

The Influence of Tooth Brushing Skills on the Debris Index of Children with Intellectual Disabilities

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ARTICLE INFORMATION	ABSTRACT
<i>Article History:</i> <i>Received: April 30, 2025</i> <i>Revised: May 30, 2025</i> <i>Published: May 31, 2025</i> Keywords: Debris Index Tooth Brushing Skills Intellectual Disabilities	Oral and dental health is an essential part of overall well-being, particularly for children with intellectual disabilities who face challenges in self-care. These children require specific assistance and training to maintain oral hygiene. This study aimed to examine the influence of tooth brushing skills on the debris index of children with intellectual disabilities at SLB C Autis Negeri Tuban in 2024. An analytical research design with a cross-sectional approach was employed. The sample consisted of 22 intellectually disabled students from grades IV and V, selected using random sampling techniques. Data collection was conducted through direct observation of tooth brushing skills and measurement of the debris index before and after brushing. Data were analyzed using the Chi-Square test with SPSS software. The findings indicated that the majority of students demonstrated poor tooth brushing skills and had a high debris index both before and after brushing. However, a reduction in the debris index was observed in some students following tooth brushing, though not all changes were statistically significant. The Chi-Square test revealed a significant relationship between tooth brushing skills and the debris index ($p = 0.002$). It can be concluded that adequate tooth brushing skills positively influence the reduction of the debris index in children with intellectual disabilities at SLB C Autis Negeri Tuban.

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INTRODUCTION

Oral health is a critical component of overall health and well-being, yet it remains one of the most neglected global health issues. According to the World Health Organization over 3.5 billion people worldwide suffer from oral diseases such as dental caries and periodontal disease (WHO, 2022). These conditions not only cause pain and discomfort but also affect essential functions such as speaking, chewing, and social interaction, thereby diminishing quality of life. Despite its importance, oral health is often overlooked in public health strategies, especially in low- and middle-income countries.

In Indonesia, the prevalence of oral and dental health problems remains alarmingly high. Based on the Basic Health Research (Riskesdas, 2018), 57.6% of the population experiences dental and oral health issues, yet only approximately 10% receive adequate dental care (Badan Penelitian dan Pengembangan Kesehatan, 2019). This disparity highlights a significant gap in access to oral health services. The challenge becomes even more pressing when addressing the needs of vulnerable groups, such as children with intellectual disabilities. These children face both cognitive and motor impairments, which hinder their ability to perform daily hygiene tasks independently, including effective tooth brushing (Zhou, Wong, & McGrath, 2019; Gaunkar et al., 2021; Orsós et al., 2021; Mafla et al., 2022; Kalf-Scholte et al., 2023; Palanisamy et al., 2023; Esposito et al., 2024).

Previous studies have emphasized that children with intellectual disabilities are at greater risk for poor oral hygiene due to limited self-care skills (Pesau, Widyorini, & Sumijati, 2020; Lee, & Chang, 2021). Most children with intellectual disabilities had low proficiency in tooth brushing, which correlated with higher debris index scores (Baumgarten et al., 2021; Son, & Ahn, 2023). This indicates a direct relationship between their brushing skills and oral hygiene status. The accumulation of dental plaque, if not managed properly, can lead to severe outcomes such as dental caries, gingivitis, and systemic infections that further compromise the child's overall health.

A preliminary examination conducted by the researchers on January 30, 2024, involving 39 students at SLB C Autis Negeri Tuban, revealed an average debris index score of 1.9, categorized as poor. Observations showed that most students lacked the skills to brush their teeth using proper techniques. This finding aligns with global evidence but also underscores a localized problem that requires urgent and targeted interventions. Despite growing awareness of the importance of oral hygiene, there remains a scarcity of studies focusing on behavioral and skill-based interventions in children with special needs, particularly in the Indonesian context.

Therefore, this study aims to examine the influence of tooth brushing skills on the debris index of children with intellectual disabilities at SLB C Autis Negeri Tuban in 2024. The novelty of this research lies in its focus on quantifying the direct impact of individual tooth brushing skills on objective oral health outcomes in a specific population, contributing valuable data for future educational and preventive oral health programs tailored for children with special needs.

METHOD

This study is a quantitative research with an analytical design and a cross-sectional approach. The design was used to determine the relationship between tooth brushing skills and the debris index in children with intellectual disabilities. The study was conducted at SLB C Autis Negeri Tuban from January to February 2024.

The population of this study consisted of all intellectually disabled students in grades IV and V at SLB C Autis Negeri Tuban. A total of 22 students were selected as the sample using a random sampling technique to ensure even representation within the population. Inclusion criteria included students who were able to follow simple instructions and had obtained parental or guardian consent.

Data collection was carried out in two main stages. First, direct observation was conducted to assess tooth brushing skills using a structured observation sheet. Second, debris index measurements were taken before and after tooth brushing to evaluate the effectiveness of brushing skills in reducing plaque. The instruments used included a toothbrush, toothpaste, disclosing solution, mouth mirror, disposable dental probe (sonde), and observation sheet.

The collected data were statistically analyzed using the Chi-Square test to examine the relationship between tooth brushing skills and the debris index. The analysis was performed with the help of the latest version of SPSS software. The results were considered statistically significant if the p-value was less than 0.05. This study was approved by the Ethics Committee of Poltekkes Kemenkes Surabaya, with approval number EA/3090/KEPK-Poltekkes_Sby/V/2024.

