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Determinant Causes of Periodontal Diseases on Students of Faculty of Public Health in Banda Aceh and Aceh Besar

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Abstract

This research aims to explore factors relevant to the cause of periodontic disease in public health students. The approach method used in this research is the analytical method through a cross-sectional study. This study's population consists of 1,613 undergraduate students at the Faculty of Public Health (FKM) in Banda Aceh and Aceh Besar. This study employs a strategy of purposive sampling with a total of 104 participants. The research was conducted by questionnaire and clinical examination. Univariate, bivariate, and multivariate data analysis with frequency distribution tables, cross-tabulations, and narratives as outputs. The data revealed that the incidence of periodontal disease was moderate (52,88%), male (53,85%), economic > UMP 59 (56,73%), terrible calculus (37,50%), dental caries (72, 12%), not smoking (52,88%), and ineffective tooth brushing (57,69%). The statistical analysis revealed no association between gender (OR: 0.51; 95% CI: 0.24-1.09) and socioeconomic status (OR: 1.56; 95% CI: 0.74 - 3.31; p=0.239) and the incidence of periodontal disease. There is a correlation between calculus (OR: 17.0, 95% CI: 6.55-44.2, p=0.001), dental caries (OR: 5.1, 95% CI: 1.89-14.0, p=0.001), ineffective brushing (OR: 3.96, 95% CI: 1.76-8.93, p=0.001), and smoking (OR: 2.59, 95% CI: 1.21-5.55, p=0.014).

Keywords: *Periodontal; Risk Factors; Public Health Students*

Introduction

The objective of health development towards Healthy Indonesia 2025 is to increase everyone's awareness, willingness, and ability to live a healthy lifestyle so that the greatest possible improvement in public health status can be achieved through the creation of a society, nation, and state of Indonesia whose people live with healthy behavior and in a healthy environment.[1] On the list of the top 10 ailments for which Indonesians most frequently file complaints, dental and oral health issues are listed first. The perspective and behavior of the Indonesian populace about dental and oral health remain deficient. This is

[1] Ministry of Health. *Indonesian Health Profile***.** Jakarta: Indonesia's Ministry of Health, 2012.

evidenced by the increasing prevalence of dental caries and oral illness in Indonesia. 2 In Indonesia, dental caries and periodontal disease are two of the most significant threats to dental and oral health.[2]

Periodontitis is an inflammation of the teeth' supporting tissues caused by specific microorganisms and results in the destruction of the periodontal ligament and alveolar bone through pocket development, recession, or both. 3 Assessment of periodontal risk, monitoring disease development, and patient education regarding the oral-systemic relationship may be taught, but are rarely addressed. Evaluation of the risk of periodontal disease is less common than an assessment of the risk of dental caries.[3]

Gingivitis is the earliest stage of periodontal disease. Gingivitis is caused by the development of plaque on the teeth. Plaque causes the gums to become swollen and reddish. Gingivitis can progress to periodontitis, which causes the bones and tissues that support the teeth to degenerate if left untreated. Periodontal disease can affect anyone, especially those who neglect oral care, including those between the ages of 18 and 23, but it is more prevalent among the elderly. Nonetheless, anyone, regardless of age, is susceptible to periodontal disease, especially those who neglect dental and oral hygiene.[4]

The community's access to dental health materials has increased in tandem with technological advancements. In addition to facilitating the broadcast of dental and oral health information, it has a growing impact on patients' ability to receive any health-related information. Thus, data- and evidence-based explanations are required for both education and evaluation of periodontal disease.[5] In 2001, periodontal disease, a disease of the mouth cavity, was the most prevalent disease among people, according to world records. Global Burden of Disease research data for 1990-2010 indicates that severe periodontitis has the sixth highest prevalence (11.2%) and affects approximately 743 million people worldwide, with a 57.3% rise in prevalence over the past decade.[6]

Much research has been conducted on the development of periodontal disease information regarding pathogenesis, mapping, bacteria, and understanding of the function of the host in disease pathogenesis and classification of periodontal disease. Despite advances in periodontal disease awareness, the prevalence of periodontitis remains very high, particularly in Indonesia. In 2018, the Basic Health Research Data (Riskesdas) indicated that the prevalence of dental and oral problems in Indonesia was 45.3%, with 38.1% of those aged 15-14 experiencing dental and oral problems. The percentage of periodontitis cases in Indonesia was 74.1%, dental caries 88.8%, while the percentage of periodontitis in the age group 15-24 was 68.7% and dental caries was 75.2%.[7]

