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Research Article

Periodontal Health Status and Level of Periodontal Treatment Needs in Stroke Patients at Hasan Sadikin Hospital Bandung

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KEYWORDS

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ABSTRACT

Introduction: A stroke is any form of brain disorder or central nervous system damage caused by altered blood flow to the brain that impairs motor and cognitive function. Impaired motor and cognitive function restrict oral hygiene, so these patients are vulnerable to dental health problems, such as periodontal disease. They often require help from family members to assist them with oral care. **Objectives:** The aim of this study was to describe the condition of periodontal tissue and the periodontal treatment needs of stroke patients. **Method:** This research is a descriptive study using a cross-sectional format. It was conducted at Hasan Sadikin Hospital Bandung with a sample of 30 stroke patients. An examination of periodontal status and periodontal treatment needs was performed using an index from the World Health Organization, the Community Periodontal Index of Treatment Needs (CPITN). **Results:** None of the patients had healthy periodontal tissue status (score 0), gingival bleeding during or after probing (score 1), or a periodontal pocket ≥ 6 mm (score 4). Nine patients (30%) had supragingival or subgingival calculus (score 2), and 21 patients (70%) had 4–5 mm periodontal pockets (score 3). **Conclusion:** Most stroke patients at Hasan Sadikin Hospital Bandung had a pocket depth of 4–5 mm, and their periodontal health status indicated a need for scaling, root planing, removal of plaque retentive factors, and oral hygiene instructions.

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INTRODUCTION

Stroke is the third deadliest disease in the world after heart disease and cancer. Stroke prevalence is 1.09% based on Basic Health Research (Riskesdas, 2018) and still becomes the number one cause of death in Indonesia.¹ According to the World Health Organization (WHO) definition, "stroke is a disorder of nerve function caused by sudden or rapid circulatory disorders of the brain that cause signs and symptoms that arise according to the focal area in the part of the brain that is disturbed."² Stroke is any form of brain abnormality or central nervous system damage caused by abnormal blood flow.³

The WHO estimates that around 15 million people have a stroke each year. Every year, more than 795,000 people in America suffer a stroke, which corresponds to an average of one stroke every 40 seconds. The age group with the highest prevalence is 43.1% all of strokes at 75 years and over.⁴ In Indonesia in 2018, the prevalence of stroke based on a doctor's diagnosis in the population aged 15 years and older was 1.09%, or an estimated 2,120,362 people. Based on a study related to risk factor of stroke patient at Hasan Sadikin Hospital Bandung showed that stroke patient was approximately 500 people every year. The highest prevalence was 55-64 years old (33.3%) and elementary school education (45.3%).^{5,6}

A stroke causes neurological damage that impairs motor and cognitive function. Cognitive problems that arise due to stroke include disorientation, impaired perception, difficulty in thinking, communication disorders, and reduced attention.⁷ Stroke patients experience motoric problems in the form of limb paralysis and impairment in performing simple tasks, such as tooth brushing.⁸ Patients who experience one-sided paralysis have difficulty controlling their body on the contralateral side.⁹ As a result of one-sided facial paralysis, mastication is disrupted, which affects oral self-cleansing, so a large amount of food residue accumulates on the paralyzed side.¹⁰ Other motoric function disorders include swallowing disorders. Dysphagia is failure to move food boluses from the oral cavity to the stomach, and it has an incidence ranging from 30 to 65% in stroke patients.^{9,11} Dysphagia is an important clinical symptom because it places patients at risk of aspiration pneumonia, in addition to dehydration and malnutrition.¹² Research conducted by Hanawi et al. in 2013 stated that aspiration pneumonia was one of the main causes of death in stroke patients, with an incidence of 22.7%.¹³ Another study found that muscle weakness caused stroke patients to be hampered in performing oral hygiene.¹⁴

Oral hygiene care is the maintenance of oral and dental hygiene in terms of physical and psychological well-being.¹⁵ This is based on research conducted by Aprilia in 2014 concerning the oral hygiene of stroke patients that found 50% required significant assistance from family members in performing oral hygiene.¹⁶ It also determined that the limitations caused by a stroke included 25.9% of patients have diminished capacity of brushing teeth and 36.1% of patients have dental problems.^{17,18} A study conducted by Elli et al. in 2017 at the Kediri Baptist Hospital found that the majority of stroke patients were unable to perform oral hygiene properly due gargling problem (70%), not using dental floss (100%), and not cleaning the tongue while brushing teeth (100%). In about 30% of cases, families provided assistance.¹⁹ The impaired motor and cognitive function that occurs in stroke patients causes poor oral hygiene, which makes them susceptible to periodontal disease.^{20,21}

