Correlation Between Tooth Brushing Behavior And Oral Hygiene Status Among 18 To 54-Year-Olds

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ABSTRACT

Background: Plaque control by brushing teeth is essential to prevent dental diseases such as halitosis, dental caries, gingivitis, and periodontitis. The proportion of good daily tooth brushing behavior is not directly proportional to the proportion of dental and oral health problems, which is still high. Tooth brushing behavior which consists of time, frequency, duration, and method of brushing teeth, affects oral hygiene status. The aim of this study to determine the correlation between tooth brushing behavior and oral hygiene status

Method: It is an observational study using a cross-sectional design. This study included 106 patients at RSGM UMY aged 18-54, which were selected using quota sampling. The variables of this study were tooth brushing behavior measured using a questionnaire, including frequency, duration, and time. Oral hygiene status was measured using the Oral Hygiene Index Simplified (OHIS). The data analysis used was Spearman's correlation test.

Result: Spearman's correlation test revealed a significant correlation between brushing time ($p=0.021$, $r=0.224$), method ($p=0.005$, $r=0.268$), and frequency ($p=0.000$, $r=0.372$) to oral hygiene status. There was no correlation between tooth brushing duration ($p=0,341$) to oral hygiene status.

Conclusion: There was a significant correlation between tooth brushing behavior, such as time, method and frequency of tooth brushing, to oral hygiene status.

INTRODUCTION

The 2018 Riskesdas results revealed that the national prevalence of dental and oral problems in people aged ≥ 3 years is 57.6%. DI Yogyakarta Province has a percentage of 65.6% which is included in the top 5 provinces with dental and oral problems in Indonesia[1]. Poor dental and oral health status is also supported by the individual's poor oral hygiene status. Oral hygiene is assessed by the presence or absence of organic deposits, such as pellicles, alba matter, food residue, calculus, and dental plaque[2]. Control of dental plaque by brushing teeth using the right method can effectively prevent plaque formation and calculus[3]. This action is important to prevent dental diseases such as caries, halitosis, gingivitis, and periodontitis, as oral hygiene also affects the function of mastication, speech, and one's self-confidence[2,4]. The COVID-19 pandemic has been going on for almost 2 years. It requires people to change their daily behavior to become more aware of upholding personal hygiene, including maintaining and caring for dental and oral hygiene[5]. Based on the survey by Unilever, positive behavioral changes in maintaining cleanliness during a pandemic focused more on physical and mental health but did not concern oral care habits. The data shows fewer people are brushing their teeth twice daily globally compared to 2018[6]. Based on Blum's theory, a person's or community's dental and oral health status can be influenced by several important factors, namely heredity, environment, behavior, and health services[7]. According to the Federation Dentaire Internationale (FDI), good tooth brushing behavior is brushing teeth every day, at least 2 times a day in the morning after breakfast and at night before bed; each for at least 2 minutes. The results of previous studies showed that only 2% of the population brushed their teeth for more than 2 minutes. Meanwhile, only 12% of the population brushed their teeth twice a day, and the majority of people (46%) still brushed their teeth once a day, which is only in the morning[8]. The data shows that many people still brush their teeth less effectively. Individuals with poor tooth brushing behavior, including timing, frequency, duration, and poor tooth brushing technique, show poor oral hygiene status. Data related to good daily tooth brushing is not directly proportional to the proportion of dental and oral problems, which are still quite high at that age. One factor is that people do not understand how to brush their teeth properly[9]. Several preventive dentistry procedures aim to improve oral health by behavioral education or intervention about oral health behavior. The factors that most affect dental checkups and oral hygiene habits, such as brushing, are yet unknown. A person may be significantly influenced by their education, dental experience, family influence, and other internal and external factors[10]. The way to improve the effectiveness of oral health education is to design health programs that directly affect the attitudes of the target population. It is believed that having an understanding of oral health is essential for forming good habits, and research has linked higher knowledge to improved oral health[11].