RESULTS AND DISCUSSION

Table 1. Frequency Distribution of Respondents' Characteristics Based on Age and Gender of Students with Intellectual Disabilities at SLB C Autis Negeri Tuban in 2024.

Characteristics	Frequency (n)	Percentage (%)
Male	12	54.5%
Femanle	10	45.5%
Total	22	100 %

Table 1 shows that the majority of respondents were male, totaling 12 individuals (54.5%), while females accounted for 10 individuals (45.5%). This indicates that male participation was slightly higher in this study; however, the distribution between genders remains relatively balanced.

Table 2. Tooth Brushing Skills of Children with Intellectual Disabilities

Tooth Brushing Skills	Frequency (n)	Percentage (%)
Good	3	13,6 %
Moderate	9	40,9 %
Poor	10	45,5 %
Total	22	100 %

Table 2 shows that the majority of students fell into the poor tooth brushing skills category, with 10 students (45.5%), while the good category was observed in only 3 students (13.6%). This indicates a generally low level of tooth brushing ability among students with intellectual disabilities.

Table 3. Debris Index Before and After Tooth Brushing

Debris Index	Before		After	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Good	0	0	4	18.2
Moderate	6	27.3	6	27.3
Poor	16	72.7	12	54.5
Total	22	100	22	100

Table 3 shows that the debris index was measured twice, before and after children with intellectual disabilities brushed their teeth. The results indicate that before brushing, most children were in the poor category. After brushing, there was a slight decrease in the debris index; however, the majority of children still did not show significant improvement to reach the good category. This suggests that the tooth brushing techniques used were not yet effective in removing plaque or food debris from the teeth.

Table 4. The Effect of Tooth Brushing Skills on the Debris Index of Children with Intellectual Disabilities

Tooth Brushing Skills	Good	Moderate	Poor	Total	p-value
Good	7	2	1	10	0.002
Moderate	5	4	0	9	
Poor	0	0	3	3	
Total	12	6	4	22	

Table 4 presents the results of the Chi-Square test, with a p-value of 0.002 ($p < 0.05$), indicating a statistically significant relationship between tooth brushing skills and the debris index.

DISCUSSION

The analysis showed that the better the children's tooth brushing skills, the lower the recorded debris index scores. This indicates that adequate tooth brushing skills directly contribute to the reduction of plaque accumulation on the tooth surface. The researcher believes that effective tooth brushing habits depend not only on knowledge but are also

strongly influenced by motor skills and consistency in performing proper and regular brushing techniques. A study by Bab et al. (2024) emphasized that a combination of oral health education and direct tooth brushing training significantly improves oral hygiene behavior in children, especially those with special needs.

Observations in this study revealed that the tooth brushing skills of intellectually disabled students were still relatively low. Most students were unable to apply proper brushing techniques according to standard guidelines, such as brushing all tooth surfaces, brushing for two minutes, and using the correct vertical or circular motion. Their brushing activities were mostly focused on the occlusal (chewing) surfaces, while labial (front) and lingual (inner) surfaces were often neglected. This condition reflects insufficient brushing skills to achieve optimal oral hygiene.

These findings are in line with the Health Behavior Model by Lawrence Green, which states that skills are one of the predisposing factors in forming healthy behavior. In this context, tooth brushing skills are not merely a physical action, but also serve as an indicator of the success of self-care programs (Green & Vermillion, 1960). Research by Arifian et al. (2022) supports this finding, showing that demonstrative and repeated brushing training significantly reduces debris index scores in children with special needs. Additionally, a study found that hands-on practice-based approaches are more effective than oral instructions alone in improving oral hygiene behavior in children with intellectual disabilities (Fadel et al., 2020; Martin et al., 2022; Kranski, & Steed, 2022).

However, these results differ from Selvyanita et al. (2021), who reported that high parental knowledge does not always correspond with better child oral hygiene unless accompanied by direct practice at home. Therefore, visual and hands-on educational approaches are crucial in developing effective tooth brushing skills among intellectually disabled children. Personalized guidance and consistent habituation are key to successfully shaping proper brushing behavior.

This study is limited by a relatively small sample size and was conducted at only one special school in a single region, which restricts the generalizability of the findings to the broader population of intellectually disabled children in Indonesia. Furthermore, other influencing variables—such as the degree of disability, parental support at home, and nutritional status—were not thoroughly analyzed, though they may impact oral hygiene outcomes. Future studies are encouraged to use a longitudinal design with control groups and to incorporate multimethod educational interventions (such as interactive visual media and family-based training) to yield more comprehensive results.

Practically, the findings highlight the importance of integrating tooth brushing training into routine programs at special education schools. These programs should involve collaboration among classroom teachers, parents, and dental health professionals. Regular debris index assessments are also recommended to evaluate the effectiveness of the implemented programs. If conducted consistently, such initiatives can not only reduce the risk of oral and dental diseases but also promote children's independence in self-care and improve their overall quality of life.

CONCLUSION

Based on the results of the study, it can be concluded that good tooth brushing skills have a significant effect on reducing the debris index scores in children with intellectual disabilities at SLB C Autis Negeri Tuban. Children with better tooth brushing abilities demonstrated higher levels of oral hygiene compared to those with poor brushing skills.

For future research, it is recommended to involve a larger sample size and include special needs schools from different regions to enhance the generalizability of the findings. In addition, it is suggested to compare the effectiveness of various tooth brushing education methods, such as the use of audiovisual media, educational games, or family-based training, to more optimally improve the tooth brushing skills of children with intellectual disabilities.

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