Periodontal disease is a bacterial interaction associated with inflammatory and immunological responses in periodontal tissue.^{22,23} Periodontal disease can be divided into gingivitis and periodontitis according to the severity of periodontal tissue damage.^{24,25} If there is an infection in the periodontal tissue of the teeth, the infection starts from the marginal gingiva and develops apically, leading to the release of the gingival attachment and the formation of periodontal pockets. There are many bacteria in periodontal pockets, which typically include pathogenic bacteria, such as *Streptococcus spp.*^{26,27}

The highest prevalence of periodontal disease is found in older adults (aged 30 years and older). Research conducted by the WHO in Chicago, USA, in 2010 showed that the prevalence of periodontal disease has increased in the elderly to as high as 70.1%.²⁸ In Bandung, based on research conducted by Susanto et al. in 2018, the prevalence of chronic periodontal disease reached 31%.²⁹ Periodontal disease is commonly found in patients with poor oral hygiene, and there is no exception in stroke patients. Sen et al. reported that there was a relationship between periodontitis and stroke.³⁰ Based on this background, the researchers were interested in investigating the condition of the periodontal tissue and periodontal treatment needs of stroke patients hospitalized at Hasan Sadikin Hospital Bandung using the Community Periodontal Index of Treatment Needs (CPITN).

MATERIALS AND METHODS

This is a descriptive study with a cross-sectional approach designed to develop an overview of the periodontal status and periodontal treatment needs in stroke patients at Hasan Sadikin Hospital Bandung.

It used a nonrandom sampling method with a purposive sampling technique to identify 30 mild to moderate stroke patients. The inclusion criteria included patients who were diagnosed with a mild to moderate stroke by a neurologist, were hospitalized, had all of their mental faculties, were able to open their mouth adequately, and were able to communicate well. The exclusion criteria were edentulous patient patients who had lost all their teeth and uncooperative patients. The data in this study were sourced from primary data obtained from the results of periodontal examinations using the CPITN method with the WHO periodontal examining probe, along with basic tools, such as mouth mirror, explorer, and cotton forceps. Scores were recorded in the CPITN examination table form.³¹ To determine the patient's periodontal health condition and periodontal treatment needs, the following CPITN scoring was table was used, which is presented in Table 1 and Table 2.

The scoring code criteria were as follows: 0 = healthy; 1 = bleeding on probing; 2 = supragingival or subgingival calculus; 3 = pocket with a depth of 4–5 mm; 4 = pocket with a depth of 6 mm or more. The treatment needs categories were as follows: 0 = no treatment (code 0); I = oral hygiene instructions (code 1); II = scaling, root planing, and oral hygiene instructions (codes 2 and 3); III = scaling, root planing, complex therapy, and oral hygiene instructions (code 4).³¹ The data obtained were processed with Microsoft Excel and displayed in tabular form. Ethical approval was obtained with the code 1309/UN6.KEP/EC/2019.

RESULTS

This research was conducted at Hasan Sadikin Hospital in Bandung during the five weeks between November 27, 2019 and January 4, 2020. It examined 30 stroke patients who met the inclusion criteria out of 50 stroke patients initially considered for the study. The patients were mild to moderate stroke patients who had been diagnosed by a neurologist. Descriptions of the research subjects included gender, age, education level, stroke level, periodontal health status, and level of periodontal treatment needs.

Table 1 presents the characteristics of the subjects according to gender, age, education level, and stroke level. There was an equal number of stroke patients according to gender, with 15 (50%) males and 15 (50%) females. Most stroke patients were older, with 27 (90%) in the ≥ 46 -year age range and only three (10%) in the 17–45-year age range. Most of the patients had limited education, with 12 (40%) having graduated from elementary school, six (20%) from junior high school, nine (30%) from high school, and three (10%) from

university (certificate). Eighteen (60%) had minor strokes and 12 (40%) had moderate strokes.

