

Relationship between teeth brushing habits and tooth pain experienced in children with Autism Spectrum Disorder (ASD)



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ABSTRACT

Introduction: Autism Spectrum Disorder (ASD) is a lifelong developmental disorder that causes difficulty in communicating and socializing. The limitations of communication result in the inability to conduct teeth brush training and lead to poor oral health which might cause tooth decay and pain. This study aims to evaluate the relationship between teeth brushing habits and tooth pain experienced in children with ASD.

Methods: This study used an analytic observational study with a cross-sectional design. The subjects of the study were selected randomly using a cluster sampling method to children with ASD at Specialize School for Disability /Sekolah Luar Biasa (SLB); SLB Bina Anggita, SLB Citra Mulia Mandiri, SLB Dharma Rena Ring Putra II, SLB Negeri 1 Bantul, SLB Samara Bunda, and SLB Tegar Harapan. The data about teeth brushing habits and tooth pain experience were measured by a questionnaire filled out by parents and caregivers and then analyzed using SPSS ver. 23.

Results: This study involved 40 children with ASD, with 30 (75%) were boys and 10 (25%) were girls. The age range were between 6-12 years (23 children; 57.5%), and 13-18 years (17 children; 42.5%). Most children report medium pain in tooth pain (16 children; 40%). The Spearman's test showed a significant inverse correlation between the teeth cleaning habits and the tooth pain experienced ($r = -0.464$; $p=0,003$).

Conclusion: There was a significant relationship between the teeth brushing habits and the tooth pain experienced in children with ASD in Specialized schools in Yogyakarta.

Keywords: ASD; Autism Spectrum Disorder; teeth brushing habits; tooth pain.

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INTRODUCTION

Autism Spectrum Disorder (ASD) is a lifelong developmental disorder that causes difficulty in communicating and socializing.¹ According to Autism and Developmental Disabilities Monitoring (ADDM) in 2014, the estimated prevalence of ASD in America was 16.8 per 1,000 or one out of 59 of the population which increased from 1 out of 150 in 2000 to 2002.² Moreover, data from the Central Bureau Statistics in 2018 showed ASD prevalence around 3,1 million with an increase of 500 cases per year in Indonesia with a population of 265 million.³

The characteristics of most individuals with ASD include having several repetitive habits, being sensitive to certain things, and having narrow interests. Communication difficulties and socialization of children with ASD occur in various contexts, including the lack of social reciprocity,

nonverbal communication, and the lack of ability to develop, maintain, and understand a relationship.¹ ASD conditions can also be accompanied by disturbances or difficulties in learning and mental health.⁴ The limitations of children with ASD result in the inability of children with ASD to perform basic behaviors for maintaining dental and oral health, one of which is not optimally brushing their teeth. The inappropriate process of brushing teeth is caused by difficulties in following instructions regarding the appropriate method and time and becomes challenging due to uncooperative behavior and over-sensory sensitivity.⁵⁻⁷ Children with ASD also do not understand the importance of maintaining oral health or anything related to the oral cavity.⁶

The most common dental health problems experienced by children with ASD were caries and periodontal disease.⁸

Both of these diseases could result in tooth pain.⁹ Pain is an uncomfortable feeling that occurs when sensory functions convey information to the brain when an infection has disrupted the tissues in the body.^{10,11} Tooth pain usually decreases the patient's daily appearance and quality of life.¹² Moreover, children with ASD cannot express the pain verbally, which leads to a frustrating feeling that both children and parents have to deal with.

Based on oral health problems in children with ASD, especially related to the inability to express the uncomfortable feeling of dental pain and the limitation in oral hygiene practice, this study aimed to examine the relationship between teeth brushing habits and tooth pain experienced in children with ASD in a specialized school in Yogyakarta. This study will justify the importance of the teeth brushing habit in the prevention

of dental caries in the population of an individual with ASD since there is still a lack of evidence about tooth pain experience and the relationship of teeth brushing habit in individuals with ASD.

