

# Determinants of Appropriate Toothbrushing Behavior

Rusmiati\*, Rosmawati

Department of Dental Health, Health Polytechnic of Jambi, Indonesia

Received January 25, 2023; Revised March 3, 2023; Accepted May 18, 2023

## Cite This Paper in the Following Citation Styles

(a): [1] Rusmiati, Rosmawati, "Determinants of Appropriate Toothbrushing Behavior," *Universal Journal of Public Health*, Vol. 11, No. 3, pp. 291 - 296, 2023. DOI: 10.13189/ujph.2023.110302.

(b): Rusmiati, Rosmawati (2023). *Determinants of Appropriate Toothbrushing Behavior*. *Universal Journal of Public Health*, 11(3), 291 - 296. DOI: 10.13189/ujph.2023.110302.

Copyright©2023 by authors, all rights reserved. Authors agree that this article remains permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

**Abstract** Tooth brushing after breakfast and before bedtime is an essential factor in reducing the risk of disease of the hard and soft tissues of the teeth. Dental caries is the primary harmful effect of mistakes in brushing teeth. The research objective was to analyze the determinants of appropriate tooth-brushing behaviour in elementary school students. This is a cross-sectional observational analytic study involving 240 respondents which was conducted in 4 elementary schools in the Jelutung sub-district, Jambi city, Indonesia. Data analysis used the chi square test. Statistically, there is a significant relationship between knowledge about the right time and appropriate brushing behaviour, where  $P$ -value = 0.018. A significant relationship exists between attitude about brushing time and proper brushing behaviour with  $P$ -value = 0.001. There is a significant relationship between the availability of tooth brushing facilities and brushing behaviour with a  $P$ -value = 0.004. There is a significant relationship between parental supervision in brushing teeth and brushing behaviour appropriately, with  $P$ -value = 0.026. As many as 143 people (59.6%) behaved correctly. Appropriate tooth-brushing behavior is related to knowledge, attitudes, facilities and parental supervision.

**Keywords** Tooth Brushing, Knowledge, Attitude, Access-Facility, Parental Consent

## 1. Introduction

Oral health is usually associated with human body health and physical quality [1,2]. Oral health is a state without pain, cancer, infection, periodontal (gum) disease, tooth decay, and tooth loss in all parts of the oral cavity. The

presence of disturbances in one or more of these components will impact an individual's ability to bite, chew, smile, speak, and psychosocial well-being [3–5].

Oral health is paramount in terms of bodily health and well-being. It dramatically affects the quality of life, including communication, mastication, and self-confidence, and even significantly affects performance. The most typical forms of the oral disorder are cavities, periodontal (gum) disease, oral cancer, oral infections, traumatic injuries, and congenital lesions [6,7].

Oral health is not entirely dependent on one's behaviour. Reducing and preventing dental and oral disease can be done through prevention, self-care, and professional staff. Maintenance of dental health is essential. Therefore dental and oral hygiene must be maintained [8,9].

Tooth brushing is the easiest way to maintain teeth and mouth clean and healthy. Excellent and correct brushing behaviour is carried out diligently, thoroughly, and regularly [8–12]. Tooth brushing should be appropriately done to free the teeth from bacteria and food residue to keep them clean and healthy. In addition, clean teeth mean they are free from plaque. *Plaque* is a thin, colourless layer containing lots of bacteria attached to the tooth surface [13–15].

Clean teeth also cannot be determined to be free of plaque because they can always form. Plaque is colourless; to see it requires a substance called a disclosing agent. Plaque plays a role in the pathogenicity of caries and periodontal disease. Plaque is the leading cause of dental and oral disease [16,17]. Plaque control methods can use chemicals (antiseptic mouth rinses), spraying or irrigation with water, and mechanical (dental polishing and toothbrushes). Brushing teeth is the most effective action to control plaque [18–20].