RESEARCH METHOD

This research was approved by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, with Number 126/EC-KEPK FKIK UMY/IV/2022 and the Dental Hospital (RSGM) UMY. This research is analytically observational with a cross-sectional design. The data sampling method utilized the quota sampling technique. The population of this study was 106 new patients at RSGM UMY from June to September 2022. Inclusion criteria included new patients aged 18-54 years, carrying out a complete examination, and agreeing to give informed consent. Meanwhile, exclusion criteria included patients using fixed orthodontic appliances and complete dentures, not having at least 2 index teeth,

having a systemic disease such as DM, hypertension, pregnancy or certain conditions that have been medically diagnosed; and medications such as hypertension drugs, DM drugs, stimulants, antidepressants, and antipsychotics. The research instruments included informed consent sheets, dental and oral hygiene behavior forms (adopted from Fitri et. al., 2017)[12], OHI-S index forms, diagnostic tools, PPE, and stationery. Research data collection began with giving informed consent to patients, conducting interviews regarding the dental and oral hygiene behavior form, which consisted of the respondent's identity and tooth brushing behavior (time, duration, frequency, and method of brushing teeth), and OHI measurements. Data were analyzed using the Spearman correlation test.

RESULTS

1. Characteristics of Respondents Based on Tooth Brushing Time

   The proper time to brush teeth is in the morning after breakfast and at night before going to bed. The frequency of brushing teeth is 2 or more times a day. The duration of brushing teeth is 2 minutes or more, using the correct technique. The following are characteristics of age, gender, occupation, and education based on time, frequency, duration and tooth brushing technique.
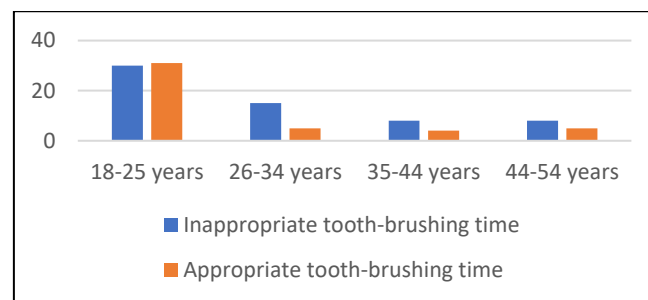

Figure 1. Age Characteristics Based on Tooth Brushing Time

Figure 1 shows that most respondents who brush their teeth at the incorrect time are 18-25 years old.
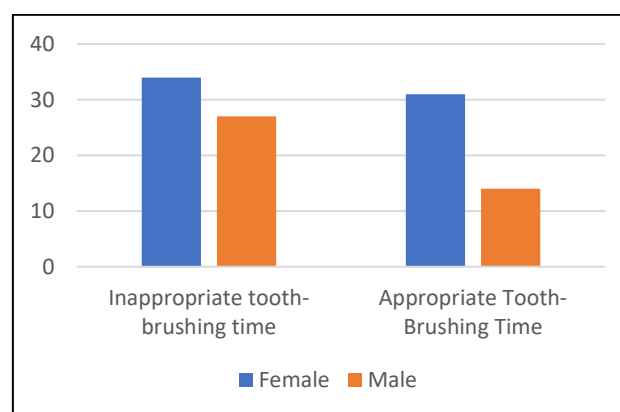

Figure 2. Gender Characteristics Based on Tooth Brushing Time

Figure 2 shows that women have a greater proportion of brushing time, either with an inappropriate or appropriate method.
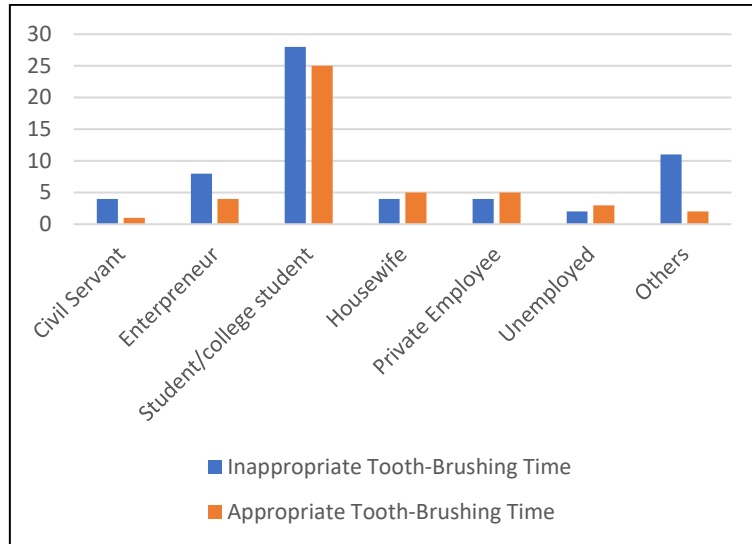
Figure 3. Occupation Characteristics Based on Tooth Brushing Time

