

The Effect of Dyspepsia and Oral Hygiene Practices on the Risk of Tooth Wear in Adolescents

Pengaruh Dispepsia dan *Oral Hygiene Practices* Terhadap Risiko Keausan Gigi pada Remaja

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ABSTRACT

Dyspepsia is a common symptom often found in adolescents due to digestive disorders and can affect eating patterns and lifestyle habits. Inadequate oral hygiene practices have the potential to increase the risk of tooth wear. Although tooth wear is a normal physiological process, it is considered pathological if it occurs rapidly and excessively. This study aims to analyze the effect of dyspepsia and oral hygiene practices on the risk of tooth wear in adolescents. The methodology used is a cross-sectional survey, conducted at Public High School 1 Kluet Tengah, South Aceh Regency, Aceh Province on July 15-16, 2024. Data collection involved 128 students from grades 1-2 through the distribution of dyspepsia questionnaires and oral hygiene practices and clinical examination of tooth wear. Of these, 117 respondents met the inclusion criteria. Statistical analysis was performed using logistic regression, which showed a protective effect of dyspepsia with p value = 0.00 (OR: 0.10; 95% CI = 0.05-0.20), oral hygiene practices with p value = 0.01 (OR: 0.02; 95% CI = 0.00-0.44). The most influential protective factor against tooth wear in adolescents is oral hygiene practices with an OR value of 0.03, R^2 = 0.0138. Students can routinely undergo dental health checks at least every six months with preventive interventions and monitoring of the risk of tooth wear.

Keywords: Dyspepsia, Oral hygiene practices, Tooth wear

ABSTRAK

Dispepsia merupakan gejala umum yang sering ditemukan pada remaja akibat gangguan pencernaan dan dapat memengaruhi pola makan serta kebiasaan hidup. *Oral hygiene Practices* yang tidak memadai berpotensi meningkatkan risiko keausan gigi. Meskipun keausan gigi adalah proses fisiologis yang normal, hal ini dianggap patologis jika terjadi secara cepat dan berlebihan. Penelitian ini bertujuan untuk menganalisis pengaruh dispepsia dan oral hygiene practices terhadap risiko keausan gigi pada remaja. Metodologi yang digunakan adalah cross-sectional survey, dilaksanakan di SMA Negeri 1 Kluet Tengah Kabupaten Aceh Selatan Provinsi Aceh pada 15-16 Juli 2024. Pengumpulan data melibatkan 128 siswa dari kelas 1-2 melalui penyebaran angket kuesioner dispepsia dan *oral hygiene practices* dan pemeriksaan klinis keausan gigi. Dari jumlah tersebut, 117 responden yang memenuhi kriteria inklusi. Analisis statistik dilakukan dengan regresi logistik, yang menunjukkan adanya pengaruh protektif dispepsia dengan p value = 0,00 (OR: 0,10; 95% CI=0,05-0,20), *oral hygiene practices* dengan p value = 0,01 (OR: 0,02; 95% CI=0,00-0,44). Faktor protektif yang paling berpengaruh terhadap keausan gigi pada remaja adalah *oral hygiene practices* dengan nilai OR=0,03, R^2 =0,0138. Bagi siswa/i dapat secara rutin menjalani pemeriksaan kesehatan gigi minimal setiap enam bulan dengan intervensi preventif dan monitoring terhadap risiko keausan gigi.

Kata Kunci: Dispepsia, *Oral hygiene practices*, Keausan gigi.



INTRODUCTION

According to WHO (World Health Organization), the global dyspepsia population reaches 15-30% in the world every year. Dyspepsia or digestive disorders, is a common problem experienced by many individuals, including teenagers.²⁰

Dyspepsia ranks 10th with a proportion of 1.5% for the category of 10 largest types of diseases in outpatients in all hospitals in Indonesia. Data from outpatients in 2010, in hospitals throughout Indonesia, stated that dyspepsia ranks 6th out of 10 most common diseases in hospitals throughout Indonesia with data on the number of visits of 163,428. In addition, dyspepsia is often not considered serious, so many sufferers do not seek medical treatment, which has the potential to worsen the condition. In Aceh Province, a traditional diet high in carbohydrates and spicy foods can be a risk factor.²¹

