A Comparative Evaluation of Community Periodontal Index (CPI) and the Presence of Nicotine Stomatitis among Smokers after Oral Hygiene Instruction

Meta Maulida Damayanti, 1 Yuktiana Kharisma, 2 Fajar Awalia Yulianto, 3 Santun Bhekti Rahimah, 2 Winni Maharani, 1 Meike Rachmawati, 1 Herri S. Sastramihardja, 2 Muhammad Alief Abdul ‘Aziiz, 3 Muhammad Ilham Halim 5

1 Department of Pathology, 2 Department of Pharmacology, 3 Department of Public Health, 4 Department of Microbiology, 5 Medical Undergraduate Study Program, Faculty of Medicine, Universitas Islam Bandung, Bandung, Indonesia

Abstract
Smoking can cause periodontal disease as well as lesions in the oral mucosa. Nicotine stomatitis is inflammation caused by heat stimuli injury on the hard and soft palate of the oral cavity; smokers commonly suffer from this condition. Knowledge of how oral hygiene affects the health of dental and oral cavity. The purpose of this study was to describe the differences in community periodontal index (CPI) and nicotine stomatitis in smokers after oral hygiene instruction. The study subjects were 54 men who have a history of active smoking for more than five years. The experiment was carried out in the Biomedical Laboratory of Faculty of Medicine Universitas Islam Bandung in September 2018–January 2019. Dental examination initiated before and after dental health instructions. CPI and nicotine stomatitis tests performed on all subjects by dentists using dental instruments. After six weeks of information about oral hygiene, all subjects re-examined. The results show that there is a statistically significant difference in the average CPI value in smokers before and after dental instruction with a p value<0.001 (p≤0.05). In contrast, the condition of nicotine stomatitis remains the same. CPI value influenced by oral and dental hygiene showed that dental health instruction is very effective. However, stomatitis has not healed as long as the cause is not eliminated.

Key words: Community periodontal index, smokers, stomatitis nicotine

Evaluasi Komparatif Community Periodontal Index (CPI) dan Stomatitis Nikotin di Kalangan Perokok setelah Instruksi Kebersihan Mulut

Abstrak

Kata kunci: Community periodontal index, perokok, stomatitis nikotin

Received: 12 April 2020; Revised: 19 April 2020; Accepted: 21 April 2020; Published: 30 April 2020

Correspondence: Meta Maulida Damayanti, drg., M.Kes. Department of Pathology, Faculty of Medicine, Universitas Islam Bandung, Jln. Tamansari No. 22, Bandung 40116, West Java, Indonesia. E-mail: meta_md@unisba.ac.id
Introduction

Smoking with tobacco increases the possibilities of periodontal disease by affecting periodontal attachment, pocket formation, and bone loss. Besides, smoking will cause inflammation on the gingiva, and cause stains on the teeth interfere with the aesthetics and halitosis.1–3 Smoking also causes damage to almost all organs and body systems. Oral health is an area that receives less attention, but it is a vital area. If the normal flora of the mouth changes, it will cause various diseases, both local and systemic. The smoke of the cigarette can cause the oral mucosal epithelium to be susceptible to the pathogen.4

Periodontal disease often occurs, and there are some risk factors such as smoking, the knowledge of dental health, socioeconomic status, diabetes, senility, heredity, genetics, oral hygiene, lifestyle, and stress are related to periodontal disease.5–7

Cigarettes have a hazardous composition such as gas, nicotine, tar, and also contains more than 4,000 chemical constituents. Nicotine and tar able to stimulate injuries that will cause changes in the oral cavity such as changes in pH of the oral cavity, oral moisture, increasing intraoral temperature, changing immune response, and resistance to infections, especially fungal and virus infections.2,8

Nicotine stomatitis is a lesion that formed due to physical irritation from smoke.9 The temperature at the tip of the tobacco cigarette combustion reaches 650°C (470°C–812°C), and the core temperature of the cigarette can reach 824°C–897°C. During inhalation of smoke, the mouth can reach 190°C. High-temperature fumes that come into direct contact with the mucous palate causing irritation and inflammation of the minor salivary glands in the hard palate.2

Periodontal screening is to prevent periodontal disease and improve oral health. Community periodontal index (CPI) or periodontal screening record should be performed for assessing the periodontal tissue.10–12

Instructions on oral hygiene such as tooth brushing techniques, frequency, and time of brushing are essential knowledge to improve dental and oral hygiene and health. The research aimed to see how the prevalence of nicotine stomatitis and the value of CPI in smokers after oral hygiene instruction that is needed to detect severe periodontal disease.