Figure 3 shows that students mostly have an inappropriate tooth brushing time.
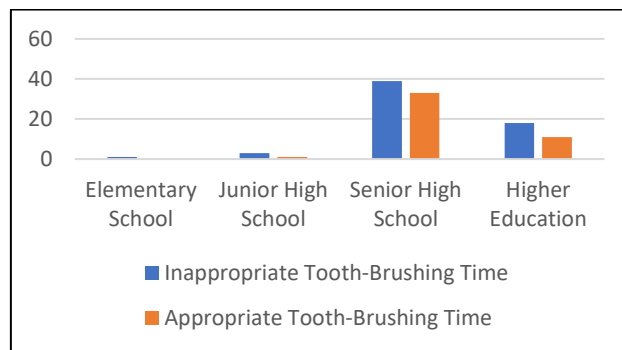

Figure 4. Characteristics of Education Level Based on Tooth Brushing Time

Figure 4 shows that the majority of respondents with a high school level of education are not precise about tooth brushing time.

2. Characteristics of Respondents Based on Tooth Brushing Frequency
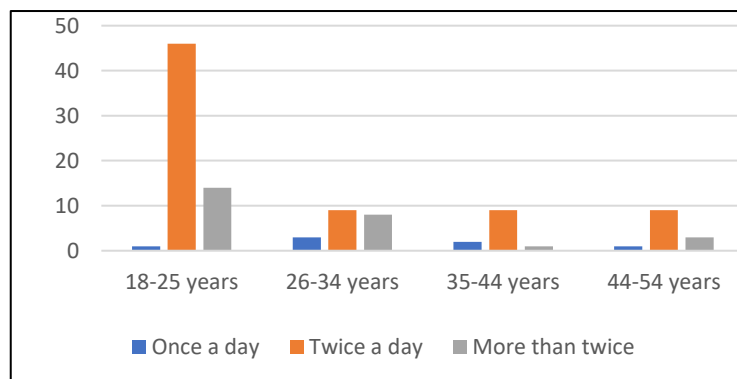

Figure 5. Age Characteristics Based on Tooth Brushing Frequency

Figure 5 displays that most respondents aged 26-34 years brush their teeth once a day, while most respondents aged 18-25 brush their teeth twice a day.

Figure 6. Gender Characteristics Based on Tooth Brushing Frequency

Figure 6 shows that the majority of female and male respondents brush their teeth twice a day.

Figure 7. Occupation Characteristics Based on Tooth Brushing Frequency

Figure 7 shows that the majority of students brush their teeth with a frequency of 2 times a day.
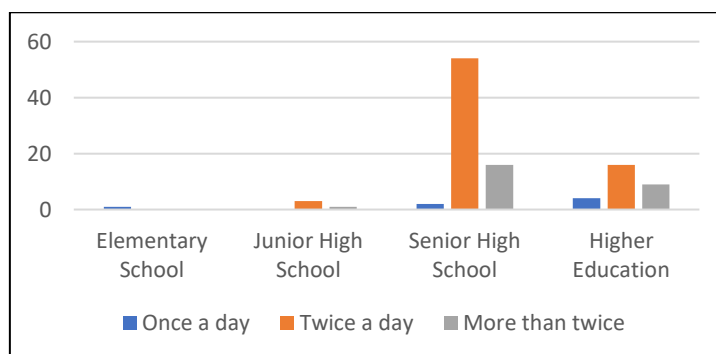
Figure 8. Education Level Characteristics Based on Tooth Brushing Frequency

Figure 8 reveals that the majority of respondents with a high school education level brush their teeth twice a day.

