

Differences between the sensitivity of salty taste of menopause concentration of 3% NaCl and postmenopause concentration of 4% NaCl

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Abstract

Background: Aging process happens in all of organ structures, including taste organ. Aging means dynamic and complexity processes that caused changing cells. Organ functions and metabolism activity on menopause become decrease. On the other hand, organ functions and metabolism activity on another menopause don't decrease during elderying. Purpose: The aim of this research was to investigate the difference perception of salty taste perception between menopause and postmenopause. This experiment was true experimental. Method: The samples were consists of two groups, each group have 16 samples. First group was menopause (45-50 years) and the other group was postmenopause (55-65 years). The respondents are experimented at 8.00 am. We applied NaCl solution in concentration 2 %, 3%, 4%, 5%, 6% on border of anterior tongue, start from low concentration until they feel perception salty taste. Result: Samples are analyzed by Mann-Whitney test, and the result $p < 0,05$. Conclusion: Concentration of 3% NaCl menopause have felt the salty taste while the postmenopause salty taste at a concentration of 4% NaCl so experimental perception of salty on postmenopause is less than menopause.

Keywords: Salty Taste; Menopause; Postmenopause; Human; Health.

1. Introduction

The sense of taste has the function of distinguishing the taste of each food that enters the oral cavity. The tongue is an important part of the body for the sense of taste which contains chemoreceptors (parts that function to capture the taste of chemical stimuli dissolved in water), to feel the response to salty, sour, bitter, sweet and umami tastes. Each taste of a substance that enters the oral cavity will be responded to by the tongue in a different place. The taste that a person receives is a combination of the five primary tastes. The salty taste is formed by ionized salts, the cations of the salt mainly play a role in forming the salty taste, but the anions also play a role, although to a lesser extent [1].

Biological age is influenced by environmental factors, which are dominated by nutritional factors. Even though the trigger factors are the same, the biological factors are different because they are influenced by the maturity or deterioration of body tissue. In general, the physical condition of someone who has entered old age experiences a two-fold decline. The number of elderly people in Indonesia in 2020 is estimated to reach 28.8 million or 11% of the total population. However, there are around 74% of elderly people aged 60 years and over suffering from chronic diseases who have to take medication continuously throughout their lives where a decrease in the production of hormones produced by the ovaries and their impact on the hypothalamus-pituitary axis will reduce target organs. Menopausal

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women live in a state of estrogen deficiency [2]. Deficiency of this hormone causes decreased function of body organs that depend on estrogen, such as the ovaries, uterus (womb) and endometrium. Sooner or later, disorders due to estrogen deficiency will definitely arise, namely in the form of increased cholesterol and triglyceride levels, reduction in bone tissue which leads to osteoporosis, psychological disorders, fatigue and depression [3,4].

The aging process is a process that occurs in the body. The aging process causes a decrease in body function, such as complaining that there is no taste of food. This complaint can be caused by increasing age affecting taste sensitivity due to a reduction in the number of taste buds on the tongue, loss of taste receptor elements can also reduce function which can affect the decline in taste sensation. One of the impacts of the aging process is hypertension, with a decrease in salty taste sensitivity there will be a buildup of Na⁺ levels so that the concentration of Na⁺ in the extracellular fluid increases. To dilute it, the volume of extracellular fluid will be increased by withdrawing fluid from the intracellular part. As a result, blood volume increases, which will increase blood pressure [2].

2. Material and methods

The method of this research was 32 samples, 16 samples each of women who came to the prosthodontics clinic who were in menopause aged 45-50 years and 16 postmenopausal samples aged 55-65 years, Javanese race and domiciled in Surabaya. The criteria for samples in this menopause study were good OH, no injuries/abnormalities on the tongue or oral cavity, no history of systemic disease.

The materials used are 2%, 3%, 4%, 5% and 6% NaCl solutions and use of distilled water while the tools used are neirbeken, tweezers, mouth mirror, cotton roll, mouthwash glass, cotton wool, tissue.