Approximately 60 - 90% of juveniles and nearly 100%

of adults undergo cavities, whereas severe periodontal (gum) disease, which can lead to a risk of tooth loss, is found in 15 - 20% of the 35 - 44 year age group worldwide [21]. In Indonesia, the youth group is the most vulnerable to dental and oral problems. The national survey in 2018 reported that 55.6% of youth aged 10-14 years and 51.9% of adolescents aged 15-24 had dental and oral diseases. Later it was discovered that maintaining dental and oral health was still low, where the proper behaviour of brushing teeth was only 2.8% of the population. These results are higher when compared to a survey in 2013, where 53.3% of the population faced dental and oral health problems. It was also stated that one of the risk factors causing significant dental and oral problems is poor behaviour in maintaining dental and oral health [22].

Several studies have found a prominent role for behaviour in maintaining oral health, where bad behaviour must be changed in order to form good health behaviour. Several factors influencing proper tooth-brushing behaviour are knowledge, attitude, availability of tooth-brushing facilities and parental supervision [23,24].

The percentage of Jambi province residents who brush their teeth every day is 95.7%, and those who brush their teeth when bathing in the morning and evening are 86.8%. In contrast, for those who brush their teeth properly, i.e. in the morning after breakfast and right at night, only 3.2% are ranked 2nd three lowest. The cause of the low tooth brushing behaviour in Jambi province is unknown, especially in public elementary school students. Therefore this study aims to determine the determinants of correct tooth-brushing behaviour in elementary school students.

## 2. Materials and Methods

### Study Design

This type of research is analytic observational using a cross-sectional study design. A cross-sectional study is a type of research design in which collect data from many different individuals at a single point in time [25].

### Participants

This research was carried out in 4 public elementary schools in Jelutung District, Jambi City, Indonesia, from April to October 2022, involving 240 randomly selected elementary school students. Participant inclusion criteria included grade V students who received permission from their parents. They were willing to be respondents, breakfast before going to school, while students from grade I to grade IV and grade VI were eliminated.

Initially, we targeted grades V and VI for inclusion. However, grade VI students were not allowed by the school and parents because they had to focus on facing school final exams. For this reason, class VI was ultimately excluded as

the target participant. Grades 1 to grade IV were excluded with consideration of age maturity to be able to understand each question item related to good tooth brushing behavior.

### Variable

The variables in this study include tooth brushing behaviour as the dependent variable, while the independent variables are knowledge, attitudes, tooth brushing facilities and parental supervision.

### Data Collection

All variables are measured using a questionnaire. Questions related to knowledge and attitudes about tooth brushing time consist of 8 items each. Each correct answer has a value of 1, and an incorrect answer has a value of 0. Questions about tooth brushing facilities consist of 5 items; each correct answer is given a score of 1, and the wrong answer is scored 0. Parental supervision is assessed through 6 question items; each correct answer was given a score of 1, and the wrong was given a score of 0. Tooth brushing behaviour was assessed through 5 question items; each correct answer was given a score of 1, and the wrong was given a score of 0.

### Sample Size

A total of 240 participants were randomly selected. This figure is obtained from calculations based on the Slovin formula [26]. In detail, the calculation is 600 population,  $d = 0.05$ , so a sample size of 240 is obtained.

### Ethical Consideration

Participants were not pledged or given incentives for their participation. The study protocol adhered to the ethical guidelines of the Declaration of Helsinki for clinical studies. Ethical clearance number LB.02.06/2/88/2022 was obtained from the Health Research Ethics Commission of the Health Polytechnic, Ministry of Health, Jambi.

### Statistical Analysis

All statistical analyzes were performed using SPSS version 16.0 via the Chi-square test. Data are presented as numbers and percentages for categorical variables and mean  $\pm$  standard deviation (SD) for continuous data. The Chi square test is non-parametric and used when the research data is in categorical data and aims to see the relationship or correlation between 2 variables. It is considered significant if the research variable has a P-value  $< 0.05$ . Data analysis using SPSS software version 16.0.

## 3. Results

An overview of the distribution of respondents' characteristics in this study is presented in table 1.

**Table 1.** Distribution of student characteristics

Characteristics	n	%
<b>Age</b>		
10	45	18.8
11	126	52.4
12	69	28.8
<b>Gender</b>		
Male	117	48.8
Female	123	51.2

As shown in Table, most age of the respondents were 11 years old with a total of 126 students (52.4%), and the majority were female (123 students (51.2%).