METHODS

Study design

This analytic observational study with a cross-sectional design was conducted to evaluate the relationship between teeth brushing habits and tooth pain experiences. Data collection was carried out using questionnaires filled out by parents or caregivers of children with ASD through a google form July-October 2021. This study was ethically approved by the Health Research Ethics Committee, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta (178/EC-KEPK FKIK UMY/VI/2021).

Study population

The population of the study was children with ASD who attended special school education in the Special Region of Yogyakarta. The research sample was selected using the cluster sampling method. Subjects were selected randomly based on areas with heterogeneous characteristics so that they were expected to represent the population.

Inclusion and Exclusion Criteria

Inclusion criteria were parents or caregivers of children with ASD who enrolled in specialized school education in the Special Region of Yogyakarta with an age range of 6-18 years; being cooperative until the study is completed; signing informed consent. Exclusion criteria were parents of children with ASD who have disabilities other than ASD.

During the study, the researchers classified the criteria of the tooth pain experience into three categories; no pain (no pain at all), mild (ever complained of pain), medium (pain interferes with activities), and severe (pain cause the children to have to consume pain medication). Furthermore, the criteria of tooth brushing independence are classified into three criteria; good (if children with ASD are not assisted by their parents at all when brushing their teeth), enough (if children with ASD still need their parents'

help when brushing their teeth, but not fully assisted), and less (if children with ASD must be assisted by their parents when brushing their teeth). In addition, the criteria of the result of brushing teeth also consisted of good (always clean all of their teeth), enough (there's still debris on their teeth), and less (never get clean all of their teeth). The researcher also divided the criteria of frequency when brushing teeth after breakfast and before bed consisted of good (always brushing their teeth after breakfast and before bed), enough (sometimes brushing their teeth after breakfast and before bed), and less (never brushing their teeth after breakfast and before bed). The last criteria are the criteria when using toothpaste, dental floss, and mouthwash that consist of good (always use toothpaste, dental floss, and mouthwash), enough (sometimes use toothpaste, dental floss, and mouthwash), and less (never use toothpaste, dental floss, and mouthwash).

Data analysis

All collected data were processed and analyzed using IBM SPSS version 23. The descriptive analysis was conducted to describe the socio-demography and the experience of oral health care of the subjects. In addition, the bivariate analysis using Spearman's test was used to determine the relationship between teeth brushing habits and tooth pain. The value of $P < 0.05$ was assessed as statistically significant.

RESULTS

The data obtained from the research questionnaire on teeth brushing habits were grouped into three levels; "Good," "Enough," and "Less." The answer to the questionnaire about tooth pain experience was divided into four levels; "No pain at all," "Mild pain," "Medium pain," and "Severe pain." This study involved a total of 40 children, of which 30 (75%) were boys and 10 (25%) were girls. The age range of children with ASD between 6-12 years is 23 (57.5%), and between 13-18 years is 17 (42.5%), as shown in [Table 1](#).

Regarding the independence of teeth brushing, most subjects were at the "Good" level (52.5%). Moreover, teeth brushing habits demonstrated the subjects

prominently at the "Enough" level (72.5%). Forty percent of children with ASD were included in the "Enough" category regarding the habit of teeth brushing after breakfast. In addition, the data in [Table 1](#) showed that the subject who had a habit of brushing their teeth before going to bed had the category "enough" (45%).

All children with ASD were included in the group at the "Good" level for the teeth brushing habits associated with the use of toothpaste. In contrast, in the association with toothpaste, dental floss, and mouthwash, the group with the highest number was at the "Less" level. A total of 39 (97.5%) were included group at the "Less" level for the habit of using dental floss, and a total of 32 (80%) were included in the group at the "Less" level for the habit of using mouthwash, as shown in [Table 1](#).

