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Description of Risk Factors Causing Gingival Recession in New Faculty of Dentistry Students Class of 2022

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Abstract: *Gingival recession is an abnormality in which the gingival margin shifts apically, causing exposure of the root surface which causes aesthetic problems, hypersensitivity, increased risk of caries in the cementum and is susceptible to abrasion. The causes of gingival recession are divided into several things, including the wrong way to brush teeth, poor oral hygiene, periodontal disease, inflammation, occlusion trauma, tooth movement due to orthodontic appliances, and also age. The aim of this research is to determine the risk factors that cause gingival recession in new faculty of dentistry students at the University of Jember Class of 2022. The type of research used in this research is descriptive observational research with a cross sectional approach. The sampling technique in this research used a total sampling technique. The subjects in this study were studied through clinical examination and questionnaires. The results of this study showed that 22 people out of a total of 157 people experienced gingival recession with class I severity according to Miller's classification. Risk factors causing gingival recession in faculty of dentistry UNEJ 2022 students are occlusion trauma experienced by 15 people (68%), tooth brushing trauma experienced by 17 people (77%), use of orthodontic appliances experienced by 2 people (9%), and periodontal disease experienced by 19 people (86%).*

Keywords - *Gingival recession, Occlusion trauma, Tooth brushing trauma, Orthodontic appliances, Periodontal disease.*

I. INTRODUCTION

Gingival recession is an abnormality in which the gingival margin shifts apically, causing exposure of the root surface which causes aesthetic problems, hypersensitivity, increased risk of caries in the cementum and is susceptible to abrasion. The severity of gingival recession was measured using a UNC-15 periodontal probe based on the distance between the cemento enamel junction and the gingival margin. If this phenomenon of

gingival recession is not treated, the supporting tissue and bone structure of the teeth can be damaged, and ultimately result in tooth loss.[1] The causes of gingival recession are divided into several things, including incorrect brushing, poor oral hygiene, periodontal disease, inflammation, occlusion trauma, tooth movement due to orthodontic appliances, and also age.[2] Gingival recession can be caused by physiological and pathological this depends on what causes the gingival recession.

Periodontal disease is a pathological condition in the periodontal tissue of teeth that is still often found throughout the world, whereas in Indonesia, according to Basic Health Research[3], this disease has a prevalence of 74.1%. Periodontal disease is a disease that often occurs in the Indonesian population. This can be seen from Basic Health Research data[3] showing that 57.6% of the Indonesian population experiences dental and oral health problems, including caries and periodontal disease. Periodontal diseases such as gingivitis and periodontitis can arise due to poor levels of oral hygiene, this will also result in abnormalities in the gingiva, namely gingival recession.[4]

Periodontal tissue functions to reduce the occlusion pressure received by the teeth. Periodontal tissue has a threshold limit for withstanding occlusion pressure, if this pressure is excessive it can injure the surrounding periodontal tissue. Excessive pressure received by periodontal tissue causes pathological or adaptive changes in periodontal tissue, called occlusion trauma. Improper contact occlusion can cause periodontal disease, this inappropriate occlusion is usually caused by overhanging fillings, poorly designed denture prostheses, bruxism habits, and irregular tooth alignment. An abnormal bite between opposing teeth can also cause gingival recession and loss of alveolar bone support.[5]

Brushing teeth is a very effective measure for maintaining oral and dental hygiene with the aim of preventing caries and periodontal problems. Using a toothbrush and the right method for brushing your teeth is very helpful in preventing plaque from sticking to your teeth.[6] Applying the correct toothbrush method is very important in supporting dental and oral health, but on the other hand, there are various inappropriate methods for brushing teeth which can have a negative impact on the continuity of dental health, especially on periodontal tissue, this inappropriate method is a method of brushing your teeth that is too hard or excessive.[7]

Frequency of brushing teeth, method of brushing teeth, hardness of toothbrush bristles, length of time brushing teeth, and frequency of changing toothbrushes can also be factors causing the development of gingival recession, this can lead to the risk of tooth root exposure due to the displacement of the gingival margin apically as gingival recession.[8] According to Basic Health Research[3] only 2.8% of all Indonesian people know how to brush their teeth properly.