3. Characteristics of Respondents Based on Tooth Brushing Duration

   Tooth Brushing Duration
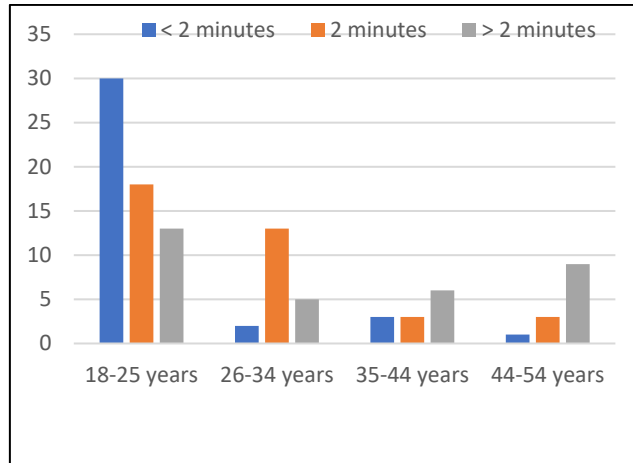
Figure 9. Age Characteristics Based on Tooth Brushing Duration

Figure 9 shows that most respondents aged 18-25 years brush their teeth for less than 2 minutes.

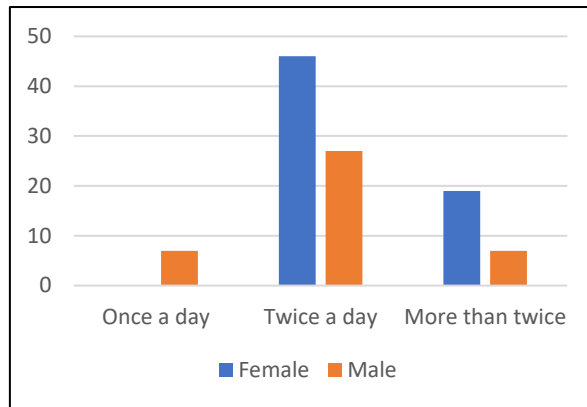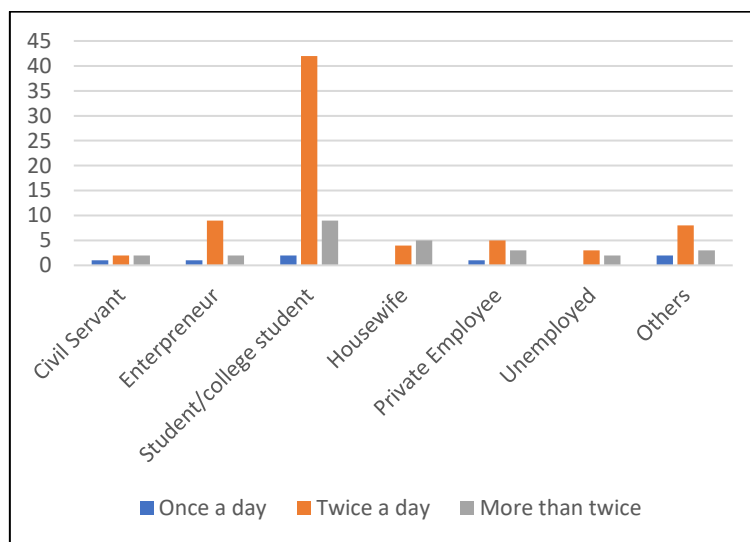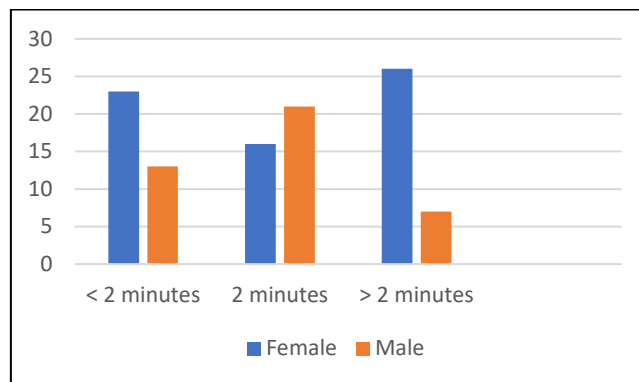
Figure 10. Gender Characteristics Based on Tooth Brushing Duration