According to Effective Medical Demand (EMD), 30.5% of residents in Aceh Province had dental and oral difficulties in the past year, whereas 45.9% received care from dental medical professionals and EMD was 14.2%. This data demonstrates the predominance in Aceh Province The number of people with dental and oral issues exceeds the national average. The percentage of population 10 years who brush their teeth daily is 89.9%, with 4.1% brushing their teeth after breakfast, 29.7% brushing their teeth before bed, and 2.2% brushing their teeth properly.[8] Riskesdas Aceh data for 2018 reveals that the proportion of problems with damaged or decayed teeth is 46.97%, teeth lost due to extraction or self-

[2] Setiawan P.B., Hartono H., Tandelilin R.T.C. & Nur'aini B., "Pemetaan dan Faktor Risiko Sosioekonomi dan Perilaku Terhadap Kejadian Penyakit Periodontal Di Kecamatan Pundong Kabupaten Bantul", *Jurnal Teknosains*, 2020;9(2):91-180.

[3] Levin L., *Periodontal Risk Assessment: A Call for Programs and Outcomes*, 2016.

[4] Lebukan B.J., *Faktor-Faktor Penyebab Penyakit Periodontal (Studi Kasus Masyarakat Pesisir Pantai Kecamatan Bacukiki Barat Kota Pare–Pare)*, 2013

[5] Wijaksana I.K.E., "Periodontal Chart Dan Periodontal Risk Assessment Sebagai Bahan Evaluasi Dan Edukasi Pasien Dengan Penyakit Periodontal", *Jurnal kesehatan gigi*, 2019;6(1):19-25

[6] Tonetti M.S., Jepsen S., Jin L. & Otomo-Corgel J., "Impact of the Global Burden of Periodontal Diseases on Health, Nutrition and Wellbeing of Mankind: A Call for Global Action", *Journal of clinical periodontology*, 2017;44(5):456-462

[7] Ministry of Health, Riskesdas Results 2018, *Online http://www. depkes. go. id/resources/download/info-terkini/materi_rakorpop_2018/Hasil% 20Riskesdas*, 2018;202018.

[8] Ministry of Health, *Basic Health Research of 2013. Research and Development Health Agency of Indonesia*, 2013.

knockout 19.85%, teeth that have been filled or filled in due to cavities 4.63 %, loose teeth 9.35 %, the behavior of brushing teeth every day is 93.59%, and the ideal time to brush teeth is 2.76 %. The percentage of dental decay or cavities in Banda Aceh City is 38.98%, teeth lost due to extraction or self-knockout 13.51%, teeth filled or filled over due to cavities 7.74%, daily brushing habit 97.34%, and correct tooth brushing time 2.80%.[9]

One of the risk factors for high dental and oral disorders is inadequate dental and oral hygiene practices. Teenagers are susceptible to dental and oral complications. The 2018 Riskesdas data indicate that 51.9% of 15- to 24-year-old teenagers suffer from dental and oral disorders, and it is well known that the behavior of preserving dental and oral health is low.[10] Students of public health will study a variety of disciplines, including medicine, sanitation, and social sciences. Students will be exposed to a variety of community-based case studies in order to better comprehend field situations and how to overcome them. Because students in public health are expected to become educators and change advocates. Then, how can public health students play an effective role in educating the population about maintaining health, particularly dental and oral care issues, if their own dental and oral maintenance practises are inadequate or problematic? The researcher is interested in examining "Determinants of the occurrence of periodontal disease in public health students in the cities of Banda Aceh and Aceh Besar," given the aforementioned description.

Research Method

This study are quantitative, analytical, and cross-sectional in character. This investigation was done between 31 October 2022 and 18 January 2023 in the cities of Banda Aceh and Aceh Besar. This study's population consisted of 1,613 Undergraduate Students of the Faculty of Public Health (FKM) from State Universities (PTN) and Private Universities (PTS) in the cities of Banda Aceh and Aceh Besar. Stratified random sampling was employed to select the sample of 104 individuals. This study utilised questionnaires and clinical examinations to obtain data. Stata program is used for univariate, bivariate, and multivariate analysis.