**Table 2.** Distribution of tooth brushing variables

Variable	n	%
<b>Knowledge</b>		
Poor	61	25.4
Good	179	74.6
<b>Attitude</b>		
Poor	102	42.5
Good	138	57.5
<b>Facility</b>		
Poor	113	47.1
Good	127	52.9
<b>Monitoring</b>		
Poor	114	47.5
Good	126	52.5
<b>Behavior</b>		
Poor	97	40.4
Good	143	59.6

Table 2 shows that most of the student's knowledge is in the Good category, with 179 students (74.6%). Most students' attitudes were good, totalling 138 people (57.5%). In the facility variable, the majority of respondents' answers were in a Good category, 127 people (52.9%); in the monitoring variable, the majority of respondents rated it as good, 126 people (52.5%), and the behaviour of the majority of respondents was correct, as many as 143 people (59.6%).

Table 3 shows that all variables (knowledge, attitudes, availability of facilities and parental supervision) are significantly related to tooth brushing behavior according

to P-value <0.05).

**Table 3.** Analysis of the relationship between variables

Independent variable	Tooth-brushing behavior		P-value
	Poor (%)	Good (%)	
<b>Age</b>			0.001
10	45 (100)	0 (0.0)	
11	52 (41.3)	74 (58.7)	
12	0 (0.0)	69 (100)	
<b>Gender</b>			0.001
Male	97 (82.9)	20 (17.1)	
Female	0 (0.0)	123 (100)	
<b>Knowledge</b>			0.018
Poor	33 (54.1)	28 (45.9)	
Good	64 (35.8)	115 (64.2)	
<b>Attitude</b>			0.001
Poor	54 (52.9)	48 (47.1)	
Good	43 (31.2)	95 (68.8)	
<b>Facility</b>			0.004
Poor	57 (50.4)	56 (49.6)	
Good	40 (31.5)	87 (68.5)	
<b>Parent's monitoring</b>			0.026
Poor	55 (48.2)	59 (51.8)	
Good	42 (33.3)	93 (66.7)	

## 4. Discussion

The age of children in primary education is the ideal time to improve children's motor skills, for example, brushing their teeth. Brushing teeth is immensely significant in order to preserve oral health. Various factors, including age and gender, also influence the success of dental and oral health maintenance. In this study, age and gender influenced students' correct tooth-brushing behavior. Descriptively, the characteristics of the students have no difference in age because the respondents in this study were taken in the age range of 10-12 years. As well as, the number of male and female students did not show a significant difference even though statistically, it was between females and males. Males have different behaviors in brushing their teeth properly.

The results showed a relationship between knowledge regarding brushing time and brushing behaviour. For students who had good knowledge about when to brush their teeth, more students had Good or appropriate brushing behaviour (64.2%) compared to students with Poor knowledge (45.9%). The statistical test results obtained a P-value = 0.018, which means a significant association between knowledge of brushing teeth and the brushing behavior of students at SDN Jelutung District, Jambi City.

As many as 74.6% of students have good knowledge, probably because the school used to be a place of practice for students of the Department of Dental Nursing. Through assistance, students' behavior in brushing their teeth becomes excellent and correct. In addition, knowledge of brushing teeth can also be obtained from advertisements for toothpaste products on TV.

Students' knowledge about the right time to brush their teeth is at the application level. It can be seen from the many students who brush their teeth correctly [7,9]. According to Green's theory, knowledge is a predisposing factor in facilitating behavior. The construction of new behavior starts from the cognitive domain, where the subject first knows the stimulus in the form of material as a basis. Generates new knowledge and then creates an inner response in the form of an attitude, and finally, what is known and fully realized will induce a retort in the physique of activity [27,28].

This study revealed a significant relationship between attitudes about tooth brushing time and tooth brushing behaviour. Students who have a good attitude about brushing their teeth are more appropriate in their tooth-brushing behaviour (68.8%) than those who have a poor attitude (47.1%), with a P = 0.001. to students at SDN Jelutung District, Jambi City.