Oral health problems and digestive disorders, especially dyspepsia, are important health issues in various regions, including Aceh Province, Indonesia.³ Poor oral hygiene practices are a major health problem that is often overlooked, especially among adolescents. Inadequate oral hygiene practices, such as irregular brushing frequency or improper technique, can lead to a variety of dental problems, including tooth wear. In Aceh Province, access to oral health education may be limited, and many people are unaware of the importance of maintaining good oral hygiene.¹⁶

Studies have shown that digestive disorders, such as dyspepsia, can be associated with tooth wear. Recurrent acid reflux, which is common in patients with dyspepsia, can lead to tooth erosion, a form of tooth wear. In addition, bad habits such as frequent vomiting can also contribute to tooth erosion.²⁵

Based on the meta-analysis conducted, it can be concluded that dental erosion (ED) is often associated with Gastroesophageal Reflux Disease (GERD) and is found in about half of patients with this common upper gastrointestinal disease. Therefore, it is recommended to more actively identify patients with high risk of ED among patients with GERD and refer them to dentists for appropriate prevention and correction of this dental pathological process.²⁷ Therefore, it is

important to examine the relationship between dyspepsia, oral hygiene practices, and the risk of tooth wear, especially in adolescents in South Aceh.⁸

The state of an individual's dental and oral health will be determined by their oral hygiene practices. Behavioural habits in the context of excellent oral hygiene practices significantly impact the status of dental and oral health. This will enhance the health and hygiene of the mouth and teeth, thereby preventing the development of dental and oral diseases. The Basic Health Research (Riskesdas) data from 2018 indicates that the knowledge, attitudes, and behaviours of the Indonesian populace regarding dental and oral health are still subpar. The data indicates that dental and oral issues remain prevalent in Indonesia, with a high prevalence of 57.6%. Additionally, only 2.8% of the 94.7% of individuals who cleanse their teeth daily adhere to the recommended schedule of brushing twice a day, after breakfast in the morning and before bed in the evening.²

The rate of damage or excessive loss of tooth surface that occurs too rapidly to cause functional dental problems, aesthetics, or sensitivity is considered pathological, despite the fact that tooth wear is a normal physiological process that occurs throughout life. Four factors contribute to the ethology of tooth wear: erosion, attrition, abrasion, and abfraction. Food and, to a lesser extent, the environment are the primary sources of acids that induce tooth erosion. Tooth injury caused by erosion can be exacerbated by underlying medical conditions, which patients may not be cognizant of.¹⁸

Clinical and experimental studies suggest that separate wear processes seldom operate in isolation but rather interact with one another. The primary interaction is the enhancement of abrasion by erosive damage to hard tooth tissues. This contact seems to be a significant contributor to occlusal and cervical wear. The research is inadequate to ascertain whether abfraction is a significant contributor to tooth wear.²² South Aceh Regency is an area with varying socio-economic conditions. Limited access to adequate dental health services and low awareness of the importance of dental health can increase the risk of tooth wear in adolescents. Factors such as consumption of acidic foods, carbonated

drinks, and unmanaged dyspepsia can worsen tooth wear.²⁵

Tooth wear can be classified as abrasion, attrition, or erosion but is often multifactorial. Abrasion results from the interaction between the teeth and a foreign body while attrition results from contact between the teeth, most commonly associated with clenching and grinding of the teeth. Erosive tooth wear is defined as the irreversible loss of tooth structure caused by the action of chemical acids without bacterial involvement. The source of the acid can be intrinsic, including gastroesophageal reflux, or extrinsic and can be further exacerbated by reduced salivary flow and the supine position during sleep. Intraoral pH below 5.5 can initiate dissolution of the superficial enamel layer and can lead to tooth erosion as well as tooth hypersensitivity and mucositis.¹⁰

Dyspepsia is one of the serious diseases that occurs in adolescents, especially students. This has an impact on the occurrence of dental and oral diseases. Students with a history of dyspepsia complain of sensitive or sore teeth with signs of tooth wear. The cause of premature tooth wear is not fully known in students. Tooth wear is a normal physiological process that occurs throughout life but is considered pathological if the damage is excessive and too rapid. Oral hygiene practices are a trigger for tooth wear. Based on School Dental Health Programme data at SMA Negeri 1 Kluet Tengah, 80% of patients with dyspepsia experience tooth wear. Therefore, this study aimed to examine the effect of dyspepsia and oral hygiene practices on tooth wear (attrition, abfraction, erosion, and abrasion) in adolescents using the BEWE Scale (basic erosive wear examination).

