

The Difference in Pocket Depth and Gingival Recession between Both Smokers and Non-Smokers with Chronic Periodontitis

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Abstract

Smoking is one of the risk factors of chronic periodontitis. Studies showing differences in pocket depth and gingival recession in chronic periodontitis patients between smokers and non-smokers remain rare.

To identify differences in pocket depth and gingival recession between smokers and non-smokers with chronic periodontitis. A cross-sectional study was conducted using medical records of 101 smokers and 101 non-smokers who suffered from chronic periodontitis. Mann-Whitney tests showed significant differences in the mean pocket depth and mean gingival recession ($p < 0.05$ for both) between smokers and non-smokers.

The mean pocket depth and gingival recession in smokers is greater than in non-smokers.

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Introduction

Periodontal disease is an oral health problem that has the second highest prevalence worldwide, after caries. Two main types of inflammation affecting periodontal tissues are gingivitis and periodontitis. Based on the National Health Survey in Indonesia 2015, periodontal disease took the second place of the dental health problems, with 95,21% of the population in Indonesia.¹ Periodontitis is a bacterial infection affecting all parts of the periodontal tissue and is a result of complex interactions between accumulated plaque and the host's efforts against the infection. Periodontitis is separated into three main categories, one of which is chronic periodontitis. Chronic periodontitis is the most frequently occurring type.² Worldwide, the prevalence of Chronic periodontitis in the general adult population is reported to be 30–35 %, with approximately 10–15 % diagnosed with severe CP.³

Chronic periodontitis, previously known as adult periodontitis or chronic adult periodontitis, is

an inflammatory disease in the periodontal tissue that causes a response against the gingiva and progresses to the cementum, periodontal ligament, and alveolar bone. Clinical signs of chronic periodontitis are periodontal inflammation, bleeding on probing, pocket formation, tooth movement, suppuration, and gingival recession. A periodontal pocket and gingival recession are signs used to diagnose chronic periodontitis.⁴ A periodontal pocket can be defined as a pathological increase of the gingival sulcus depth.⁵ Meanwhile, a gingival recession is defined as tooth root exposure due to gingival apical migration.⁶

Chronic periodontitis has some risk factors, such as local factors, systemic factors, habits, environmental factors, and genetic factors. One habit that can increase chronic periodontitis severity is smoking.⁴ Smoking is a worldwide health problem that causes many diseases, even death. WHO predicts smoking is the cause of death for six million people worldwide each year.⁷ According to WHO, in 2012, Indonesia was third for having the most smokers worldwide, after China and India.⁸ Nationally, the smoking prevalence in 2013 was 36.3%, with the highest prevalence is East Nusa Tenggara (55.6%).⁹ The smoking habit can be linked to certain diseases, locally or systemically. Systemic diseases due to smoking include cardiovascular, gastrointestinal and respiratory.¹⁰ Research has shown that

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smokers have a high risk for periodontal and oral mucosal lesions, which is another oral cavity problem.¹¹ Cigarette smoke is known to contain carbon monoxide which will reduce oxygen levels. Thus, vasoconstriction of blood vessels will occur to compensate the oxygen drop and host response will also reduce.¹² This findings support another research that stated there was a connection between the smoking habit and periodontal pocket depth and gingival recession in patients. Generally, smokers have deeper periodontal pockets compared to non-smokers.¹³ Previous researches stated that gingival recession is increased in smokers compared to non-smokers.¹⁴

Based on a literature review, previous research has stated there are correlations between a smoking habit and both periodontal pocket depth and gingival recession. However, few studies have specifically studied differences in periodontal pocket depth and gingival recession in smokers and non-smokers who are also periodontitis patients, especially in Indonesia. Therefore, this study examined the difference in both pocket depth and gingival recession between smokers and non-smokers who were chronic periodontitis patients. This was done through a retrospective study of dental records. This research aimed to give a clear explanation concerning the differences in periodontal pocket depth and gingival recession in smokers and non-smokers who were chronic periodontitis patients.