The research procedure was carried out on both sample groups with the same treatment, namely the samples were instructed to rinse their mouths first with distilled water, then the samples were instructed to stick out their tongues, then the tongues were dried with a cotton roll to obtain a relatively dry tongue condition to prevent the influence of saliva. On the anterior tip of the tongue, two drops of NaCl solution were dripped with the help of a dropper from the lowest concentration to the highest concentration until the subject felt a salty taste. If the sample does not taste salty, it is instructed to gargle with distilled water for 20 seconds and rest for approximately 5 minutes before the next treatment at a higher concentration. During the experiment, keep the mouth open so that the tongue remains dry and if the sample tastes salty, give a sign with your index finger. Researchers gave a scoring index, namely 2% concentration = score 4, 3% concentration = score 3, 4% concentration = score 2, 5% concentration = score 1, 6% concentration = score 0.

3. Results

Based on the results of research on the sensitivity of the sense of salt taste in the menopausal and postmenopausal groups, with 16 samples each, the following results were obtained.

Table 1 Descriptive table

Group	N	\bar{x}	SD	Min	Max
Menopause	16	3	0,447	2	3
Postmenopause	16	1	0,632	0	2

The information is that n is the size of the research sample, \bar{x} is the average scoring, sd is the standard deviation, min is the smallest value, max is the largest value.

The sample size obtained from previous research for each group was 16 samples. This number was obtained from sample size calculations and preliminary research results. The menopausal group has a mean sensitivity score for the sense of salt taste to NaCl solution of 3 which can also be called 4% with a standard deviation of 0.447, while the postmenopausal group has a mean sensitivity score for the sense of salt taste to NaCl solution of 1 which can also be called 5% with a standard deviation of 0.632. This can prove that the menopausal group has a higher sensitivity to salt taste to NaCl solution than the postmenopausal group.

From the research results, the results of data analysis were obtained like this: Mann-Whitney U was 12,000, Wilcoxon W was 148,000, z was -4,620, Asymp.Sig.(2-tailed) was .000, Exact Sig. [2*(1-tailed Sig.)] is found to be .000a

To determine the difference in the sense of saltiness in menopausal and postmenopausal women in this study, the Mann-Whitney test was used. This is because the group being tested had an interval data measurement scale, and tested two sample groups.

In the Mann-Whitney test statistical test between the menopausal and postmenopausal groups the result was $p = 0.000$ ($p < 0.05$). This shows that there is a significant difference in the sensitivity of the sense of salt taste between menopausal and postmenopausal women.

4. Discussion

This research was conducted to determine whether there are differences in the sensitivity of the sense of saltiness in menopausal and postmenopausal women. In this study, NaCl solutions were given with concentrations of 2%, 3%, 4%, 5%, 6%.

Salty is a taste produced by the presence of Na⁺, apart from Na⁺ there are also alkali metal groups, but unlike Na⁺ the sensation of salty taste is less. A number of organic compounds can also be tasted as salty, for example the dipeptides lysyltaurine and ornithyltaurine. The cations from salt mainly play a role in forming a salty taste, but the anions also play a role, although to a lesser extent. The quality of the salty taste varies from one to another depending on the cation and actually because salt also gives off other flavors besides the salty taste [1]. The salty taste is triggered by NaCl, through the main receptor is the epithelial Na⁺ channel (EnaC). Like epithelial Na⁺ channel (EnaC) receptors elsewhere, receptors in the oral cavity are inhibited by amiloride, so administering this diuretic to the tongue will eliminate the ability to taste salty. Surface Na⁺ channels will depolarize the cell so that they can activate Ca⁺ channels in the basolateral membrane, resulting in transmitters being released to afferent neurons. The entry of Na⁺ channels into salt receptors causes receptor depolarization and triggers the release of glutamate, in surrounding afferent neurons [2].