The most dominating level of tooth pain experience was the group at "Mild pain" level with 16 (40%), followed by the group at the "Medium pain" level with a total of 12 (30%), then the last is the group at the "No pain at all" level with a total of 11 (27.5%). For the group at the "Severe pain" level, there was only 1 (2.5%), as shown in [Table 1](#).

The bivariate analysis results using Spearman's two-tailed test showed a relationship between teeth brushing habits and tooth pain experience in children with ASD with a correlation coefficient of -0.464 and a significant p-value of 0.003 ($p < 0.05$), as shown in [Table 2](#). The correlation coefficient value of -0.464 meant a correlation with a moderate level of strength between the two variables. The negative value (-) of the correlation coefficient showed the inverse correlation between the two variables, which means that if the value of teeth cleaning habits increases, the value of tooth pain experience will decrease, or vice versa.

DISCUSSION

The results of this study were similar to the previous studies, including the study by Escoffié-Ramirez et al. and Alsubaie, which confirmed a significant relationship between teeth cleansing and tooth pain in children.^{13,14} Teeth brushing habits consist of the element of independence, the results of brushing teeth, time to brush teeth,

Table 1. Demographic data and teeth cleaning habits in children with ASD.

| | Total (N=40) N (%) | Tooth Pain Experience | | | |
|---------------------------------------|-----------------------|-----------------------|------------|-------------|-------------|
| | | No pain | Mild pain | Medium pain | Severe pain |
| Gender | | | | | |
| Boy | 30 (75%) | 8 (20%) | 13 (32.5) | 8 (20%) | 1 (2.5%) |
| Girl | 10 (25%) | 3 (7.5%) | 3 (7.5%) | 4 (10%) | 0 (0%) |
| Age | | | | | |
| <13 years old | 23(57.5%) | 4 (10%) | 9 (22.5%) | 9 (22.5%) | 1 (2.5%) |
| ≥13 years old | 17(42.5%) | 7 (17.5%) | 7 (17.5%) | 3 (7.5%) | 0 (0%) |
| Tooth brushing independence | | | | | |
| Good | 21 (52.5%) | 10 (25%) | 6 (15%) | 4 (10%) | 1 (2.5%) |
| Enough | 16 (40%) | 1 (2.5%) | 8 (20%) | 7 (17.5%) | 0 (0%) |
| Less | 3 (7.5%) | 0 (0%) | 2 (5%) | 1 (2.5%) | 0 (0%) |
| Results of brushing teeth | | | | | |
| Good | 8 (20%) | 4 (10%) | 3 (7.5%) | 1 (2.5%) | 0 (0%) |
| Enough | 29 (72.5%) | 7 (17.5%) | 12 (30%) | 9 (22.5%) | 1 (2.5%) |
| Less | 3 (7.5%) | 0 (0%) | 1 (2.5%) | 2 (5%) | 0 (0%) |
| Brushing teeth after breakfast | | | | | |
| Good | 14 (35%) | 6 (15%) | 5 (12.5%) | 3 (7.5%) | 0 (0%) |
| Enough | 16 (40%) | 5 (12.5%) | 6 (15%) | 4 (10%) | 1 (2.5%) |
| Less | 10 (25%) | 0 (0%) | 5 (12.5%) | 5 (12.5%) | 0 (0%) |
| Brushing teeth before bed | | | | | |
| Good | 17 (42.5%) | 4 (10%) | 7 (17.5%) | 6 (15%) | 0 (0%) |
| Enough | 18 (45%) | 6 (15%) | 7 (17.5%) | 4 (10%) | 1 (2.5%) |
| Less | 5 (12.5%) | 1 (2.5%) | 2 (5%) | 2 (5%) | 0 (0%) |
| Use of toothpaste | | | | | |
| Good | 40 (100%) | 11 (27.5%) | 16 (40%) | 12 (30%) | 1 (2.5%) |
| Use of dental floss | | | | | |
| Enough | 1 (2.5%) | 0 (0%) | 1 (2.5%) | 0 (0%) | 0 (0%) |
| Less | 39 (97.5%) | 11 (27.5%) | 15 (37.5%) | 12 (30%) | 1 (2.5%) |
| Use of mouthwash | | | | | |
| Enough | 8 (20%) | 2 (5%) | 5 (12.5%) | 1 (2.5%) | 0 (0%) |
| Less | 32 (80%) | 9 (22.5%) | 11 (27.5%) | 11 (27.5%) | 1 (2.5%) |

