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The correlation of decreased vertical dimensions with occurrence of angular cheilitis in elderly at the integrated healthcare center of elderly in Gurah Village, Gurah District, Kediri

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Abstract

Tooth loss is a state of detachment of one or more teeth from their sockets. This condition if not treated will cause changes in the face due to a decrease in vertical dimensions. The deep folds at the corners of the mouth allow saliva to come out of the mouth and tend to collect in the area thereby creating a moist and conducive environment for the growth of fungi or bacteria which will cause new problems, namely the emergence of abnormalities in the mucocutaneous area called Angular cheilitis. The study aims to determine the correlation between the decrease in the vertical dimension and the occurrence of Angular cheilitis In the Elderly at the Integrated Healthcare Center of Elderly in Gurah Village, Gurah District, Kediri. This study used an analytical observational design, with a cross-sectional design with sampling techniques using purposive sampling. The data obtained are then analyzed and interpreted to test the hypothesis using the Fisher exact alternative test and the contingency coefficient correlation test. The results showed the significance value of the Fisher exact test on both variables is 0.025 Asymp. Sig. (2-sided) and Contingency coefficient test value of 0.001 Approx. Sig and a value of 0.476 mean that there is a moderate correlation. There is a moderate correlation between a decrease in the vertical dimension and its occurrence of Angular cheilitis In the Elderly at the Integrated Healthcare Center of Elderly in Gurah Village, Gurah District, Kediri.

Keywords: Loss of Teeth; Decreased Vertical Dimension; Angular Cheilitis; Pathogenic Bacteria; Elderly.

1. Introduction

The Elderly is a period that has reached old age and shows a decline in function and endurance so they can easily be affected by various diseases [1]. Along with the increasing elderly population, the government has formulated various health service policies, one of which is the Integrated Healthcare Center of the Elderly [2].

The condition of the oral cavity of the elderly is identical to tooth loss as a result, the elderly no longer have complete teeth [1]. Loss of teeth can cause disturbances in occlusal relations, speech function, and esthetics and can cause changes in vertical dimension [3]. The magnitude of the decrease in the vertical dimension is also influenced by the gender factor. Elderly women are affected by the menopause phase, causing elderly women to experience alveolar bone resorption, loss of attachment to periodontal tissue, and tooth loss [4].

In elderly patients with a decrease in vertical dimension, there will be deep folds in the corners of the mouth allowing saliva to flow out of the mouth, saliva tends to accumulate in these areas, creating a moist and favorable environment for the growth of fungi or bacteria, which causes new mucocutaneous problems called Angular cheilitis [5]. Angular cheilitis or also called angular stomatitis, or "perlèche" which comes from the French "pourlècher" is a lesion in the form of inflammation in the corner of the lips that starts from the mucocutaneous junction and can extend to the skin area

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[6]. Based on this, it shows the importance of treatment and prevention of this disease. ² It is necessary to conduct further research related to the relationship of vertical dimension decline with the occurrence of Angular cheilitis, especially in the elderly in Gurah village, Gurah District, Kediri Regency.

⁴ 2. Material and methods

2.1. Material

The tools used in this study consisted of an Informed Consent sheet, handscoon, mask, sliding caliper, chair, mouth glass, camera, and autoclave. The material used was 70% alcohol and soap.

⁵ 2.2. Methods

The research design used in this study was analytic observational with a cross-sectional design. The population in this study were all elderly at the Integrated Healthcare Center of Elderly in Gurah Village, Gurah District, Kediri which amounted to 50 elderly women. The sample in this study were all elderly women at the Integrated Healthcare Center in Gurah Village, Gurah District, Kediri who met the criteria. Sampling was done by purposive sampling technique using the Slovin formula and obtained a sample size of 35 elderly.