Methods

The study was at the Biomedical Laboratory, Faculty of Medicine, Universitas Islam Bandung (Unisba), from September 2018 to January 2019. Subjects were Unisba security officers with inclusion criteria, adults aged over 20 years, and a history of active smoking for more than five years. The research subjects were 54 men. The method is by examining the periodontal health status based on the criteria of the CPI and lesions on the palate that is nicotine stomatitis before and after instructions regarding dental and oral hygiene.

CPI examination by evaluating the community periodontal index treatment needs (CPITN) as follows; Code 0 to Code 4 (Code 0: healthy periodontal conditions; Code 1: gingival bleeding on probing; Code 2: calculus and bleeding; Code 3: periodontal sac 4–5 mm; and Code 4: periodontal sac ≥6 mm). Nicotine stomatitis examination is done with anamnesis and examination using a mouth glass by the dentist.10,13

The data were processed using SPSS, and differences in CPI values analyzed with the Wilcoxon signed ranks test while for nicotine stomatitis analyzed with a chi-square test. The data presented in tabular form. The Health Research Ethics Committee of Faculty of Medicine Universitas Islam Bandung has approved this research, with the ethical clearance number: 379/Komite Etik.FK/X/2018.

Results

A total of 54 subjects were included in this study, had an average age of 34 years, with 74% had a history of having a toothache.

Table 1 shows that before oral hygiene instructions, most smokers in Code 1 as much as 37 people (68%), whereas after instruction, most in Code 0 as much as 45 people (83%). The results of the analysis using the Wilcoxon signed ranks test at 95% CI that there are statistically significant differences in the average CPI value in smokers before and after oral hygiene instruction at Unisba, with a p value<0.001 (p≤0.05).

Table 2 shows stomatitis in smokers before and after oral hygiene instruction. Before oral hygiene instructions, most smokers experience stomatitis as much as 37 people (68%), while after instructions, most smokers also experience stomatitis are 35 people (65%).
Table 1 Differences of Average in CPI Values of Smokers before and after Oral Hygiene Instruction

<table>
<thead>
<tr>
<th>CPI Values</th>
<th>Groups (n=54)</th>
<th>p Value *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>CPI codes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code 0</td>
<td>15 (28%)</td>
<td>45 (83%)</td>
</tr>
<tr>
<td>Code 1</td>
<td>37 (68%)</td>
<td>8 (15%)</td>
</tr>
<tr>
<td>Code 2</td>
<td>2 (4%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>CPI value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average (SD)</td>
<td>0.76 (0.51)</td>
<td>0.19 (0.43)</td>
</tr>
<tr>
<td>Median (min–max)</td>
<td>1 (0–2)</td>
<td>0 (0–2)</td>
</tr>
</tbody>
</table>

Note: *Wilcoxon signed ranks test; Code 0: healthy periodontal conditions; Code 1: gingival bleeding on probing; Code 2: calculus and bleeding

Table 2 Overview of Nicotine Stomatitis in Smokers before and after Oral Hygiene Instruction

<table>
<thead>
<tr>
<th>Stomatitis</th>
<th>Groups (n=54)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Yes</td>
<td>37 (69%)</td>
<td>35 (65%)</td>
</tr>
<tr>
<td>No</td>
<td>17 (31%)</td>
<td>19 (35%)</td>
</tr>
</tbody>
</table>

Table 3 Differences in Nicotine Stomatitis Conditions in Smokers before and after Oral Hygiene Instruction