This research has confirmed that students' negative attitudes toward brushing their teeth lead to poor behaviour in brushing their teeth. It emphasized that they do not understand when to brush their teeth properly and correctly; thus, it can lead to the potential for more severe tooth decay.

The results of this study also indicate a significant relationship between the availability of tooth-brushing facilities and tooth-brushing behavior. Students with good tooth-brushing facilities are more likely to have proper brushing behavior (68.5%) than respondents with poor tooth-brushing facilities (49.6%). The value of the association between tooth brushing facilities and tooth brushing behavior in Jelutung Elementary School students is statistically significant with P-value = 0.004.

Facilities are important supporting factors to enable a person to perform a behavior [17,28]. In brushing teeth, the facilities needed are a toothbrush, toothpaste and water. The results of this study indicate that 97% of respondents have their own toothbrush as an important facility for brushing their teeth as well as the availability of toothpaste and water for brushing their teeth.

The results showed that there was a relationship between parental supervision in brushing teeth and brushing behavior. Students who were supervised by their parents in brushing their teeth were in a good category, more had good behavior in brushing their teeth (66.7%) than respondents who had less parental supervision in brushing their teeth (53.5%). There is a significant relationship between parental supervision in brushing teeth and tooth brushing behavior in students of SDN Jelutung District, Jambi City (P=0.026).

Social support is one of them from parents when parents because of their ignorance or ability, and some parents have less time to supervise and communicate with their children, so children will choose sources of information from peers whose truth is not certain [9,21,29]. Parents and family are the first social environment in which a human interacts. Individuals learn not only by how they interact with their parents or other family members but also by seeing how their parents or family members interact with themselves or how they interact with one another. Parents and other family members provide a model of life skills that the individual learns in the early years of life. Parents can play their role in increasing good tooth brushing habits to prevent the high prevalence of dental caries in school-age children. Parents play a role besides also supervising, teaching good habits and providing reinforcement or positive feedback when children carry out good habits in caring for their teeth [7,30]. The good habit of brushing their teeth in children can be improved through teaching and behaviour reinforcement from parents [2].

Although, in general, 52.5% of parents' supervision of their children was good, only 24.6% accompanied the respondent when brushing their teeth in the morning after breakfast, and 33.3% accompanied after breakfast and before bedtime. In this study, the supervision of new parents at the level of reminding was seen in the question of whether parents reminded them to brush their teeth in the morning before breakfast. The result is that 81.3% of respondents said that parents remind them to brush their teeth and whether parents remind them to brush their teeth before going to bed at night. The result is high; 88.3 parents remind respondents to brush before sleep. Parental supervision needs to be maintained; it would be even better if parents set an example by brushing their teeth with their children. If the habit of brushing your teeth at night before going to bed is made routinely, you can reduce the problem of cavities in children by up to 50% because bacteria reproduce faster at night [18].

Most students spend their daily time at home, not school, so parents play an essential role in growing children. In this case, parents play a role in nurturing and understanding the importance of getting used to brushing their teeth, giving an example of doing the proper brushing, and telling them the right time to brush their teeth. Parents must prepare means for brushing their teeth [15,29].

## 5. Conclusion

The behaviour of the majority of respondents was correct, as many as 143 people (59.6%). Correct tooth-brushing behaviour is related to knowledge, attitude, availability of facilities and parental supervision.

## Acknowledgements

We greatly appreciate the Director of the Health Polytechnic, Jambi Ministry of Health, Indonesia, for the facilitation and mediation provided in carrying out this research.