The study procedure began by:

- Samples were instructed to fill out an informed consent form.
- Samples were subjected to intra-oral examination to see the use of dentures, and the number and region of missing teeth, then vertical dimension measurements were taken directly using the Willis method.
- The measurement of the vertical dimension in this study was carried out with 2 measurements, namely the initial VDO and final VDO measurements at one time.
- The measurement begins with the initial DVO measurement which is carried out directly on the subject in a physiological rest position.
- The measurement was carried out by placing the subject in a comfortable upright position on a chair, then instructing the subject to close their eyes, and then taking measurements with a sliding caliper from the corner of the eye (pupil) to the lip commissure area (rima oris) after getting these results and then deducting the freeway space (2mm).
- After obtaining the initial DVO results and recording them, then proceed to measure the final DVO directly on the subject using a sliding caliper in a predetermined area, namely the subnasion and gnation points in the occlusion position.
- After obtaining these two results, the Vertical Dimensional Decrease = VDO (Initial) - VDO (Final) is calculated and the results are recorded. Furthermore, observation of oral conditions, especially the lip commissure area, was carried out by the dentist to see whether or not there were Angular cheilitis lesions. The results were then recorded in the form of a nominal scale.

⁴ 3. Results and discussion

The results of research conducted on the elderly ≥ 60 years obtained different vertical dimension measurement results in each individual.

Table 1 Vertical Dimension Measurement Distribution

	Minimum	Maximum	Mean
VDO (Initial)	48.40	69.60	62.066
VDO (Final)	36.90	64.30	53.423
ΣDV	3.7	17.0	8.643

Based on Table 1, the average result of reducing the vertical dimension in female respondents is 8.643mm. In previously conducted research, it was proven that male respondents obtained an average decrease of 2.833mm and female respondents obtained an average decrease of 4.683mm. Based on this, it can be seen that there is a significant difference between measurements in elderly men and women. In elderly women, the menopausal phase causes a decrease in

estrogen levels during menopause and can cause elderly women to more easily experience alveolar bone resorption, loss of periodontal tissue attachment, and tooth loss. Estrogen hormones function to maintain the balance of osteoclast and osteoblast activity and increase vitamin D receptors on osteoblasts. Osteoblasts play a role in new bone formation, while osteoclasts play a role in the bone resorption process. Osteoblasts, osteoclasts, and osteocytes also coordinate during the bone remodeling process. Estrogen also serves to stimulate the secretion of the hormone Insulin-Like Growth Factor I (IGF I) which acts to activate Transforming Growth Factor β (TGF β) which can inhibit bone resorption [7].

Table 2 Frequency Distribution Based on the Presence of Angular Cheilitis Lesions

Examination result	Frequency	Percentage (%)
Lesions found	2	5.7
No lesions found	33	94.3
Total	35	100

Based on Table 2, the results showed that the samples who were diagnosed with Angular cheilitis were 2 elderly people (5.7%) while those who were not diagnosed with Angular cheilitis were 33 elderly people (94.3%).

Table 3 Frequency Distribution of Samples With Angular Cheilitis Based on Clinical Features

	Frequency	Percentage(%)
Classification		
Type I	2	100
Type II	0	0
Type III	0	0
Type IV	0	0
Total	2	100
Location		
Unilateral	0	0
Bilateral	2	100
Total	2	100

Frequency distribution based on the clinical features of Angular cheilitis. Based on the classification of Angular cheilitis, samples who suffered from Angular cheilitis Type I were 2 elderly people (100%). Angular cheilitis type I is characterized by a single rhagade limited to the lip commissure [6]. The lesions found in this study were bilateral Angular cheilitis lesions in as many as 2 elderly people (100%) and no unilateral Angular cheilitis lesions were found. This states that type I is the most common type found in patients. This is in line with research conducted previously, which found bilateral lesions as much as 72.3%. Unilateral lesions are generally caused by bad habits, namely licking the corners of the lips, while bilateral lesions are caused by predisposing factors, one of which is a decrease in vertical dimensions in the elderly [8]. The results of the study presented in Table 4 show that samples with a decrease of 1-10mm were not found to have Angular cheilitis lesions in the elderly, while at a decrease of 11-20mm, there were 2 elderly samples diagnosed with Angular cheilitis. If the vertical dimension decreases, it will cause the angle of the mouth to drop which will later form folds at the corners of the mouth. The folds in the corners of the mouth will cause an accumulation of saliva, creating an atmosphere conducive to the growth of infectious agent microorganisms [9]. Infectious agents that cause Angular cheilitis are mostly caused by *Candida albicans* and *Staphylococcus aureus* fungi which are included in the normal microflora, but when influenced by predisposing factors and microorganism imbalances can cause Angular cheilitis [10].