After conducting research on NaCl solutions with concentrations of 2%, 3%, 4%, 5%, 6%. At a concentration of 3%, the postmenopausal group could not taste the salty taste, while at 5% the menopausal group could taste more salt than the postmenopausal group. This means that the sensitivity of the sense of saltiness in postmenopausal women decreases compared to postmenopausal women. The NaCl solution at a concentration of 2% cannot be felt in this sample, this is possible because the NaCl solution at a concentration of 2% is the lowest threshold for the taste buds to feel a salty taste, so the sample cannot taste the salty taste at this concentration [3].

The scores from research results from menopause and postmenopause can show that there is a difference in the menopausal sample starting to taste salty at a score of 3, while postmenopausal people start to feel salty at a score of 2. This is due to the degeneration process, including a decline in the body's metabolism and a decrease in hormone production and the presence of papillary atrophy. tongue. There is also a scoring which shows that menopausal samples have tasted salty at a score of 3, while postmenopausal people have only felt a salty taste at a score of 1. This could be due to a decrease in estrogen deficiency which can disrupt the production of Growth Hormone and Insulin-like Growth Factor (IGF-1). so that there is an increase in the process of apoptosis in various body cells and this will cause the aging process to occur more quickly [1,5,6].

The results of this study are also supported by a theory which explains that in elderly people the dorsal surface of the tongue tends to become smoother due to atrophy of the tongue papillae. Histopathological changes in the tongue show papillary atrophy which often starts from the tip of the tongue, lateral sides and base of the tongue. So the number of taste buds in the circumvallate papillae decreases, which causes a decrease in taste sensitivity. The larger circumvallate papillae each contain up to 100 taste papillae, usually located on the sides of the papillae, but due to limited data it is said that there are around 200-250 taste buds per circumvallate papillae in each individual under 20 years of age, and this decreases to 200 taste buds. approaching maturity, approximately 100 taste buds before the age of 75 years [4].

One of the impacts that can occur in old age is hypertension. In the oral cavity, what happens is that the epithelium becomes thin and atrophies due to keratinization, resulting in decreased tolerance to the prosthesis and changes in the sense of taste. Decreased sense of salty taste which causes consumption of higher doses of salt in postmenopausal women. If this continues for a long time it will result in changes in blood pressure. Excessive Na⁺ consumption causes the Na⁺ concentration in the extracellular fluid to increase. To dilute it, the volume of extracellular fluid will be increased by withdrawing fluid from the intracellular part. As a result, blood volume increases, which in turn will increase blood pressure [2,5].

If the nerve is cut, degeneration of the taste buds will occur. Apart from causing a decrease in the sensitivity of the sense of taste on the tongue, manifestations on the tongue that are often found in menopausal and postmenopausal women often experience a dry mouth due to reduced saliva volume (dry mouth), reduced blood flow, the sensation of taste arises due to the detection of chemical substances by special receptors at the tips of taste cells (taste buds) found on the surface of the tongue and soft palate. Taste cells continue to experience changes in growth, death and regeneration. This process depends on the influence of the sensory nerves because if these nerves are cut, degeneration of the taste buds will occur. The taste buds served by sensory nerve fibers are the taste buds on the anterior 2/3 of the tongue (filiform papillae and some fungiform papillae) served by the chorda tympani branch of the facial nerve (VII nerve) [1,2,3].

From the results of this study, it can be concluded that there is a difference in the sensitivity of the sense of taste for salt in menopausal and postmenopausal women, where at a concentration of 3% NaCl, menopausal sufferers already taste salty, while postmenopausal people only experience a salty taste at a NaCl concentration of 4%.

5. Conclusion

Concentration of 3% NaCl menopause have felt the salty taste while the postmenopause salty taste at a concentration of 4% NaCl so experimental perception of salty on postmenopause is less than menopause.

Compliance with ethical standards

Disclosure of Conflict of interest

No Conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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