Figure 10 shows that the majority of female respondents brush their teeth for less than 2 minutes.
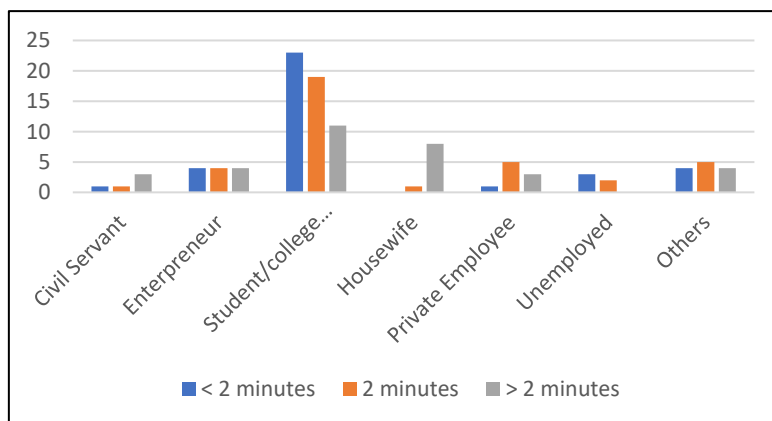
Figure 11. Characteristics of Respondents Based on Occupation

Figure 11 shows that students brush their teeth for less than 2 minutes.
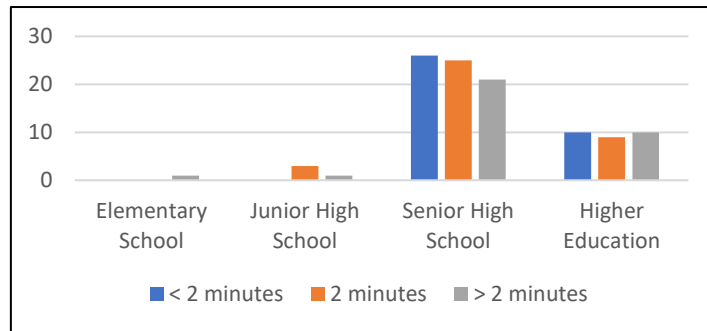
Figure 12. Characteristics of Education Level Based on Tooth Brushing Duration

Figure 12 displays that most respondents with a high school education level brush their teeth for less than 2 minutes.

4. Characteristics of Respondents Based on Teeth Brushing Technique

    Tooth Brushing Technique
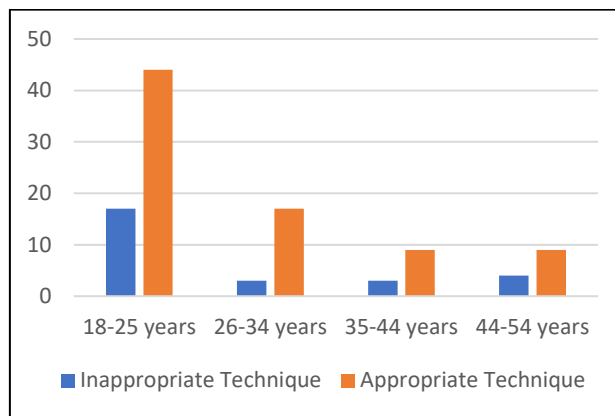
Figure 13. Age Characteristics Based on Tooth Brushing Technique

Figure 13 demonstrates that the majority of respondents aged 18-25 years inappropriately brush their teeth.
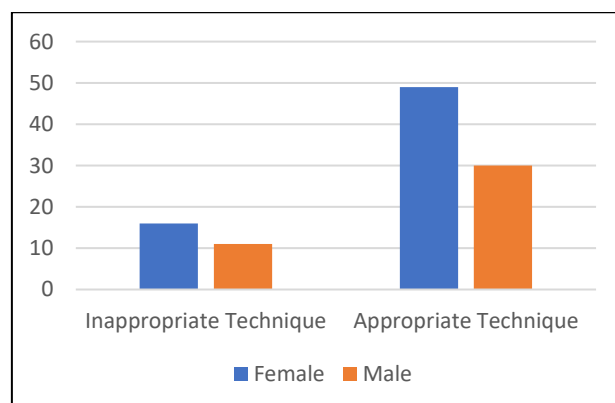
Figure 14. Gender Characteristics Based on Teeth Brushing Technique