The Fisher exact test results in Table 5 show the significant value generated is 0.025. This value is smaller than 0.05, which means that there is a relationship between a decrease in the vertical dimension and the occurrence of Angular cheilitis in the elderly at the Integrated Healthcare Center of Elderly in Gurah Village, Gurah District, Kediri. The main factor to be considered in cases such as Angular cheilitis is the age of the patient. As we age, changes in the body's

immunity will occur. These changes will contribute to the occurrence of disease and inflammation. If the patient has lost many posterior teeth, the vertical dimension will be reduced due to the absence of occlusion between the teeth in the maxilla and mandible. The combination of bone resorption, muscle atrophy, and tooth loss will lead to a reduced distance between the nose and chin. This condition causes the skin around the mouth area to fold and wrinkle. The folds and wrinkles will cause saliva containing *Candida albicans* and *Staphylococcus aureus* to gather in the corners of the mouth and cause infection [11]. Angular cheilitis examination is based on the condition of the corners of the lips with symptoms and clinical images such as cracks, fissures, or deep lines, white or red, which can appear on one side or both sides of the examination based on the presence or absence of Angular cheilitis recorded on a nominal scale.

Table 4 Cross-Tabulation Between Decreased Vertical Dimension and Angular Cheilitis

		Angular Cheilitis		Total
		No lesions found	Lesions found	
Decreased vertical dimension	1-10 mm decreased	29	0	29
	11-20 mm decreased	4	2	6
Total		33	2	35

Table 5 Data Analysis Between Decreased Vertical Dimension and Angular Cheilitis

	Asymp. Sig. (2-sided)
Fisher's Exact Test	0.025

Table 6 Contingency Coefficient Correlation Analysis Test

	Value	Approx. Sig
Contingency Coefficient	0.476	0.001

The Contingency Coefficient correlation test in Table 7 shows the Approx. Sig of 0.001 and a value of 0.476. This can be interpreted that there is a moderate relationship between the decreased vertical dimension and the occurrence of Angular cheilitis. Although Angular cheilitis can occur in the elderly with decreased vertical dimension, not all elderly with decreased vertical dimension will have this condition. Based on the interviews conducted in this study, the group that did not have Angular cheilitis stated that the samples had good oral hygiene habits such as brushing their teeth regularly and using mouthwash, and consuming foods with protein and vitamin sources such as chicken meat, eggs, vegetables, and nuts, so it can be concluded that the nutritional needs of these samples were well fulfilled.

This is in agreement with research conducted by Sriwahyuni that good oral hygiene can reduce the risk of Angular cheilitis [5]. The other factor that causes the decreased risk of Angular cheilitis in the elderly of Gurah Village is the routine of the elderly in visiting the Integrated Healthcare Center so that systemic diseases that are suffered by the elderly of Gurah Village, especially those with diabetes mellitus, are always controlled. Research that has been done before states that if there is an increase in glucose levels it can cause overgrowth of *Candida albicans* [12].

Based on the description above, it can be concluded that there is a moderate relationship between decreased vertical dimension and the occurrence of Angular cheilitis. In the elderly with decreased vertical dimension, the risk of Angular cheilitis can be reduced by maintaining oral hygiene, diet, lifestyle, and frequent visits to health services so that systemic diseases are always controlled.

4. Conclusion

The results showed that the average decrease in vertical dimension in the elderly women of Gurah village was 8.463mm and the distribution of Angular cheilitis sufferers in the elderly women group of Gurah village was 5.7%. The results of

⁵ this study can be concluded that there is a moderate relationship between the decrease in the vertical dimension and the occurrence of Angular cheilitis in the elderly at the Integrated Healthcare Center of Gurah Village, Gurah District, Kediri. Further research needs to be done related to Angular cheilitis with other predisposing factors such as nutritional deficiencies, immunity deficiencies, allergies, and systemic diseases.

Compliance with ethical standards

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Disclosure of Conflict of interest

The authors of this manuscript do not have any financial or personal conflicts of interest.

Statement of ethical approval

The study received ethical approval from Institut Ilmu Kesehatan Bhakti Wiyata Faculty of Dentistry Health Research Ethical Clearance Commission, Kediri (161/FKG/EP/II/2023).

⁶ Statement of informed consent

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

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