RESEARCH METHODS

This study is cross-sectional survey design, the independent variables of dyspepsia, oral hygiene practices and the dependent variable of tooth wear (attrition, abfraction, erosion and abrasion) was carried out simultaneously or at the same time. This study was conducted at SMA Negeri 1 Kluet Tengah Kluet Tengah District, South Aceh Regency

on July 15-16, 2024.

The population in this study was taken from the total number of classes 1 and 2 of SMA Negeri 1 Kluet Tengah totaling 128 students in Kluet Tengah District, South Aceh Regency. The sample in this study was taken as a whole from the total population, but in the implementation of the study, the sample that was willing and met the research requirements was 117 students. Determination of the sample based on the inclusion criteria, All Students with a history of dyspepsia and do not have dyspepsia in class 1-2 of SMA Negeri 1 Kluet Tengah.

The method used in this study is primary data collection. The technique used to collect data is by distributing questionnaires on the independent variables of dyspepsia and oral hygiene practices.

Respondents who have a history of dyspepsia and do not have dyspepsia filled out each of the 6 questions of the questionnaire Validity and Reliability Test of Rome IV Functional Dyspepsia Diagnostic Questionnaire (R4-FDDQ) on Indonesian Population⁹ with Yes and No criteria and respondents filled out an oral hygiene practices questionnaire consisting of 10 questions with Good, moderate and bad criteria. and a clinical examination of tooth wear (attrition, abfraction, erosion and abrasion) was carried out using a diagnostic set and dental odontogram, measurements were taken using the BEWE Scale (basic erosive wear examination)¹⁷, score 0 no wear, score 1 erosive tooth wear affecting only enamel, score 2 tooth wear affecting dentin, but less than 50% of the tooth surface, score 3 erosive tooth wear affecting dentin more than 50% of the tooth surface. Based on the total BEWE score (basic erosive wear examination)¹⁷, The severity of tooth wear is classified as follows, score 0-2 no intervention required, score 3-8 preventive intervention, score 9-13 preventive intervention and monitoring, score 14-18 preventive intervention, monitoring, and further management. Clarification of tooth wear is divided into 2 with the level of wear, low 0-8 and high > 8 on the dependent variable.



Figure 1. Tooth Wear

Data analysis using the Stata MP 17 application, data analysis was carried out univariately, bivariate and multivariate. The statistical tests used are logistic regression and multiple logistic regression. The data that is processed and analysed is presented in the form of tables and interpretations containing explanations of information obtained from the results of the analysis in descriptive form.

This research has obtained an Ethical Appropriateness certificate from the Health Research Ethics Commission (KEPK) of Universitas Prima Indonesia, with certificate number: 046/KEPK/UNPRI/X/2024. It is stated to be ethically appropriate according to the 7 (seven) WHO 2011 Standards, namely 1) Social Value, 2) Scientific Value, 3) Equitable Distribution of Burdens and Benefits, 4) Risk, 5) Inducement/Exploitation, 6) Confidentiality and Privacy, and 7) Consent After Explanation, which refers to the 2016 CIOMS Guidelines. This is as indicated by the fulfilment of the indicators of each standard.²⁴

This study was conducted by following the ethical principles of research and respondents have been given an explanation before participating in the study (PSP) and have obtained approval from parents/guardians who are respondents by filling out an informed consent to participate in the study voluntarily without coercion, if during this study the respondent wants to withdraw, then the respondent can withdraw at any time without any sanctions. Respondent data is kept

confidential, transparent and respondents who participate will be given compensation in the form of a soft toothbrush after participating in the study. Dental examinations are carried out professionally using Personal Protective Equipment and a complete set of diagnoses are carried out by dental and oral therapists with collaboration and direction from dentists. Respondents with findings of tooth wear are given personal education during the study with referrals to the Health Center/Dental clinic to get preventive intervention and monitoring.