Discussions

Table 1- Distribution of Periodontal Disease Risk Factors Among Public Health Students in Banda Aceh and Aceh Besar (n=104)

Variable		f	%
1	**Periodontal Disease**		
	Light	55	52,9
	Currently	36	34,6
	Heavy	13	12,5
2	**Sex**		
	Man	56	53,8
	Woman	48	46,2
3	Family Finance		
	≥ Provincial Minimum Wage of Aceh (UMP)	59	56,7
	< Provincial Minimum	45	43,3

[9]Ministry of Health, Riskesdas Results 2018, *Online) http://www. depkes. go. id/resources/download/info-terkini/materi_rakorpop_2018/Hasil% 20Riskesdas*, 2018;202018

[10] Rakhmawati NF., Budiono I., Rustiana ER., "Determinan Perilaku Pemeliharaan Kesehatan Gigi dan Mulut pada Remaja", *Seminar Nasional Pascasarjana 2020*: ISSN: 2686 6404, dipublikasikan Pascasarjana Universitas Negeri Semarang; 2020

	Wage of Aceh (UMP)		
4	**Calculus**		
	Good	28	26,9
	Middle	37	35,6
	Bad	39	37,5
5	**Caries**		
	Available	29	27,9
	Not Available	75	72,1
6	**Brushing Teeth**		
	Good	44	42,3
	Not Good	60	57,7
7	**Smoking**		
	Yes	55	52,9
	No	49	47,1

According to Table 1, 12.5% of public health students in Banda Aceh City and Aceh Besar suffered from severe periodontal disease, whereas 53.8% of males and 56.5% of students from families with an income below UMP had poor calculus skills. As much as 72.1% of people have dental cavities, 57.7% have poor brushing habits, and 52.9% do not smoke.

Table 2 - Variables Related with the Prevalence of Periodontal Disease among Students of Public Health in Banda Aceh and Aceh Besar (n=104)

Variable	**Periodontal Diseases**						**Total**	**OR**	***P***
	Light		**middle**		***heavy**				
	f	%	f	%	f	%			
Sexes									
Man	26	46,4	20	35,7	10	17,9	56	0,51	0,085
Woman	29	60,4	16	33,3	3	6,3	48		
Economy									
≥ UMP	34	57,6	19	32,2	6	10,2	59	1,56	0,239
< UMP	21	46,7	17	37,8	7	15,5	45		
Calkulus									
Good	26	92,8	1	3,6	1	3,6	28		
Middle	28	75,7	7	18,9	2	5,4	37		
Bad	1	2,6	28	71,8	10	25,6	39	17,0	0,001
Caries									
Available	23	79,3	5	17,2	1	3,5	29		
NA	32	42,7	31	41,3	12	16,0	75	5,16	0,001
Brushing teeth									
Good	31	70,4	12	27,3	1	2,3	44		
Not Good	24	40,0	24	40,0	12	20,0	60	3,96	0,001
Smoking									
No	35	63,6	16	29,1	4	7,3	49		
Yes	20	40,8	20	40,8	9	18,4	55	2,59	0,014

The statistical analysis reveals that there was no association between gender and periodontal disease (OR: 0.51, 95% CI: 0.2-1.01, p: 0.085), showing that men were inversely related with periodontal events, with a 0.51-fold increased likelihood of developing severe periodontal disease.

The results of statistical tests indicated that there was no association between family economics and periodontal disease (OR: 1.56, 95% CI: 0.7-3.3, p: 0.239), indicating that students with family economics below UMP were nearly twice as likely to experience severe periodontal disease as those with family income above UMP.

Statistical analysis revealed a link between calculus and periodontal disease (OR = 17, 95% CI = 6.5-44.2, p = 0.001), showing that calculus in the poor category was associated with a 17-fold increased risk of periodontal disease compared to calculus in the good category.

Statistical analysis revealed a connection between dental caries and periodontal disease (OR: 5.16, 95% CI: 1.89-14.0, p: 0.001), showing that dental caries is associated with a 5-fold increased risk of developing severe periodontal disease.

Statistical analysis revealed a correlation between tooth brushing and periodontal disease (OR: 3.96, 95% CI: 1.7-8.9, p: 0.001), showing that poor tooth brushing is associated with a 4-fold increased risk of severe periodontal disease.

Statistical analysis revealed a link between smoking and periodontal disease (OR: 2.59, 95% CI: 1.21-5.55, p: 0.014), indicating that smokers are 2.6 times more likely to develop severe periodontal disease than nonsmokers.