Figure 14 shows that most of the female respondents inappropriately brush their teeth.
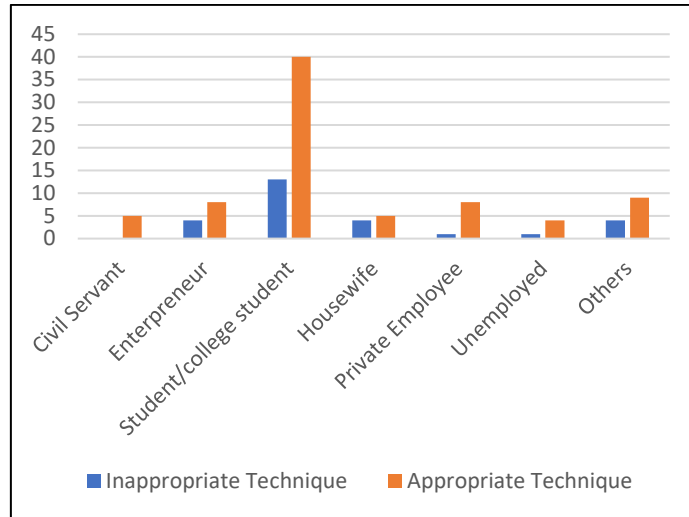
Figure 15. Occupation Characteristics Based on Tooth Brushing Techniques

Figure 15 shows that students mostly inappropriately brush their teeth.
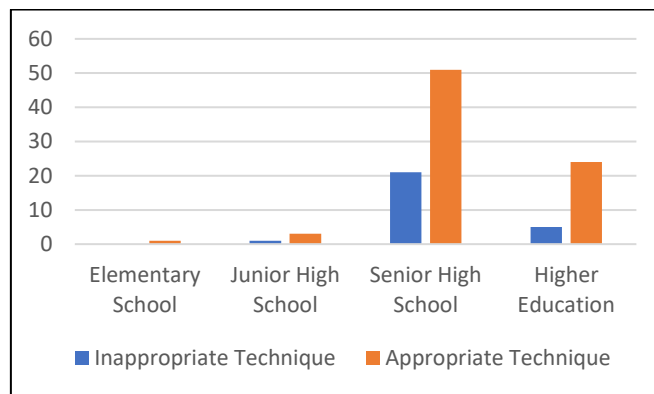
Figure 16. Education Level Characteristics Based on Tooth Brushing Techniques

Figure 16 displays that respondents with a high school level of education inappropriately brush their teeth.

5. Spearman correlation test results

The correlation between tooth brushing behavior such as time, frequency, and duration and tooth brushing technique on oral hygiene status (OHIS) was analyzed using the Spearman correlation test (Table 2).

Table 2. Distribution of Respondent Characteristics Based on OHIS

	OHIS		
	Good (n)	Moderate (n)	Poor (n)
Age			
18-25	16	39	6
26-34	6	12	2
35-44	3	8	1
45-54	4	8	1
Gender			

Female	14	46	5
Male	15	21	5
Occupation			
Civil Servant, Indonesian national army. and police	0	4	1
Enterpreneur	3	6	3
Student/college student	15	33	5
Housewife	2	7	0
Private Employees	5	3	1
Unemployment	1	4	0
Others	3	10	0
Education Level			
Elementary School	0	1	0
Junior High School	1	3	0
Senior High School	21	44	7
Higher Education	7	19	3

Table 1 demonstrates that the respondents' oral and dental hygiene status was in the moderate category; aged 18-25 years, female, and students in high school education level.

Table 2. Spearman Correlation Test Results

Oral Hygiene Index (OHI)			
	r	*p-value*	n
Tooth Brushing Time	0,224	0,021*	106
Tooth Brushing Frequency	0,372	0,000*	106
Tooth Brushing Duration	0,093	0,341	106
Tooth Brushing Technique	0.268	0,005*	106

Table 2 shows a significant relationship between tooth brushing time (p=0.021), tooth brushing frequency (p=0.000), tooth brushing technique (p=0.005) and oral hygiene status. Meanwhile, there is no relationship between tooth brushing duration and oral hygiene status.