## REFERENCES

- [1] Al-Wesabi AA, Abdelgawad F, Sasahara H, El Motayam K. Oral health knowledge, attitude and behaviour of dental students in a private university. *BDJ open*. 5(1), 1–5, 2019. DOI: 10.1038/s41405-019-0024-x
- [2] Åström AN, Jakobsen R. The effect of parental dental health behavior on that of their adolescent offspring. *Acta Odontologica Scandinavica*. 54(4), 235–41, 1996. DOI: 10.3109/00016359609003530
- [3] Bashiru BO, Omotola OE. Oral health knowledge, attitude and behavior of medical, pharmacy and nursing students at the University of Port Harcourt, Nigeria. *Journal of Oral Research and Review*. 8(2):66. 2016. DOI: 10.4103/2249-4987.192209
- [4] Davidović B, Ivanović M, Janković S, Lečić J. Knowledge, attitudes and behavior of children in relation to oral health. *Vojnosanitetski pregled*. 71(10). 2014. PMID: 25518275
- [5] Collett BR, Huebner CE, Seminario AL, Wallace E, Gray KE, Speltz ML. Observed child and parent toothbrushing behaviors and child oral health. *International journal of paediatric dentistry*. 26(3):184–92. 2016. DOI: 10.1111/ipd.12175
- [6] Farsi JMA, Farghaly MM, Farsi N. Oral health knowledge, attitude and behaviour among Saudi school students in Jeddah city. *Journal of dentistry*. 32(1):47–53. 2004. DOI: 10.1016/j.jdent.2003.08.002
- [7] Febres C, Echeverri EA, Keene HJ. Parental awareness, habits, and social factors and their relationship to baby bottle tooth decay. *Pediatric dentistry*. 19:22–7. 1997. PMID: 9048409
- [8] Jensen O, Gabre P, Sködd UM, Birkhed D. Is the use of fluoride toothpaste optimal? Knowledge, attitudes and behaviour concerning fluoride toothpaste and toothbrushing in different age groups in Sweden. *Community Dentistry and Oral Epidemiology*. 40(2):175–84. 2012. DOI: 10.1111/j.1600-0528.2011.00658.x
- [9] Gao J, Ruan J, Zhao L, Zhou H, Huang R, Tian J. Oral health status and oral health knowledge, attitudes and behavior among rural children in Shaanxi, western China: a cross-sectional survey. *BMC oral health*. 14(1):1–7. 2014. DOI: <https://doi.org/10.1186/1472-6831-14-144>
- [10] Levin KA, Currie C. Adolescent toothbrushing and the home environment: sociodemographic factors, family relationships and mealtime routines and disorganisation. *Community Dentistry and Oral Epidemiology*. 38(1):10–8. 2010. DOI: <https://doi.org/10.1111/j.1600-0528.2009.00509.x>
- [11] Li Y, Zhang YE, Yang R, Zhang Q, Zou J, Kang D. Associations of social and behavioural factors with early childhood caries in Xiamen city in China. *International journal of paediatric dentistry*. 21(2):103–11. 2011. DOI: 10.1111/j.1365-263X.2010.01093.x
- [12] Liu H-Y, Chen J-R, Hsiao S-Y, Huang S-T. Caregivers' oral health knowledge, attitude and behavior toward their children with disabilities. *Journal of Dental Sciences*. 12(4):388–95. 2017. DOI: 10.1016/j.jds.2017.05.003
- [13] Maes L, Vereecken C, Vanobbergen J, Honkala S. Tooth brushing and social characteristics of families in 32 countries. *International dental journal*. 56(3):159–67. 2006. DOI: 10.1111/j.1875-595x.2006.tb00089.x
- [14] Marshman Z, Ahern SM, McEachan RRC, Rogers HJ, Gray-Burrows KA, Day PF. Parents' experiences of toothbrushing with children: a qualitative study. *JDR Clinical & Translational Research*. 1(2):122–30. 2016. DOI: 10.1177/2380084416647727
- [15] Peres MA, Peres KG, De Barros AJD, Victora CG. The relation between family socioeconomic trajectories from childhood to adolescence and dental caries and associated oral behaviours. *Journal of Epidemiology & Community Health*. 61(2):141–5. 2007. DOI: 10.1136/jech.2005.044818
- [16] Sharda AJ, Shetty S. A comparative study of oral health knowledge, attitude and behaviour of first and final year dental students of Udaipur city, Rajasthan, India. *International journal of dental hygiene*. 6(4):347–53. 2008. DOI: 10.1111/j.1601-5037.2008.00308.x
- [17] Smyth E, Caamaño F, Fernández-Riveiro P. Oral health knowledge, attitudes and practice in 12-year-old schoolchildren. *Medicina Oral, Patología Oral y Cirugía Bucal (Internet)*. 12(8):614–20. 2007. PMID: 18059251
- [18] Petersen PE, Aleksejuniene J, Christensen LB, Eriksen HM, Kalo I. Oral health behavior and attitudes of adults in Lithuania. *Acta Odontologica Scandinavica*. 58(6):243–8. 2000. DOI: 10.1080/00016350050217073
- [19] Qiu RM, Tao Y, Zhou Y, Zhi QH, Lin HC. The relationship between children's oral health-related behaviors and their caregiver's social support. *BMC Oral Health*. 16(1):1–10. 2016. DOI: <https://doi.org/10.1186/s12903-016-0270-4>
- [20] Ronis DL, Lang WP, Farghaly MM, Passow E. Tooth brushing, flossing, and preventive dental visits by Detroit-area residents in relation to demographic and socioeconomic factors. *Journal of public health dentistry*. 53(3):138–45. 1993. DOI: 10.1111/j.1752-7325.1993.tb02692.x
- [21] Dewi TK, Syaefuddin FN. Hubungan Perilaku Hidup Bersih dan Sehat dengan Pengetahuan dan Perilaku Menggosok Gigi. *Jl-KES (Jurnal Ilmu Kesehatan)*. 4(2):50–4. 2021. DOI: <https://doi.org/10.56922/phc.v2i4.260>