Table 2 describes periodontal status based on gender, age, education level, and stroke level. According to gender, most males (11/15, 73.3%) and females (10/15, 66.7%) had a 4–5 mm pocket depth (score 3). According to age, almost all of the patients (8/9, 88.9%) in the oldest age group (> 65 years) had a pocket depth of 4–5 mm (score 3). As for the youngest age group (17–25 years), the only patient had supragingival or subgingival calculus (score 2). Based on education level, nearly all (10/12, 83.3%) of the least educated patients (elementary school graduates) had a 4–5 mm pocket depth (score 3). All three of the patients with a graduate certificate had supragingival or subgingival calculus (score 2). Table 2 also divides periodontal health status based on stroke level. More than half (11/18, 61.1%) of the mild stroke patients had pockets as deep as 4–5 mm (score 3). An even higher percentage (10/12, 83.3%) of the moderate stroke patients had pockets as deep as 4–5 mm (score 3).

Table 3 differentiates periodontal treatment needs in stroke patients by gender, age, education level, and stroke level showed that TN II was the most common. In accordance with CPITN theory, TN II means that they required scaling, root planing, removal of plaque retentive factors, and oral hygiene instructions.

Table 1. Characteristics of research subjects by gender, age level, education level, and stroke level.

	Amount (n)	Percentage (%)
Gender		
Male	15	50
Female	15	50
Age		
17-25	1	3.33
26-35	0	0
36-45	2	6.67
46-55	7	23.33
56-65	11	36.67
>65	9	30.00
Education		
Elementary school	12	40
Middle school	6	20
High school	9	30
Certificate	3	10
Stroke Level		
Mild stroke	18	60
Moderate stroke	12	40
Total	30	100

Table 2. Periodontal health status based on gender, age, education, and stroke level

	Normal		Bleeding		Calculus		Pocket 4-5mm		Pocket ≥6mm		Total	
	0		1		2		3		4		n	%
	n	%	n	%	n	%	n	%	n	%		
Gender												
Male	-	-	-	-	4	26.27	11	73.33	-	-	15	100
Female	-	-	-	-	5	33.33	10	66.77	-	-	15	100
Age												
17-25	-	-	-	-	1	100	0	0	-	-	1	100
26-35	-	-	-	-	-	-	-	-	-	-	-	100
36-45	-	-	-	-	2	100	0	0	-	-	2	100
46-55	-	-	-	-	3	42.86	4	57.14	-	-	7	100
56-65	-	-	-	-	3	27.27	8	72.73	-	-	11	100
>65	-	-	-	-	1	11.11	8	88.89	-	-	9	100
Education												
Elementary school	-	-	-	-	2	16.67	10	83.33	-	-	12	100
Middle school	-	-	-	-	3	50	3	50	-	-	6	100
High school	-	-	-	-	4	44.44	5	55.56	-	-	9	100
Certificate	-	-	-	-	3	100	0	0	-	-	3	100
Stroke level												
Mild stroke	-	-	-	-	7	38.89	11	61.11	-	-	18	100
Moderate stroke	-	-	-	-	2	16.67	10	83.33	-	-	12	100

Table 3 The level of periodontal treatment needs of stroke patients based on gender, age, education level, and stroke level

	OHI		SRP + OHI		SRP + CS + OHI		Total	
	TN I		TN II		TN III		n	%
	n	%	n	%	n	%		
Gender								
Male	-	-	15	100	-	-	15	100
Female	-	-	15	100	-	-	15	100
Age								
17-25	-	-	1	100	-	-	1	100
26-35	-	-	-	-	-	-	-	-
36-45	-	-	2	100	-	-	2	100
46-55	-	-	3	100	-	-	3	100
56-65	-	-	3	100	-	-	3	100
>65	-	-	1	100	-	-	1	100
Education								
Elementary school	-	-	12	100	-	-	12	100
Middle school	-	-	6	100	-	-	6	100
High school	-	-	9	100	-	-	9	100
Certificate	-	-	3	100	-	-	3	100
Stroke level								
Mild stroke	-	-	18	100	-	-	18	100
Moderate stroke	-	-	12	100	-	-	12	100

DISCUSSION

This study of 30 mild and moderate stroke patients hospitalized at Hasan Sadikin Hospital found that most (70%) had pocket depths of 4–5 mm, while 30% had supragingival or subgingival calculus. No patients had bleeding on probing because their oral hygiene was so restricted that their periodontal tissue was in very poor condition and they had calculus and pocket formation. Therefore, stroke patients should be referred to a dentist for treatment, including scaling, root planing, removal of plaque retentive factors, and instructions for maintaining cleanliness and oral health.