RESULTS

The application of univariate analysis is carried out to obtain a description of each variable, the frequency distribution of various variables studied including independent variables (age, gender, class, dyspepsia factors, and oral hygiene practices). Dependent variables (tooth wear). Data displayed in the form of frequency tables, percentages, means, minimums and maximums).

Table 1. Characteristics of Respondents

Characteristics	N	%	Mean (SD)	Min-Max
Age			16,82 (0,77)	15-19
Gender				
Male	43	36,75		
Female	74	63,25		
Class				
X				
MIPA/MIPS/1	61	52		
XI				
MIPA/MIPS/2	56	48		

Based on the results of the analysis of Table 1 above, it can be seen that the average age of respondents is 17 years, the female gender is more at 63.25% and class X MIPA/MIPS/1 as many as 61 respondents (52%)..

Table 2. Frequency Distribution of the Influence of Dyspepsia, Oral Hygiene Practices

Variable	N	%
Dyspepsia		
No	20	17,09
Yes	97	82,91
Oral Hygiene Practices		
Good	1	0,85
Currently	41	35,04
Bad	75	64,10

Table 3. Bivariate Analysis of Factors Influencing Tooth Wear in Adolescents

Variable	Tooth Wear Level				OR	95%CI	p-value
	Low		Hight				
	(BEWE Score 0- 8)		(BEWE Score >8)				
	n	%	N	%			
Dyspepsia							
No	20	100,00	0	0,00			
Yes	88	90,72	9	9,28	0,10	0,05-0,20	0,00
Oral Hygiene Practices							
Good	1	100,00	0	0,00			
Currently	39	95,12	2	4,88	2,06	0,41-10,17	0,37
Bad	68	90,67	7	9,33	0,02	0,00-0,44	0,01

Based on the results of the analysis of Table 2 above, it can be seen that 82.91% of respondents had dyspepsia and 64.10% had poor oral hygiene practices. Based on the results of the analysis above, it shows that adolescents with high levels of tooth wear have a BEWE (basic erosive wear examination) score >8 in adolescents who experience dyspepsia of 9.28%. At a low level of tooth wear with a BEWE score of 0-8 in adolescents who do not experience dyspepsia of 100.00%. The results of the statistical test obtained an OR value of 0.10, meaning that adolescents who experience dyspepsia with a high level of tooth wear 90% have an protective effect on the risk of tooth wear and must receive preventive intervention and monitoring. The results of the statistical test p-

value 0.00, which means that there is a significant protective effect between dyspepsia and the risk of tooth wear.

Adolescents with high tooth wear levels BEWE score >8 on poor oral hygiene practices of 9.33%. At low tooth wear levels with BEWE scores of 0-8 on good oral hygiene practices of 100%. The results of statistical tests obtained an OR value of 0.02. This means that adolescents with poor oral hygiene practices 98% have an protective effect on the risk of tooth wear and must receive preventive intervention and monitoring. The results of statistical tests p-value 0.01, which means there is a significant protective effect between poor oral hygiene practices on the risk of tooth wear.

Table 4. Multivariate Analysis of Factors Influencing Tooth Wear in Adolescents

Variables	OR (95%CI)	p-value
Dyspepsia		
No		
Yes	1 (omitted)	
Oral Hygiene Practices		
Good		
Currently	2.01(0,40-9,94)	0,391
Bad	0.03(0,00-0,56)	0,019
Pseudo R2		0,0138

Multivariately, oral hygiene practices have the most dominant protective effect on tooth wear. The statistical results obtained an OR value of 0.03, meaning that adolescents with oral hygiene practices can reduce the risk of tooth wear by 97% and must receive preventive intervention and monitoring. The results of the statistical test showed a pseudo R2 value of 0.0138, meaning that these results simultaneously (together) protective effect the risk of tooth wear in adolescents by 1.38%.