Materials and methods

This research was a retrospective and analytical study from secondary data with a cross-sectional technique done at the Faculty of Dentistry, University of Indonesia Dental Hospital from June to September 2016. Data were taken from periodontal medical records for patients who were either smokers or non-smokers that had chronic periodontitis and had visited the clinic from 2010 to 2015. Medical records with complete data were collected from 538 medical records, and from those, 138 were smokers and 400 were non-smokers. Groups in this study were divided into smoking or non-smoking patients. A purposive sampling technique was done with the 138 smokers, resulting in 101 smokers who matched the inclusion criteria.

Sampling for non-smokers was also done using a purposive sampling technique, resulting in 231 patients who matched the inclusion criteria. Sampling continued using a blind sampling technique to get 101 non-smokers from the 231 who matched the inclusion criteria. Then, demographic data, pocket depth, gingival recession clinical examinations, and data on smoking habits were gathered. Oral hygiene was examined based on the oral hygiene index simplified.

Data were analyzed using the SPSS V.20 statistical data processing application. The analyses started with a univariate analysis to determine the distribution of patients, then a normality test was done. After that, bivariate analyses were done to analyze differences in periodontal pocket depths and gingival recession in smokers and non-smokers. If the data distribution was normal, independent *t*-tests were used with a 5% significance score. However, if the data distribution was not normal, Mann-Whitney tests were used with a 5% significance score. Results were significantly different with $p < 0.05$.

Results

Data were taken from the Faculty of Dentistry, University of Indonesia Dental Hospital dental records from examinations occurring from 2010 to 2015. Table 1 shows that most of the patients were male (69.8%) and the majority of patients had bad oral hygiene (65.8%). Table 2 shows that patients were separated into six age groups, pocket depth and gingival recession.

Variable	Frequency	Percentage
Smoking habit		
Smokers	101	50.0
Non-smokers	101	50.0
Gender		
Male	141	69.8
Female	61	30.2
Age		
17–25 years old	34	16.8
26–35 years old	29	14.4
36–45 years old	55	27.2
46–55 years old	51	25.2
56–65 years old	28	13.9
> 65 years old	5	2.5
Oral hygiene		
Good	6	3.0
Fair	63	31.2
Bad	133	65.8

Table 1. Patient demographic variables and clinical status.

Variables	Smoking Habit (n)	
	Smokers (n = 101)	Non-smokers (n = 101)
Age Groups		
17–25 years old	13 (6.44%)	21 (10.40%)
26–35 years old	15 (7.43%)	14 (6.93%)
36–45 years old	32 (15.84%)	23 (11.39%)
46–55 years old	22 (10.89%)	29 (14.35%)
56–65 years old	16 (7.92%)	12 (5.94%)
> 65 years old	3 (1.48%)	2 (0.99%)
Pocket Depth		
1–3 mm	45 (44.55%)	92 (91.09%)
4–6 mm	52 (51.49%)	9 (8.91%)
≥ 7 mm	4 (3.96%)	0 (0%)
Gingival Recession		
0–2 mm	73 (36.14%)	86 (42.57%)
3–4 mm	18 (8.91%)	15 (7.43%)
> 4 mm	10 (4.95%)	0 (0%)

Table 2. Distribution for Smokers and Non-smokers between different age groups, pocket depth, gingival regression with Chronic Periodontitis.

	Pocket mean ± SD (mm)	Min-Max (mm)	95% CI
Periodontal Pocket			
Smokers	3.96±0.119	2-7	3.72–4.20
Non-smokers	2.93±0.049	2-4	2.83–3.03
Gingival Recession			
Smokers	2.19±0.132	0-6	1.93–2.45
Non-smokers	1.52±0.098	0-4	1.33–1.72

Table 3. Mean, minimum, and maximum periodontal pocket and gingival recession scores for smokers and non-smokers with chronic periodontitis.

Age Groups (years old)	Gingival Recession Mean ± SD (mm)		Periodontal Pocket Mean ± SD (mm)	
	Smokers	Non-smokers	Smokers	Non-smokers
17–25	1.92 ± 0.400	1.76 ± 0.217	3.54 ± 0.243	2.90 ± 0.095
26–35	2.13 ± 0.336	1.29 ± 0.286	4.00 ± 0.258	3.00 ± 0.105
36–45	2.16 ± 0.186	1.61 ± 0.224	3.59 ± 0.210	2.91 ± 0.087
46–55	2.64 ± 0.298	1.55 ± 0.161	4.45 ± 0.292	3.00 ± 0.111
56–65	2.00 ± 0.408	1.17 ± 0.297	4.25 ± 0.310	2.75 ± 0.179
> 65	1.67 ± 0.882	1.50 ± 0.500	4.33 ± 0.333	3.00 ± 0

Table 4. Mean Gingival Recession and periodontal pocket in Smokers and Non-smokers with Chronic Periodontitis Based on Age Group.