Lulu et al. stated that chronic infections caused by bacteria, such as pathogens *A. Actinomycetemcomitans* and *P. gingivalis*, in the periodontal tissue are associated with the incidence of stroke. They determined that the mean value of the periodontal index in the stroke patient group was 4.37, while it was 3.46 in the non-stroke patient group.³² This supports the relationship between poor oral hygiene and stroke because stroke patients with paralysis of the upper extremities experience problems performing self-care, such as brushing their teeth. Research by Aprilia found that 50% of stroke patients rely significantly on family assistance to perform personal hygiene. In addition, it was found that the oral health problems caused by a stroke were due to a decrease in the ability to brushing teeth which was seen

in about 62% of patients.¹⁶ Stroke patients who experience paralysis on one side also have difficulty controlling the contralateral side. As a result of one-sided facial paralysis, chewing and the self-cleansing function of saliva are inadequate, so significant amounts of food residue accumulate on the paralyzed side. This remaining food develops into plaque, after which it calcifies and turns into calculus. If bacteria penetrate the gingival sulcus, a periodontal pocket will form.³³

Stroke patients often experience long-term disabilities, so good oral hygiene is difficult to maintain. Limited motor movement, decreased cognitive function, and a lack of knowledge about oral hygiene cause the patient to be limited in self-care activities, which makes them vulnerable to dental health problems, such as periodontal disease.³⁴ Most of the stroke patients at Hasan Sadikin Hospital clean the oral cavity using gauze and mouthwash because of the difficulty in brushing their teeth. This is what causes the oral hygiene of stroke patients to be less than optimal.

Decreased muscle function of mastication and dysphagia that occur in stroke patients also make it difficult for patients to eat, so they may require a nasogastric tube. A nasogastric tube is inserted through the nose to the stomach as an alternative for meeting nutritional needs. The use of a nasogastric tube decreases the self-cleansing effect of saliva and thereby increases the accumulation of cariogenic debris in the cheek area and floor of the mouth.³⁵

The lowest level of education for most of the patients in this study was elementary school. This result is in line with another study suggested that most of education of the stroke patient was elementary school (45,3%)⁶ The low education had less knowledge about the importance of oral hygiene. Conversely, stroke patients had more education level are better able to absorb information either verbally or through writing, and education is influential in determining the benefits of health services, even though it may not be fully implemented in daily life.³⁶ Different levels of education lead to differences in basic health knowledge. The higher the level of education, the easier it is for patients to accept and develop knowledge and technology so that productivity will increase, which in turn will improve the health and welfare of the family.³⁷ Patients with lower education levels only pay attention to the limitations caused by their stroke and ignore their oral health. If oral hygiene is not considered, patients will be prone to experience oral health problems, such as periodontal disease, which is a risk factor for stroke complications, namely aspiration pneumonia.³⁸ In this case, knowledge affects the patient's oral hygiene.

The results of this study indicate that there is an

increase in the percentage of periodontal pockets with increasing age. This is consistent with a study conducted by Arunima et al. on a group of elderly people over 70 years of age. They found that 86% experienced moderate periodontitis and 25% experienced tooth loss, which is further evidence that the prevalence and severity of periodontal disease increases with age.³⁹ The degenerative changes in tissue associated with the aging process can increase susceptibility to periodontal disease. Changes related to the aging process, such as medication use, decreased immune function, changes in nutritional status, and other risk factors increase susceptibility to periodontal disease.⁴⁰

According to stroke level, the periodontal condition of patients with moderate strokes was worse than patients with mild strokes. This is because moderate stroke patients have more severe motor function disorders that make it more difficult for them to chew and swallow. In addition, they have greater needs for family assistance with self-care.

The limitation of this study includes the limited number of research subjects; thus, the results cannot be generalized to a larger population. There were many exclusion criteria so that the sample only got 30 patients. Number of subjects this limited study led to a decrease in the validity of the analyzes conducted. The other limitation is that the researcher did not include data on how long the patients had their strokes.

CONCLUSION

This assessment of the periodontal health conditions in stroke patients at Hasan Sadikin Hospital Bandung found that most patients had 4–5 mm pocket depths and required scaling, root planing, removal of plaque retentive factors, and oral hygiene instructions. In general, stroke patients hospitalized at Hasan Sadikin Hospital Bandung have poor periodontal health condition due to a lack of oral hygiene education. Therefore, it is necessary to implement an integrated oral health education program for stroke patients, especially inpatients stroke. Visit the dentist regularly for dental examinations and treatments every 6 months.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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