Table 3 - Association of Predominant Variables with the Prevalence of Periodontal Diseases in Banda Aceh and Aceh Besar Students (n=104)

Periodontal Diseases	Odds Ratio	P>IzI	[95% Conf. Interval]
Calculus	12,71	0.001	4,79-33,7
Carries	1,75	0.383	0,49-6,24
Brushing teeth behavior	2,03	0,174	0,73-5,68
Smoking	1,71	0.258	0,67-4,39

Calculus is the most influential variable in relation to the occurrence of periodontal disease, as indicated by OR = 12.71 (95% CI = 4.79-33.7) and p = 0.001 in Table 3.

Relationship of Gender and Periodontal Diseases

Analysis of the data reveals that 17.9% of male respondents and 6.3% of female respondents had severe periodontal disease. The statistical analysis revealed that there was no association between gender and periodontal disease (OR: 0.51, 95% CI: 0.2-1.01, p: 0.085), showing that men were inversely related with periodontal events, with a 0.51-fold increased likelihood of developing severe periodontal disease. Periodontal disease is more prevalent in men than in women because women are more compassionate than men.[11] Inadequate oral and dental hygiene, a lack of concern for dental and oral health, and the absence of six-monthly dental and oral health examinations can also contribute to gender variations in the

[11] Kumar A., Raju R.K., Hegde S. & KS R., "Effect of Lifestyle, Education and Dental Health Behavior on the Periodontium", *Indian Journal of Stomatology*, 2014;5(3).

severity of the periodontal disease. This may be related to differences in men's and women's healthy habits and lifestyles.[12]

This study contradicts the findings of Harapan (2020) regarding the description of periodontal disease by age and gender among visitors to the Dental Polyclinic at the Tikala Baru Health Center in Manado City. In 2017-2018, periodontal disease was significantly more prevalent in females, with gingivitis affecting 38 respondents (69.1%) and periodontitis affecting 630 respondents (59.0%). [13]This study is also supported by Setiawan's (2020) research on the mapping and socioeconomic and behavioral risk factors for the occurrence of periodontal disease in Pudong District, Bantul Province. p-value = 0.983 (P> 0.05) indicated that there was no association between gender and the severity of periodontal disease, with OR = 0.991 indicating that women have a 0.991 times lower chance of suffering from periodontal disease with a generalized level of dental severity (generalized), or women have a lower chance of suffering from periodontal disease with the overall severity of the teeth.[14]

The researcher can presume, based on the preceding description, that the respondent's gender is unrelated to the prevalence of periodontal disease and is not a risk factor for the occurrence of periodontal disease. This is supported by the findings of this study, which revealed that both male and female respondents developed periodontal disease. Although more moderate and severe periodontal events occurred in male respondents, moderate and severe periodontal events also occurred in female respondents. This indicates that there is no major gender disparity in the disease's incidence.

Family's Economy Relationship with Periodontal Diseases

Analysis of the data reveals that students with family economics UMP suffered from severe periodontal disease (10.2%), whereas those with family economics UMP suffered from severe periodontal disease (15.5%). Statistical tests revealed no association between family economics and periodontal disease (OR: 1.56, 95% CI: 0.7-3.3, p: 0.239), suggesting that family economics is not a risk factor for periodontal disease. This study contradicts Setiawan's (2020) research on the mapping and socioeconomic and behavioral risk factors for the occurrence of periodontal disease in Pudong District, Bantul Province. The findings revealed a correlation between socioeconomic status and the severity of the periodontal disease. The statistical results indicate that p-value = 0.046 (P 0.05) and OR = 2.294 indicate that the poor have a probability of developing periodontal disease with a moderate degree of dental severity (2.294 times).[15]

Every family's ability to meet their everyday demands, such as dental and oral health needs, is influenced by their socioeconomic condition. Economic position can influence a person's selection of health care services. For those with a high socioeconomic standing, the best health care facilities, including dental and oral health treatments, are available. Individuals with low earnings are more prone to delay attending health facilities, especially dental clinics, resulting in deteriorating dental and oral health.[16]

On the basis of the preceding description, researchers can assume that the incidence of periodontal disease can arise in groups of students with a low or high UMP. This is achievable due to individual awareness, which is influenced by dental and oral care knowledge. Even though a group with high socioeconomic status is aware of the importance of dental and oral health behaviors and receives

[12] Abdi Z.E., "Analisa Pengaruh Perilaku Pencegahan Hipertensi Berdasarkan Konsep Health Belief Model Dan Dukungan Sosial Pada Masyarakat Desa Baruh Jaya Propinsi Kalimantan Selatan Tahun 2015", *Tesis,* Universitas Airlangga Surabaya; 2015.