The use of orthodontic devices will result in plaque accumulation which can increase the number of microbes and change the microbial composition. This plaque retention will increase susceptibility to caries and periodontal infections.[9] Plaque bacteria on teeth are the main etiology that causes gingivitis, which is the initial stage of damage to periodontal tissue. Periodontal complications associated with orthodontic therapy primarily include gingivitis, periodontitis, gingival recession or hypertrophy, alveolar bone loss, dehiscences, and fenestrations. Bone dehiscence and fenestrations are often associated with thin alveolar bone plates compared to normal or thick bone plates, thus thin alveolar bone plates are susceptible to alveolar bone resorption and subsequently cause gingival recession.[10] The presence of microbial plaque is reported to be the most important factor in the initiation, development and recurrence of periodontal disease in reduced periodontium.[9] The subjects used were students from the Faculty of Dentistry, University of Jember Class of 2022 because they had not studied the specifics related to periodontal disease and risk factors. causes of gingival recession.

II. INDENTATIONS AND EQUATIONS

This research is a descriptive observational study with a cross sectional approach. Data collection was carried out on Jember University, *faculty of dentistry* Students Class of 2022 at the Periodontics Integration Clinic, Jember University Dental and Oral Education Hospital. Ethical clearance was obtained from the Health Research Ethics Committee, faculty of dentistry Jember University. The research was conducted in September-October 2023. Research respondents were taken using a total sampling technique, namely a technique that takes the same number of samples as the population and a total of 157 respondents were obtained. Respondents were interviewed based on the list of questions on the questionnaire sheet. An examination of the respondent's oral cavity was carried out to determine the risk factors causing gingival recession which were measured using the

UNC 15 probe. The variables in this study were gingival recession in Jember University faculty of dentistry Students Class of 2022 and risk factors causing gingival recession.

III. FIGURES AND TABLES

Research has been conducted regarding the risk factors that cause gingival recession in *faculty of dentistry* Class of 2022 students. This research was conducted from May to October 2023. The total number of students from the Class of 2022 was 157 people. The number of subjects who underwent examination was found to be 22 people (14%) out of 157 people who experienced gingival recession. The results of gingival recession examination data for Class of 2022 students are presented in table 1 as follows:

Table 1. Frequency distribution based on gingival recession results

faculty of dentistry Student	Amount	Total
Recession	22	14%
Not a recession	135	86%
Total	157	100%

Subjects who experienced gingival recession were divided based on severity into classes I, II, III, and IV as in table 1.

Table 2. Frequency distribution based on severity of gingival recession according to Miller's classification

Class	Amount	%
I	22	100%
II	0	0%
III	0	0%
IV	0	0%
Total	22	100%

Table 2 shows the severity of gingival recession in Jember University *faculty of dentistry* Students Class of 2022 based on Miller's classification. All students who experienced gingival recession were in class I with a clinical picture, namely that the gingival recession experienced did not extend to the mucogingival junction (MGJ) and there was no loss of periodontal tissue (bone or soft tissue) in the interdental area, so this recession was still reversible.

Table 3. Frequency distribution of respondents based on risk factors that cause gingival recession

Risk Factors	Yes	%	No	%	Total	%
Occlusion trauma	15	68%	7	32%	22	100%
Toothbrushing trauma	17	77%	5	23%	22	100%

Use of orthodontic appliances	2	9%	20	81%	22	100%
Periodontal disease	19	86%	3	14%	22	100%

Table 3 shows that 15 respondents (68%) had risk factors for gingival recision due to occlusion trauma, 17 people (77%) due to brushing trauma, 2 people (9%) due to the use of orthodontic tools, and 19 people (86%) due to periodontal disease. Risk factors for traumatic occlusion are assessed based on indicators of bad habits in the oral cavity and malposition of teeth experiencing gingival recession. This condition can be seen in respondents as in table 4 below.

Table 4. Frequency distribution of respondents based on occlusion trauma indicators

Occlusion Trauma	Yes	%	No	%	Total	%
Bad habits in the oral cavity	0	0%	22	100%	22	100%
Malposition of teeth experiencing gingival recession	15	68%	7	32%	22	100%

Table 4 shows that none of the respondents had bad parafunctional habits in the oral cavity. Respondents who experienced malposition of teeth experiencing gingival recession were 15 people (68%). Risk factors for toothbrushing trauma are assessed based on indicators of strength when brushing teeth and toothbrushing technique. This condition can be seen in respondents as in table 5 below.

Table 5. Frequency distribution of respondents based on toothbrushing trauma indicators

Tooth Brushing Trauma	Yes	%	No	%	Total	%
Strength when brushing teeth	11	50%	11	50%	22	100%
Tooth brushing technique	17	77%	5	23%	22	100%

Table 5 shows that 11 people (50%) applied strong force when brushing their teeth. Respondents who used inappropriate tooth brushing techniques were 17 people (77%). Risk factors for using orthodontic appliances were assessed based on indicators of length of use of orthodontic appliances and gingivitis. These conditions can be seen in respondents as in the table below.