<table>
<thead>
<tr>
<th>Stomatitis before</th>
<th>Stomatitis after</th>
<th>Total (%)</th>
<th>p Value *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (%)</td>
<td>35 (95)</td>
<td>37 (100)</td>
<td>0.500</td>
</tr>
<tr>
<td>No (%)</td>
<td>0 (0)</td>
<td>17 (100)</td>
<td></td>
</tr>
<tr>
<td>Total (%)</td>
<td>35 (65)</td>
<td>19 (35)</td>
<td>54 (100)</td>
</tr>
</tbody>
</table>

Note: McNemar test; *chi-square test

Discussion

Smoking is a significant risk factor associated with a lifestyle that causes periodontal disease. Oral hygiene instruction is the most effective way to change people's behavior regarding the importance of oral and dental hygiene, starting with proper technique, frequency, and time of brushing.14

This study shows that the periodontal disease that is assessed by CPI before the oral and dental health instruction is higher than after the instruction, and it is useful for explaining the pathogenesis of periodontal disease caused by smoking. Sajjad et al.1 and Saribas et al.7 stated there is a high correlation between the consumption of tobacco and gingival index, the plaque index, and the community periodontal index of treatment needs, there was a high correlation between intake of tobacco and the gingival score.

Global Medical and Health Communication, Volume 8 Number 1, April 2020
Nicotine can inhibit alveolar bone repair. Smokers have periodontitis four times more than nonsmokers. In general, calculus deposits are higher and also gingival inflammation. The results showed that smoking is very susceptible to periodontal disease. Smoking affects the periodontitis process through an immunological mechanism and vascular damage. The periodontal status index and gingival melanin pigmentation were significantly worse in smokers than nonsmokers; it indicates that chronic smoking habits can affect dental health and can cause different periodontal disease. The level of gingival melanin pigmentation can correlate with worsening periodontal status and can be used as an early symptom of developing periodontal disease.

History of stomatitis in the study showed no difference between before and after oral hygiene instruction. Mild nicotine stomatitis does not need therapy. However, if it worsens, it can be treated palliatively, giving the instructions for improving oral hygiene and stop smoking. Nicotine stomatitis is a keratosis in the palate caused by tobacco. Palatal mucosa initially appeared reddish. Furthermore, in the vicinity of the minor salivary gland ducts shows inflammation and dilated holes, many micronodules from the red punctate region forming and making diffuse grayish-white wrinkles. The epithelial lining of the oral mucosa is the first immune system to invading microorganisms and carcinogenic agents.

Etiology of nicotine stomatitis increased because of the temperature, rather than the tobacco chemicals. The temperature is responsible for this lesion. Among elderly Indian and Thaiandian people, the general oral mucosal lesion type is smoker’s palate with an incidence of 43%. Lesions mostly involve the maxillary hard palate region with a prevalence of 23.1%. During an intraoral examination, different oral lesions also recorded. The most common oral lesion was oral submucosal fibrosis, which affected 12.2% of subjects, followed by nicotine stomatitis (10.8%). Other studies state that there are effects of smoking at different sites of the oral cavity and show the potential effects of smoking on buccal mucosal microbiota. The heterogeneity of the oral microbe ecosystem found can contribute to the stability of the oral microbiota in most locations, when environmental disturbances occurred, such as those caused by smoking. Research that is conducted by Ain et al. regarding various oral lesions where the subject has various bad habits; the most common is smoking (56.46%).

**Conclusions**

Smoking is closely related to the onset of periodontal disease. Assessment and diagnosis of periodontal conditions of a smoker is a complex and challenging task to prevent serious diseases. Instructions regarding effective oral hygiene can reduce the risk of periodontal disease but cannot cure nicotine stomatitis.

**Conflict of Interest**

There is no conflict of interest in this study.

**Acknowledgments**

The authors convey gratitude to all staff of Biomedical Laboratory staff of Faculty of Medicine, Universitas Islam Bandung.

**References**

8. Horinouchi T, Higashi T, Mazaki Y, Miwa...