[13] Harapan I.K., "Gambaran Penyakit Periodontal Berdasarkan Umur Dan Jenis Kelamin Pada Pengunjung Poliklinik Gigi Puskesmas Tikala Baru Kota Manado", *JIGIM (Jurnal Ilmiah Gigi dan Mulut),* 2020;Volume 3, No. 1 Mei 2020.

[14] Setiawan P.B., *Op.Cit,* 91-180.

[15] *Ibid*, 91-180.

[16] Sanders A.E., Slade G.D., Turrell G., John Spencer A. & Marcenes W., "The Shape of the Socioeconomic–Oral Health Gradient: Implications for Theoretical Explanations", *Community dentistry and oral epidemiology,* 2006;34(4):310-319.

dental and oral care, they will not take preventative steps. Similarly, in the income group below UMP, individuals are unwilling to visit Puskesmas for dental care. Although if BPJS is already available, they do not feel it vital to care for their teeth and mouth at least once every six months due to their habits and awareness.

Relationship between Calculus and Periodontal Diseases

Analysis of the data reveals that 3.6% of respondents with good calculus, 5.4% of respondents with moderate calculus, and 25.6% of respondents with bad calculus developed severe periodontal disease. Statistical analysis revealed a link between calculus and periodontal disease (OR = 17, 95% CI = 6.5-44.2, p = 0.001), showing that calculus in the poor category was associated with a 17-fold increased risk of periodontal disease compared to calculus in the good category. This study's findings are consistent with Sompie's (2016) research on the periodontal health of students aged 12 to 14 at SMP Negeri 2 Ranoyapo, South Minahasa Regency. The research findings addressing the status of periodontal tissue based on CPITN measures revealed that only eight students (12.5%) had healthy periodontal tissue; 43 students (67.2%) suffered gingival bleeding accompanied by calculus.[17]

The prevalence of periodontal disease in Indonesia, according to Surya's research (2019), The link between local factors, systemic factors, and behavioural factors on the incidence of periodontal disease in Indonesia (Riskesdas analysis), is 9.77%. Calculus, a local factor related to periodontal disease (p = 0.001, OR) (2.03-2.39).[18] Wulandari (2014) conducted research on the relationship between pH and salivary buffer capacity and calculus formation in patients at the USU Dental Hospital Periodontology Installation. This study began with the collection of stimulated saliva using waxed gum and the spitting method to determine the pH and buffer capacity of saliva, followed by the examination of periodontal tissue using a calculus index and a periodontal index comprised of the Simplified Oral Calculus Index, Volpe Manhold Index, and Periodontal Disease Index. This study revealed a positive and statistically significant relationship between pH and salivary buffer capacity and the calculus index and periodontal index ($p<0.05$).[19]

This finding is further corroborated by a previous study conducted by Pranata (2019), entitled "Dental calculus as the unique calcified oral ecosystem: a review article," which concluded that periodontal disease results from interactions between bacteria and the immune system. If the pathogenicity of the microflora is more prominent than the immune response, damage to the periodontal tissue might result. Some germs lose their virulence when calcified. Dental calculus development is a form of the body's defensive mechanism against infections. Yet, the formation of dental calculus, with its abrasive surface, makes plaque accumulation more likely.[20] Plaque and calculus accumulation is the origin of dental and oral diseases, especially periodontal disease. Calculus is a component that continually irritates the gums and can lead to gum inflammation. If it is not removed or cleansed, it will continue to damage the supporting tissues of the teeth, causing them to eventually wobble and fall out on their own.[21]

Researchers can believe calculus is related to periodontitis, that the presence of plaque on the surface of the teeth causes periodontitis in public health students, and that calculus is created by plaque that develops immediately after brushing the teeth. Plaque cannot be seen with the naked eye, therefore

[17] Sompie GM., Mintjelungan., Juliatri., *Status Periodontal Pelajar Umur 12-14 tahun di SMP Negeri 2 Ranoyapo Kabupaten Minahasa Selatan,* 2016.