DISCUSSION

Based on Table 2. Adolescents who experience dyspepsia with a high level of tooth wear 90% have an effect on the risk of tooth wear and must receive preventive intervention and monitoring. Dyspepsia is a medical term used to describe symptoms of upper digestive disorders, such as discomfort or pain in the upper abdomen, burning sensation, bloating, or a feeling of fullness quickly when eating. Several studies have linked dyspepsia to tooth wear conditions, although this relationship may be complex and multifactorial. The influence between dyspepsia and tooth wear is where Gastric Acid and Tooth Erosion are often associated with increased stomach acid or acid reflux. Gastric acid that rises into the mouth can damage tooth enamel, causing tooth wear or erosion. The impact of diet that is often associated with dyspepsia, such as spicy, sour, or high-fat foods. Dyspepsia are associated with stress. Stress can cause bruxism in which cause tooth wear.¹⁴

In the study of oral manifestations associated with gastrointestinal (GI) diseases, including dyspepsia, gastroesophageal reflux disease (GERD) dyspepsia which causes reflux of stomach acid into the mouth is a common cause of tooth erosion. Gastric acid has a very low pH, which can dissolve tooth enamel, resulting in loss of tooth structure. Conditions such as this can result in increased tooth sensitivity and even structural damage to the teeth. This is in accordance with this study where respondents who experienced dyspepsia with erosion had a significant effect.¹⁵

In an additional investigation, the prevalence and correlation between gastroesophageal reflux disease and tooth erosion were examined. It was asserted that patients with GERD are at a greater risk of tooth erosion than those who are healthy.⁵ This

meta-analysis study strongly supports the notion that individuals with GERD/S are at a heightened risk of experiencing erosive dental wear in comparison to those without GERD.¹⁰

Another study "Patients with gastroesophageal reflux disease (both reflux esophagitis and non-erosive reflux disease) Prevalence and severity of erosive tooth wear and salivary properties". The prevalence and severity of acid reflux were significantly correlated with tooth attrition. Salivary buffer capacity and tooth attrition were clinical indicators that were contingent upon the severity of acid reflux.¹² Demonstrates that dental wear is a substantial health issue, with a high prevalence among adults. Risk factors identified include dietary habits, particularly the consumption of acidic foods and beverages, inadequate oral hygiene, and medical conditions such as gastroesophageal reflux disease (GERD). These results underscore the necessity of heightened awareness and prevention strategies to mitigate the prevalence of dental wear.²⁶

The author assumes that this is because acid reflux is one of the triggers for tooth wear in general. Gastric acid that rises into the mouth can damage tooth enamel due to changes in the pH of saliva. So, it is hoped that adolescents who have a history of dyspepsia can routinely have dental and oral health checks at the Health Centre or dental clinic routinely at least once every 6 months, to inhibit damage to tooth enamel and prevent tooth wear. in his research showed that tooth wear is quite common, with prevalence increasing with age. The main risk factors found include the habit of biting hard objects, consumption of acidic foods and drinks, and bruxism (grinding teeth). This study suggests the need for prevention and early intervention efforts to reduce the incidence of tooth wear.²³

Based on Table 2. Adolescents with poor oral hygiene practices 98% have an influence on the risk of tooth wear and must receive preventive intervention and monitoring. Good oral hygiene practices are very important for body health and an attractive smile. Regular brushing can prevent cavities and tooth decay, this is very unfortunate if not done because it can cause serious health problems. However, cleaning teeth also has disadvantages. In addition to brushing teeth, the use of toothpaste

containing high abrasive ingredients can also contribute to tooth wear. Abrasive toothpaste can erode enamel if used excessively. The use of toothpaste specially formulated for sensitive teeth, which usually has a low abrasive level, can help reduce the risk of tooth wear.⁴

Both children and adults are significantly affected by fluoride's effects on their dental and oral health. By brushing the teeth with toothpaste that contains fluoride, that can prevent the development of cavities, remineralize the surface of teeth have been exposed to bacterial acid products that cause cavities, smooth the surface of the teeth, and remove stains, plaque, and cleanse the breath.⁶