Table 6. Frequency distribution of respondents based on indicators of orthodontic appliance use

Use of Orthodontic Appliances	Yes	%	No	%	Total	%
Using orthodontic appliances ≥ 1 year	2	9%	20	91%	22	100%
Gingivitis	2	9%	20	91%	22	100%

Table 6 shows that 2 people (9%) used orthodontic devices for more than one year. Respondents who used orthodontic devices experienced gingivitis as many as 2 people (9%). Risk factors for periodontal tissue disease are assessed based on BOP indicators and bleeding when brushing teeth. This condition can be seen in respondents as in table 7 below.

Table 7. Frequency distribution of respondents based on indicators of periodontal tissue disease

Periodontal Disease	Yes	%	No	%	Total	%
BOP	19	86%	3	14%	22	100%
Bleeding when brushing teeth	18	82%	4	18%	22	100%

Table 7 shows that 19 people (86%) experienced BOP. Respondents who experienced bleeding when brushing their teeth were 17 people (77%).

IV. DISCUSSION

Gingival recession is a shift or movement of the gingival margin in an apical direction because the marginal gingiva is positioned more apical than the Cemento Enamel Junction (CEJ), so that the root surface which was originally closed becomes open.[11] Gingival recession occurs more frequently in the adult population, because the prevalence of gingival recession increases with age, but gingival recession is not always caused by the aging process.[12]

The results of this study showed that 14% (22 people out of 157 people) of *faculty of dentistry* UNEJ Class of 2022 students experienced gingival recession. All respondents experienced class I gingival recession according to Miller's classification. The clinical picture of Class I gingival recession, namely that the gingival recession experienced does not extend to the mucogingival junction (MGJ) and there is no loss of periodontal tissue (bone or soft tissue) in the interdental area, so this recession is still reversible. Based on other research, gingival recession does not occur frequently in young adults although its frequency increases with age.[13] This is in line with this research that only 14% (22 people out of 157 people) only experienced gingival recession.

The results of other studies state that recessions in the mild category occur more often due to poor oral hygiene, smoking, malposition, protruding root morphology, and a frenulum that is too coronal, narrow gingival attachment, the habit of combing, and the use of orthodontic appliances and teeth. imitation. The wrong way to brush your teeth can also cause gingival recession because the duration, strength, consistency of the brush, brushing method, and frequency of changing the brush influence the process of gingival recession, shifting the gingiva towards the apical direction.[14]

The results of the questionnaire obtained from respondents showed that as many as 36% (8 out of 22 people) were active smokers. This data is supported by other research which states that smoking can be associated with the incidence of gingivitis, periodontitis and epithelial malignancies in the oral cavity. Smoking also increases the number and depth of periodontal pockets and loss of periodontal ligament attachment. Loss of periodontal tissue strength caused by harmful compounds in tobacco can increase gingival recession and changes in the oral mucosa.[15]

Gingival recession in *faculty of dentistry* UNEJ students class of 2022 is caused by several risk factors listed in Table 3, namely occlusion trauma, tooth brushing trauma, use of orthodontic appliances, and periodontal tissue disease. The highest frequency of risk factors causing recession are periodontal disease (86%), tooth brushing trauma (77%), occlusion trauma (68%), and use of orthodontic appliances (9%). Based on the results of this research, the gingival recession experienced occurred because each individual experienced more than 1 causal risk factor. This is based on the multi-factorial etiology of gingival recession such as excessive or inadequate tooth brushing, destructive periodontal disease, tooth malposition, alveolar bone dehiscence, thin and smooth marginal root surfaces, high muscle attachment and frenulum pull, occlusal trauma and iatrogenic factors. others so that when one or more factors are experienced by a person, gingival recession will occur.[16]

There are various mechanisms for the formation of gingival recession, based on this, the risk factors causing gingival recession experienced by *faculty of dentistry* UNEJ students class of 2022 are divided into risk factors due to trauma (occlusion trauma, tooth brushing trauma, and use of orthodontic tools) and due to bacterial infection (disease) periodontal tissue.