DISCUSSION

The correlation test results revealed a relationship between tooth brushing behavior, namely time, frequency, and tooth brushing technique, and oral and dental hygiene status. It aligns with previous studies demonstrating a relationship between brushing time and oral hygiene status, especially after eating and before bed[13]. Brushing teeth 2 times in the morning after breakfast aims to clean food debris that sticks to the teeth to prevent the development of bacteria while brushing teeth at night before going to bed aims to protect the oral cavity. Saliva flow will decrease at night, and bacteria will be more active. Therefore, when people do not brush

their teeth, the teeth will be more at risk of being damaged by bacterial activity. The ideal tooth-brushing time is after eating. However, the most important thing is at night before going to bed[14]. Furthermore, previous studies have stated that there is a relationship between tooth brushing frequency and technique and dental and oral hygiene status[15]. Cleaning teeth involves more than just trying to get them clean; it also involves using the right technique, brushing for the right amount of time to get the teeth clean. The modified Bass technique is also frequently advised, but the American Dental Association recommends brushing the teeth twice a day with little force and circle or sweeping motions. Additionally, brushing teeth thoroughly should take at least two minutes. Toothbrushing is effective in reducing dental plaque levels and is considered the reference technique for mechanical control of plaque. Moreover, brushing teeth more than once a day lowers the risk of developing caries, and cleaning frequency is crucial[16].

Based on age, most respondents aged 18-25 brushed their teeth twice a day with inappropriate timing, duration, and technique. Based on gender, female respondents have brushed their teeth 2 times a day with appropriate duration and technique; however, the timing of brushing their teeth is not yet appropriate. Furthermore, based on education level, respondents with high school education level brushed their teeth 2 times a day with an inappropriate timing, duration and technique. Based on the respondents' occupation, students brushed their teeth 2 times a day at an appropriate time, duration and technique. Some respondents have used the Bass method to brush their teeth. It aligns with previous research revealing that Modified Bass is an effective method for reducing plaque[17]. Besides the brushing method, other aspects that affect cleaning efficiency include pressure rate, type of toothbrush (bristle stiffness), and ability or skill in applying the method of brushing teeth[18]. The results of this study indicated that most respondents had moderate oral hygiene status, namely 53.8% with an inappropriate brushing time, although they had a brushing frequency of 2 times a day, a duration of more than 2 minutes, and the Modified Bass method. There is a lot of evidence to support the disparities in toothbrushing behavior between genders. Since the 1960s, studies on brushing behaviors across all age groups have consistently shown differences between genders. Female subjects brush more often and consistently than male subjects do. A lot of studies have also shown that brushing frequency increases with income, occupation, and education levels[19]. Women tend to pay more attention to dental and oral hygiene which usually prioritizes aesthetic physical appearance[20]. College and high school students have appropriate tooth brushing techniques, this is related to the level of knowledge of respondents about oral health. Knowledge accompanied by awareness, attitudes and actions will have a positive impact on improving oral hygiene. There is a relationship between knowledge, actions, and attitudes with oral hygiene maintenance behavior[21].

The results of this study demonstrated that age, gender, level of education, and occupation are likely to influence tooth brushing behavior. It can be influenced by a lack of awareness and information in maintaining oral health, gender, age, level of education, and unhealthy eating or smoking habits[22]. Women tend to pay more attention to dental and oral hygiene as they are more likely to prioritize aesthetic physical appearance[18]. Female respondents also had good tooth-brushing behavior with moderate oral hygiene status. People at a young age are likely to search for self-actualization but still need parental guidance. They grow up as they are more concerned with oral and dental hygiene. Furthermore, they tend to experience psychological changes, such as unconfident feelings, so they are likely to pay more attention to their physical appearance and prevent this by maintaining dental hygiene[23]. Individuals with a younger age range have better alertness and awareness compared to the older age range[24]. There are a significant association between gender, school district and

mother's occupation to oral hygiene status[25]. Oral hygiene behaviors like tooth brushing, interdental cleaning and tongue cleaning are likely to influenced by socio-psychological consequences such as attitude, social norm and perceived behavior control[26]. Oral health education to improve oral health knowledge and to increase the frequency of tooth brushing should be undertaken in all education level[27,28.]

CONCLUSION

Based on the result of the study, it can be concluded that there was a relationship between tooth brushing behavior, namely time, frequency, tooth brushing technique, and dental and oral hygiene status. Most patients' dental and oral hygiene status was in the moderate category. They were mostly female students or college students aged 18-25 years with a high school/vocational school education level.

ACKNOWLEDGMENT

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