The article titled "Is Toothbrush Bristle Stiffness Associated with Erosive Tooth Wear in Adolescents?" a Population-Based Cross-Sectional Study. greater incidence of tooth wear compared to individuals who utilized a toothbrush with extremely soft bristles. study identified a minimal yet significant correlation between toothbrush bristle stiffness and tooth wear in adolescents. Given the cross-sectional methodology of this investigation and the identification of links in very young populations, future research employing other methodologies and including various age groups may clarify the therapeutic significance of these findings.¹⁹

In other studies, the tooth wear of the groups analysed was not significantly different between manual and electric toothbrushes. This study suggests that other factors, such as brushing techniques or eating habits, may be more influential than toothbrush type in causing tooth wear in adolescents. The authors assume that this may be because patients already know that a good toothbrush to use is a soft-bristled toothbrush, but other factors such as eating habits also influence tooth wear. Therefore, it is necessary to conduct a more detailed study of other factors cause wear.²⁷

The severity of abrasion is a prevalent phenomenon in the male population that is associated with the combination of horizontal and vertical brushing movements and is age-related. Cervical abrasion is also associated with a higher incidence of dentin hypersensitivity. The new CAITN test is a

valuable instrument for evaluating the severity of cervical abrasion and the necessary treatment. The components and importance of oral hygiene practices, individuals can better maintain their oral health and prevent the development of conditions such as dental erosion. Implementation of proper brushing habits, use of additional oral hygiene products, and following recommendations for frequency and duration of brushing can contribute significantly to reducing the risk of oral health problems.¹

The author assumes that good oral hygiene practices are very important to maintain dental and oral health. The habit of brushing teeth too hard or using a toothbrush with hard bristles, using toothpaste, brushing too often, brushing time and changing toothbrushes can affect tooth wear, tooth wear can be caused by bad behavioural factors and habits such as consuming certain foods, carbonated drinks, bruxism, and liking to bite foreign objects with teeth. oral hygiene practices are supporting factors for tooth wear because tooth wear cannot occur with just one factor but with other supporting factors. After multivariate analysis, the most dominant factor was obtained $p = \text{value} < 0.25\%$, the oral hygiene practices factor was obtained. very closely related to the occurrence of tooth wear. It is expected that students can maintain good oral hygiene practices in order to maintain dental and oral health.

Based on the researcher's direct observation in this research process, there are several limitations experienced and can be several factors that can be considered more by further researchers in perfecting their research because this research itself certainly has shortcomings that need to be continuously improved in further research. Some limitations in the study include:

1. The number of respondents is only 117 students. Of course, it is still not enough to describe the real situation.
2. The object of research that only focuses on adolescents and is carried out in schools. This can affect the results of a study. Further research needs to be done at an age of less than 15 years. To find out the cause of premature wear.

3. The selection of research variables, namely dyspepsia and oral hygiene practices, this is because the research was conducted in schools so that the selection was made on the most dominant variables. Further research needs to be carried out with a wider scope such as villages/communities and the selection of other variables related to tooth wear factors such as demographic factors, smoking habits, bad habits (biting hard objects, Bruxism, etc.), alcohol consumption habits, drug consumption habits.
4. In the data collection process, the information provided by respondents through questionnaires sometimes does not show the respondent's true opinion, this happens because sometimes there are differences in thoughts, assumptions and understanding of each respondent, as well as other factors such as honesty in filling in the respondent's opinion in the study.
5. The selection of dyspepsia research variables in the data collection process was carried out by filling out a questionnaire without further clinical examination, this can be an influence on the results of the study.

CONCLUSION

The results of the study showed that overall oral hygiene practices were the most dominant protective factor influencing the risk of tooth wear in adolescents. Adolescents with a history of dyspepsia had a protective effect on the risk of tooth wear, poor oral hygiene practices had a protective effect on tooth wear in adolescents. According to the BEWE Scale (Basic Erosive Wear Examination) adolescents with a protective history of dyspepsia and poor oral hygiene practices should receive preventive and monitoring interventions.

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CONFLICT OF INTEREST

The authors affirm that there are no conflicts of interest from any party.

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