Tables 3 and 4 show there was a mean and periodontal pocket, gingival recession, and age distribution difference between smokers and non-smokers. Table 4 shows that the largest mean periodontal pocket in smokers and non-smokers was in the 45-55 years age group. Table 4 shows that largest mean gingival recession in smokers was in the 46-55 years age group, and for non-smokers, it was in the 17-25 years age group. Bivariate analysis consisted of pocket periodontal depth and gingival recession differences between smokers and non-smokers.

Before the bivariate analysis was done, a data normality test was done.

Based on the Mann-Whitney non-parametrical test results shown in Table 5, the difference in mean pocket depths between the smokers and non-smokers was significant with a $p = 0.000$ ($p < 0.05$). This table also shows there was a significant difference in mean pocket periodontal depth between smokers and non-smokers. Table 5 also shows that the difference in the mean gingival recession between smokers and non-smokers was significant with $p = 0.001$ ($p < 0.05$). Therefore, our hypothesis that stated there would be periodontal pocket and gingival recession difference between smokers and non-smokers with chronic periodontitis is accepted.

	Mean ± SD (mm)		p-value
	Smokers	Non-smokers	
Periodontal pocket	3.96 ± 0.119	2.93 ± 0.049	0.000
Gingival recession	2.19 ± 0.132	1.52 ± 0.098	0.001

Table 5. Mean periodontal pocket significant difference tests on smokers and non-smokers with chronic periodontitis.

Discussion

Following the medical record selections, 538 medical records were used in this research. From these medical records, 202 patients were chosen and separated into two groups, 101 smokers and 101 non-smokers, all with chronic periodontitis. Age and gender were not considered in choosing the patients. Collected data was processed using the SPSS application and then analyzed using Mann-Whitney non-parametrical tests because the data distribution was not normal. Statistical analyses showed there was a significant difference in the mean pocket periodontal depth between smokers and non-smokers. Smokers mean periodontal pocket depth was 3.96 ± 0.119 mm, while the non-smokers mean was 2.93 ± 0.049 mm. This result is similar to findings by Jomezai *et al*, which stated that smokers had significantly larger mean periodontal pockets compared to non-smokers.¹⁵

Statistical analysis showed that there was a significant difference ($p < 0.05$) in the mean gingival recession depth between smokers and non-smokers. Smokers mean gingival recession depth was 2.19 ± 0.132 mm, while the non-smokers was 1.52 ± 0.098 mm. This result confirms previous research which stated there

were larger gingival recessions in smokers.¹⁴ Another factor affecting gingival recessions is having a brushing habit that is too strong, frenulum pressure, traumatic occlusion, and other iatrogenic factors. However, a smoking habit and supragingival calculus can be the most significant factors associated with gingival recession. Even though the same plaque scores have been found in smokers and non-smokers, smokers have more supragingival calculus formations compared to non-smokers.¹⁶

One limitation of this study was that we extracted data from medical records rather than taking data directly from the patients. Incomplete data, such as the number of cigarettes smoked per day and how long the patient had been smoking, was another limitation to this study. Lacking this information may be a limitation because a higher cigarette amount and longer smoking habit are consistent with increases in periodontal pocket depth and gingival recession.¹⁶ Medical record writing is sometimes ambiguous and cannot be read properly, which may lead to different interpretations of the data. Another limitation is that there was no control of other factors affecting pocket depth and gingival recession in chronic periodontitis patients. Periodontal pocket depth and gingival recession are not only affected by smoking, but also by other factors, such as age, gender, brushing habits, and traumatic occlusion.

Conclusion

The mean periodontal pocket depth and mean gingival recession were larger in smokers than in non-smokers, which were findings based on significantly different statistical analyses.

Declaration of Interest

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