- [22] Kemenkes RI. Hasil utama RISKESDAS 2018 [Internet]. Kementerian Kesehatan Badan Penelitian dan Pengembangan Kesehatan. Jakarta; 2018. Available from: [https://kesmas.kemkes.go.id/assets/upload/dir\\_519d41d8cd98f00/files/Hasil-riskesdas-2018\\_1274.pdf](https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-riskesdas-2018_1274.pdf). Last accessed: 20 June 2022.
- [23] Deinzer R, Cordes O, Weber J, Hassebrauck L, Weik U, Krämer N, et al. Toothbrushing behavior in children—an observational study of toothbrushing performance in 12 year olds. *BMC oral health*. 19(1):1–9. 2019. DOI: <https://doi.org/10.1186/s12903-019-0755-z>
- [24] Aunger R. Tooth brushing as routine behaviour. *International Dental Journal*. 57(S5):364–76. 2007. DOI:10.1111/J.1875-595X.2007.TB00163.X
- [25] Olsen C, St George DMM. Cross-sectional study design and data analysis. College entrance examination board. 2004; 26(03):2006. [http://yes-competition.org/media.collegeboard.com/digitalServices/pdf/yes/4297\\_MODULE\\_05.pdf](http://yes-competition.org/media.collegeboard.com/digitalServices/pdf/yes/4297_MODULE_05.pdf)
- [26] Sugiyono. Metode penelitian pendidikan pendekatan kuantitatif, kualitatif dan R&D. Alfabeta; 2013. pp. 1-123
- [27] Zhu L, Petersen PE, Wang H-Y, Bian J-Y, Zhang B-X. Oral health knowledge, attitudes and behaviour of children and adolescents in China. *International dental journal*. 53(5):289–98. 2003. DOI: 10.1111/j.1875-595x.2003.tb00762.x
- [28] Tolvanen M, Lahti S, Miettunen J, Hausen H. Relationship between oral health-related knowledge, attitudes and behavior among 15–16-year-old adolescents—a structural equation modeling approach. *Acta Odontologica Scandinavica*. 70(2):169–76. 2012. DOI: 10.3109/00016357.2011.600722
- [29] de Jong-Lenters M, Duijster D, Bruist MA, Thijssen J, De Ruiter C. The relationship between parenting, family interaction and childhood dental caries: a case-control study. *Social Science & Medicine*. 116:49–55. 2014. DOI: 10.1016/j.socscimed.2014.06.031
- [30] Bozorgmehr E, Hajizamani A, Malek Mohammadi T. Oral health behavior of parents as a predictor of oral health status of their children. *International Scholarly Research Notices*. 2013 May 8;741783. DOI: 10.1155/2013/741783