[18] Surya LS., Sutiawan,, Besral., "Hubungan Faktor Lokal, Faktor Sistemik dan Faktor Perilaku terhadap Kejadian Penyakit Periodontal di Indonesia (Analisis Riskesdas)", *Makassar Dent J* 2019; 8(2): 57-66. p-ISSN:2089-8134 . e-ISSN:2548-5830.

[19] Wulandari p., Lestari F., "PH dan Kapasitas Buffer Saliva Dalam Hubungannya terhadap Pembentukan Kalkulus pada Pasien di Instalasi Periodonsia RSGM USU", 2014. *dentika Dental Journal,* Vol 18, No. 2, 2014: 116-119.

[20] Pranata N., "Dental calculus as the unique calficied oral ecosystem a revies artikel", *Oceana Biomedicina Journal.* Vol 2 No 2 Jul – Dec 2019.

[21] Artawa I. & Swastini I., "Perbedaan Kondisi Karang Gigi Pada Masyarakat Yang Mengkonsumsi Air Sumur Dengan Bukan Air Sumur", *Jurnal Periodontology,* 2010;8:1-2

people tend to disregard or even be unaware that its existence makes it easier for food to adhere, which, if not cleansed properly, will result in bacterial metabolism and inflammation/periodontitis. Periodontitis risk increases proportionally with the difficulty of calculus encountered by students. Even though calculus can be prevented or lowered in severity with regular tartar removal at least once every six months. It's only that occasionally public health students themselves pay insufficient attention to dental hygiene, particularly tartar removal.

Relationship of Caries with Periodontal Diseases

Analysis of the data reveals that respondents without dental caries had severe periodontal disease (3.5%), but those with dental caries had severe periodontal disease (16%). Statistical analysis revealed a connection between dental caries and periodontal disease (OR: 5.16, 95% CI: 1.89-14.0, p: 0.001), showing that dental caries is associated with a 5-fold increased risk of developing severe periodontal disease. The findings of this study are corroborated by Riyanto's (2021) research on the relationship between incorrect restoration, caries around the gums, food waste, and gingivitis in elementary school children. The results revealed a significant association between incorrect restorations, caries around the gums, food scrap piles, and crowding and gingivitis in youngsters ($p<0.05$).[22]

Caries is a disease of the hard tissues of the teeth, including enamel, dentine, and cementum, that is produced by the action of a microbe in a questionable carbohydrate. The symptom is the demineralization of hard tooth tissue, followed by the decomposition of organic substances. As a result, there is bacterial invasion and death of the pulp, as well as pain-causing infection spread to the periapex tissue. Nonetheless, it is possible for remineralization to occur, and the disease can be prevented in its earliest stages.[23]

Researchers might presume that dental caries can enhance the likelihood of periodontal disease onset. This is evident from the findings of the study, which revealed that the proportion of respondents with periodontal disease was higher among those with dental caries than among those without dental caries. This is conceivable because dental caries make it easier for food residue to adhere to and is difficult to remove, resulting in the formation of plaque, which contaminates the periodontal tissue. Dental caries should be prevented by maintaining personal hygiene, particularly of the teeth and mouth, by avoiding foods and beverages that can damage tooth enamel, by receiving regular dental care, and by brushing teeth in the proper manner and at the proper time, so as to maintain healthy teeth and remove food residue effectively.

Relationship between Tooth Brushing Behavior and Periodontal Diseases

Analysis of the data reveals that respondents who cleaned their teeth properly experienced severe periodontal disease at a rate of 2.3%, whereas those who brushed their teeth poorly got severe periodontal disease at a rate of 20%. Statistical analysis revealed a correlation between tooth brushing and periodontal disease (OR: 3.96, 95% CI: 1.7-8.9, p: 0.001), showing that poor tooth brushing is associated with a 4-fold increased risk of severe periodontal disease. This study's findings are consistent with Verianti's (2020) findings about drug users' oral health practices and the prevalence of chronic periodontitis. Oral hygiene (p-value = 0.000; OR = 96.84; 95% CI = 21.58-434.66) and toothbrush frequency (p-value = 0.035; OR = 8.39; 95% CI = 1.08-65.55) are associated with the risk of chronic periodontitis in drug users.[24]

[22] Riyanto A., "Hubungan Restorasi Keliru, Karies Sekitar Gusi, Tumpukan Sisa Makanan, dan Crowded dengan Gingivitis pada Anak Sekolah Dasar", *MPPKI (September, 2021) Vol. 4. No. 3.* ISSN 2597-6052.