The risk factors due to trauma experienced by *faculty of dentistry* UNEJ 2022 students are divided into occlusion trauma, tooth brushing trauma, and the use of orthodontic appliances. Table 4 shows that the most frequently experienced risk factor for occlusion trauma is malposition of teeth experiencing gingival recession, which was experienced by 15 people (68%). This may occur due to malposition of the teeth which are rotated, tilted, or shifted facially, the bone layer becomes thinner or the bone height decreases, so that the gingival tissue becomes thin, and when the marginal part of the gingiva receives repeated trauma it will cause recession. gingiva (Mundung et al., 2022). In inflamed periodontal tissue structures, occlusion trauma causes the spread of inflammation to the alveolar crest, causing bone loss. This causes damage to the top of the periodontal ligament and affects the inflamed periodontal tissue, resulting in migration of the junctional epithelium towards the area of damage to form gingival recession.[17]

Table 5 shows that the most common risk factors for toothbrushing trauma experienced by respondents were inappropriate toothbrushing technique (77%) followed by strong force when brushing teeth (50%). The horizontal brushing technique is an inappropriate tooth brushing technique, this technique has a strong relationship with the occurrence of gingival recession. The horizontal technique is carried out by brushing the buccal lingual surface with a back and forth movement.[18] This can cause trauma to the periodontal tissue when brushing teeth, which if done continuously can cause gingival recession. The force when brushing teeth received by the gingiva is also influenced by the texture of the toothbrush bristles in terms of the diameter of the toothbrush bristles. If the bristles have a hard texture due to their large diameter, the flexibility of the bristles will decrease so that the bristles cannot reach many areas of the teeth. In line with the data obtained from the questionnaire, 8 people (36%) used hard bristle brushes. Both of these things will cause excessive pressure on the bristles at several points, including the cervical part of the tooth, which can cause abrasion of the gingival margin epithelium, resulting in gingival recession.[19]

Table 6 shows indicators of risk factors for using orthodontic devices, that among respondents who used orthodontic devices for ≥ 1 year, gingival recession was the lowest risk factor experienced (9%). This is because the orthodontic tools used can move the teeth in a labial direction (change in inclination/angulation of the teeth) resulting in thinning of the alveolar bone due to the remodeling process which leads to gingival recession.[20]

The risk factors for bacterial infections experienced by *faculty of dentistry* UNEJ 2022 students are due to the use of orthodontic appliances and periodontal tissue disease. Table 6 shows indicators of the use of orthodontic devices, namely gingivitis experienced by respondents (9%). This can happen because respondents who use orthodontic devices if they do not maintain oral hygiene will increase plaque retention on the teeth so that the prevalence of gingival recession increases.[20] This data is supported by plaque and calculus examinations in respondents who use orthodontics which reached 23% and 53%.

Gingival recession caused by bacteria, subgingival bacterial biofilms can cause an inflammatory response in the connective tissue between the oral epithelium and the sulcus epithelium. If the gingival phenotype is thin, the gingival connective tissue is affected by the inflammatory process. This causes the gingival margin to lose support from the underlying connective tissue and proliferate in an apical direction accompanied by loss of attachment, and form a periodontal pocket. Therefore, individuals with thin periodontal conditions are more susceptible to the formation of gingival recession compared to individuals with thick periodontal conditions.[21] In this study, 86% of respondents experienced BOP ≥ 10% and 82% experienced bleeding when brushing their teeth, which indicates that the respondents experienced gingival inflammation.

Table 7. Indicators of risk factors for periodontal tissue disease that were most frequently experienced by respondents were Bleeding On Probing (BOP) (86%) and followed by gingival bleeding when brushing teeth (82%). Periodontal health is defined as the absence of attachment loss and gingival inflammation limited to less than 10% of sites.[22] Classification of gingival inflammation by BOP examination is categorized into generalized inflammation (BOP% > 30%), local gingival inflammation (10% ≤ BOP% ≤ 30%), and minimal inflammation (BOP% < 10%). Bleeding when brushing teeth is most often found in people who have generalized gingival inflammation (BOP% > 30%).[23] The presence of bleeding when brushing teeth can be used to determine various degrees of gingival inflammation and periodontal disease (gingivitis and periodontitis), while the absence of bleeding when brushing teeth is reported to have a predictive value of >90% for good periodontal health.[24]

V. CONCLUSION

The results of this study showed that 22 people (14%) out of 157 people experienced gingival recession with class I severity according to Miller's classification, namely gingival recession that did not extend to the mucogingival junction (MGJ), no loss of periodontal tissue (bone or soft tissue). in the interdental area, and 100% root coverage can be anticipated or is still reversible. Risk factors causing gingival recession in *faculty of dentistry* UNEJ 2022 students are occlusion trauma experienced by 15 people (68%), tooth brushing trauma experienced by 17 people (77%), use of orthodontic appliances experienced by 2 people (9%), and periodontal disease experienced by 19 people (86%).

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