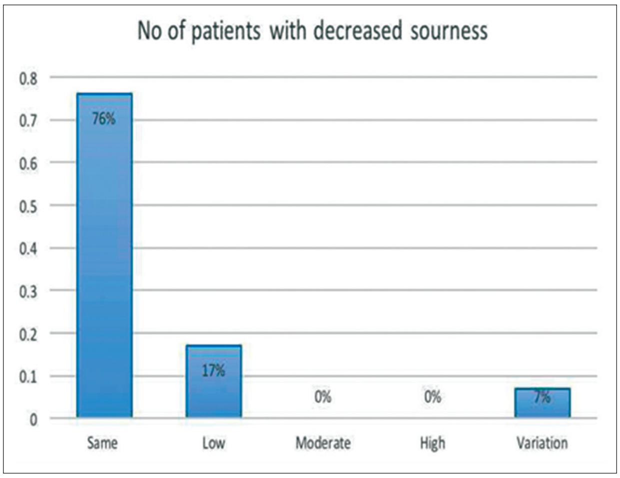


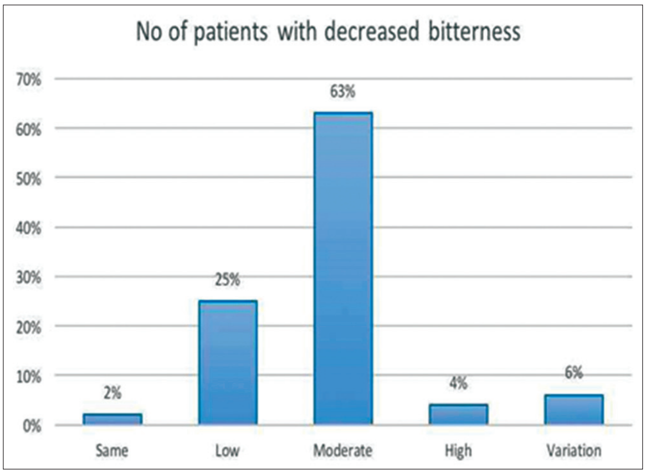
Fig. 3: Molecular structure of chlorhexidine. www.lookchem.com



Graph 1: Decreased perception of sweetness



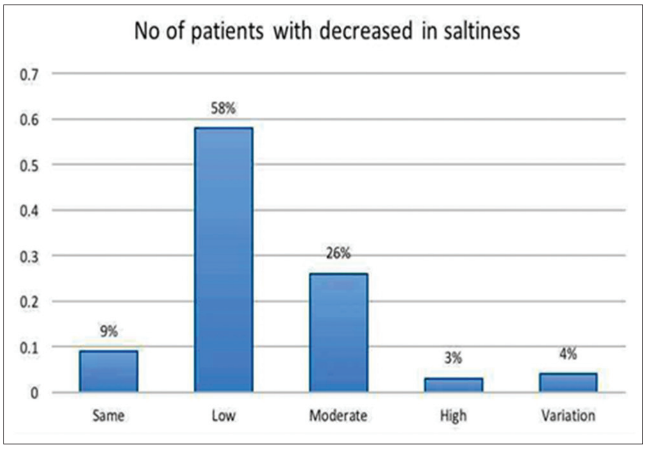
Graph 2: Decreased perception of sourness



Graph 3: Decreased perception of bitterness

the bitter taste of a subset of bitter compounds but has little effect on sweet and sour tastes [11]. Humans may have less specialized oral taste fields than rodents [12]. Perceptions activated by either the facial or glossopharyngeal nerve encompass sweet, salty, sour, and bitter taste qualities. CHX is the only known blocker of salty taste in humans [13]. The uniqueness of CHX action may be due to its bis-biguanide structure, and the mechanism may involve reduced paracellular ion movement [14] and blockage of ion channels in taste receptor cell membranes [15].

For the bitter taste, coffee powder mixed in water was used which helped to induce the bitter sensation. Caffeine has a distinct bitter taste and has a test threshold of only 75-155 mg/L. However, it was also found that caffeine only accounts for around 10% of the perceived bitterness in coffee [16]. Quinic acid which is a degradation product of chlorogenic acids is present at 20 times its maximum value and is partly responsible for the perceived bitterness in coffee. Trigonelline is found as a bitter component at concentrations of 0.25%, whereas chlorogenic acids need a concentration of 0.4% at pH of 5 to give bitterness. Trigonelline degradation is proportional to roast degree. Its byproducts include pyridines, which are said to contribute a roasty aroma to the coffee. Since the main constituent present in coffee powder is quinic acid - a derivative of quinine, taste perception of quinic acid maybe same as quinine. In humans, the intensity and identification as bitter of bitter ionic and nonionic stimuli, including quinine, bitter salts with



Graph 4: Decreased perception of saltiness

monovalent cations, urea, and sucrose octaacetate, are reduced by CHX [13,14]. Only tastes of bitter salts with divalent cations, like $CaCl_2$ and $MgSO_4$, are known to be unaffected by CHX. The results found from this study gives similar results to the studies of Frank *et al.* 2001 [13] and Breslin and Tharp 2001 [14].

CONCLUSION

The perception of bitter and salty taste was found to be decreased while sour and sweet taste remained almost undisturbed.

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