[23] Alim S., "Pola Makan dan Kebiasaan Menggosok Gigi Dengan Timbulnya Karies Gigi Pada Anak", *Sing Journal of Pediatric Nursing*, 2014;Vol 1 (3):131-136.

[24] Verianti T., "Perilaku Kesehatan Ronga Mulut Terhadap Kejadian Periodontitis Kronis pada Pengguna Narkoba" *Tesis,* Dipublikasikan. 2020.

This study is also supported by Susanti's (2021) investigation on the connection between oral health knowledge and behavior and periodontitis in patients visiting the Dental Clinic at the Kasomalang Health Center in Subang. The results revealed that respondents exhibited both positive (31,6%) and negative (68.4%) conduct. p=0.001 (p<0.05) and r=0.846 were the results of the gamma correlation analysis between dental and oral health behaviors and periodontitis. Thus, there is a strong correlation between oral health practices and periodontitis.[25] Rohmawati (2009) did research on the state of periodontal disease in adult male smokers. Interview approaches for data collection. The results indicated that teeth brushing practice was connected with periodontal disease status in adult male smokers (p = 0.030).[26]

The use of a toothbrush to maintain the cleanliness and hygiene of the structure of the teeth and mouth. The high prevalence of dental disease in Indonesia is attributable to poor brushing habits. It is beneficial to reduce the likelihood of plaque formation by brushing your teeth after breakfast and before going to bed. Plaque can only be eliminated by using the correct toothbrush technique. Plaque that transforms into tartar and thickens over time. The gums become prone to gingivitis due to the presence of dense plaque (gingivitis). Periodontitis begins with gingivitis in both children and adults.[27]

Researchers may hypothesize that proper teeth brushing can prevent periodontal disease. Students who brush their teeth incorrectly and at the wrong time are more likely to develop periodontal disease than those who clean their teeth correctly and at the right time. According to this study, the majority of public health students with poor tooth brushing habits had periodontal disease. This is due to the fact that the respondent has brushed his teeth, but not according to the correct procedure. For example, brushing his teeth at the same time as taking a shower is the wrong time; it should be in the morning after eating and at night before going to bed. Furthermore, the respondent has brushed his teeth in an easy-to-reach location and position, using only the original brushing motion. The formation of bacterial plaque and calculus, which can lead to periodontitis, can be accelerated by improper brushing techniques and timing.

Relationship between Smoking and Periodontal Diseases

Analysis of the data reveals that 7.3% of non-smokers had severe periodontal disease, while 18.4% of smokers had severe periodontal disease. Statistical tests revealed a link between smoking and periodontal disease (OR: 2.59, 95% CI: 1.21-5.55, p: 0.014), indicating that smokers are 2.6 times more likely to develop severe periodontal disease than nonsmokers. Alamsyah (2009) conducted earlier research on the factors that influence smoking habits and their relationship to the prevalence of teenage periodontal disease in Medan City, which is consistent with the findings of this study. The findings revealed a substantial association between smoking and periodontal disease (p=0.000, t=-5.905, df=406).[28]

This study is further corroborated by research conducted by Rohmawati (2009) on the prevalence of periodontal disease among adult male smokers. interview technique. Using Chi-square and logistic regression for data analysis. Among adult male smokers, smoking status (p=0.017), smoking duration (p=0.037), and quantity of cigarettes (p=0.040) were linked with the presence of periodontal disease.[29] The prevalence and severity of the periodontal disease can be exacerbated by smoking. The greater one's

[25] Susanti., "Hubungan Pengetahuan Serta Perilaku Kesehatan Gigi dan Mulut dengan Periodontitid pada Pasien Pengunjung Poli Gigi Puskesmas Kasomalang Kabupaten Subang", *Journal of Oral Health Care*, Vol.9, No. 1, September 2021, pp. 01-09, ISSN 2623-0526 (Online) DOI: http://dx.doi.org/10.29238.

[26] Rohmawati N., "Status Penyakit Periodontal Pada Pria Perokok Dewasa", *HIGEIA*, 2019; 3. ISSN 1475-362846, e ISSN 1475-222656, http://journal.unnes.ac.id/sju/index.php/higeia.

[27] Notohartojo I.T., "Merokok Dan Karies Gigi Di Indonesia: Analisis Lanjut Riskesdas 2013", *Jurnal penelitian dan pengembangan pelayanan kesehatan*, Vol. 2, No. 3, 2013.

[28] Alamsyah RM., "Faktor-faktor yang Mempengaruhi Kebiasaan Merokok dan Hubungannya dengan Status Penyakit Periodontal Remaja di Kota Medan", *Tesis*, Medan: Sekolah Pasca Sarjana Universitas Sumatra Utara, 2009.

[29] Rohmawati N, *Op.Cit*, 3.

cigarette consumption, the greater one's chance of acquiring the periodontal disease. Smoking can be a key etiological factor and can promote periodontal disease since it can influence the health of the periodontium (Ramadhan, 2010). The average DMF T index is greater in smokers than in nonsmokers. This is related to the condition of saliva, which is a natural oral cavity defender. If saliva's protective function is diminished, germs multiply rapidly and generate acids that erode tooth enamel.[30]

Smokers accumulate more calculus than nonsmokers. This is produced by the pH of inhaled and exposed cigarette smoke in the oral cavity. The higher salivary flow rate in smokers may contribute to increased calculus development. The concentration of calcium in smokers' saliva increases.[31]

Researchers can hypothesize that smoking can exacerbate the detrimental effects on teeth. This is demonstrated by the findings of this study, which indicate that the incidence of periodontal disease is greater among smokers than nonsmokers. Consequently, these data demonstrate that nonsmoking behavior has a large and statistically significant effect on the low formation of calculus in the teeth, implying that nonsmokers tend to have less calculus formation in their teeth. The high tar content of cigarettes promotes discoloration and roughening of the tooth surface, which accelerates the formation of plaque on the teeth in proportion to the duration of smoking and the number of cigarettes smoked per day. The vast majority of male respondents are smokers.

Conclusion

In conclusion, it can be concluded that there is no correlation between gender and periodontal disease in this study (OR: 0.51; 95% CI: 0.24-1.09; p = 0.085), indicating that men were negatively related to the incidence of moderate periodontitis, with a 0.51-fold increased likelihood of causing moderate periodontitis. There is no association between family economics and periodontal disease (OR: 1.56, 95% CI: 0.74-3.31, p: 0.239), demonstrating that family economics is not a cause of periodontal disease; this difference is statistically significant (p = 0.239). There is a correlation between calculus and periodontal disease (OR: 17.0, 95% CI: 6.55-44.2, p: 0.001), indicating that pupils with poor calculus conditions have a 17-fold increased risk of severe periodontal events compared to those with good calculus conditions and adequate lighting. There is a correlation between dental caries and periodontal illness (OR: 5.16, 95% CI: 1.89-14.0, p: 0.001), indicating that students with dental caries have a 5-fold increased risk of developing the severe periodontal disease compared to those without dental caries. There is a correlation between tooth brushing and periodontal disease (OR: 3.96, 95% CI: 1.76-8.10, p = 0.001), indicating that students who brush their teeth improperly have the potential to increase the incidence of severe periodontal disease by a factor of 4 compared to those who brush their teeth properly. There is a correlation between smoking and periodontal disease (OR: 2.59, 95% CI: 1.21-5.55, p: 0.014), indicating that students who smoke are 2.6 times more likely to develop severe periodontal disease than nonsmokers. Calculus has the strongest association with the occurrence of periodontal disease, with OR = 12.7 (95% CI 4.79-33.7) and p value = 0.001.

Suggestion

It is recommended that educational institutions, particularly public health and epidemiology study programmes, will use the findings of this study as a source of data and information for the advancement of science, particularly in the field of dentistry and oral care. Enhancing health promotion among students

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[31] Ruslan & Parmasari., "Hubungan Antara Perilaku Merokok dengan Timbulnya Kalkulus Gigi pada Mahasiswa Fakultas Kedokteran di Surabaya, pISSN 1978-2071 | eISSN 2580-5967", *Jurnal Ilmiah Kedokteran Wijaya Kusuma* 11(1) : 49-55, Maret 2022.

of public health, particularly in regard to periodontal disease. Include dental and oral health/hygiene topics in personal hygiene courses and others. Students of public health should be able to use the results of this study as input and suggestions for enhancing dental and oral care so as to prevent the occurrence of periodontal disease. It is intended that other researchers would use the results of this study as preliminary information and a point of reference for future studies, particularly those pertaining to public health, particularly dental and oral hygiene.

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