Table 2. The Correlation between teeth brushing habits and tooth pain experience.

| Teeth brushing habits | Tooth pain experience | |
|-----------------------|-----------------------------|--------|
| | Correlation Coefficient (r) | -0.464 |
| P value (2-tailed) | 0.003* | |
| N (Total) | 40 | |

*significant at $p < 0.05$ by Spearman test

and the use of toothpaste, dental floss, and mouthwash, which notably affect the overall health of teeth and mouth. Good teeth brushing habits affect dental and oral health, while poor oral and dental health ought to induce tooth pain.¹⁵

Brushing tooth disposing of the biofilm, preventing the formation of diseases, which include caries and periodontal disease, that cause tooth pain.^{13,16} Better brushing consequences in healthy teeth, and the frequency of brushing influences

much less possible pain experienced.¹³ Low frequency of brushing is associated with severe periodontal disease.¹⁷ Despite brushing teeth properly and correctly, toothpaste that contains fluoride should additionally be considered. The use of this type of toothpaste can prevent the formation of caries.¹⁸ Dental floss additionally prevents caries because its use could be very effective in removing debris in the interdental parts of the teeth that are difficult to reach if only using a

toothbrush.¹⁹ Mouthwash can also help maintain oral health and prevent caries formation.²⁰

Based on the study result, only seven subjects (17.5%) routinely brushed their teeth twice a day after breakfast and at night before going to bed, four of whom had mild pain experience. The results of this study were in line with the results of research by Krause et al., which showed that children who never brushed their teeth or only brushed their teeth once a day was four times more likely to experience tooth pain than children who brushed their teeth twice a day or more.²¹ This was also supported by research conducted by Han & Park that stated that a low prevalence of periodontal disease was related to brushing teeth at night before bed and after lunch.²² However, the results of this study were different from the results of Bakar et al., which showed that there was no relationship between teeth brushing frequency and tooth pain. This result showed that many other factors also contribute to tooth pain, such as the correct brushing technique and brushing time.²³

The correct brushing technique is related to lower motor skills owned to perform tooth brushing. Even if teeth were brushed twice a day, bacterial plaque was not adequately removed.²¹ The help of parents or caregivers in brushing their children's teeth is urgently needed. It may be that children cannot effectively remove plaque when they brush their teeth because they cannot brush their teeth properly without parental help. The parent's or caregivers' assistance when the child brushes his teeth can reduce the risk of caries.¹⁸ The results showed that only 7.5% of subjects always needed help brushing their teeth. This result is much lower than 64.2% based on research conducted by Hage et al.²⁴

All research subjects used toothpaste when brushing their teeth, and this result was higher than in previous studies, namely 49.5% conducted by Qiao et al.²⁵ As much as 97.5% of research subjects have never used dental floss. This result was similar to a study conducted by Alsubaie in Saudi Arabia, where all of the research subjects did not use dental floss to clean teeth.¹⁴ The results also showed

that only 2.5% of the research subjects used mouthwash frequently. The lack of use of dental floss and mouthwash could be due to the difficulties caused by the sensitivity that children with ASD have to certain sensories.²⁵

The obtained results of the study have limitations in the number of subjects that probably could be generalized if applied to numerous subjects. Moreover, there are probably several confounding variables that can also affect the correlation between teeth brushing habits and tooth pain. In addition, some issues to be questioned related to the rigorous observation of the technique of brushing. Therefore, future research is recommended to conduct the study with proper teeth brushing training in a larger population.

CONCLUSION

There was a significant relationship between the teeth brushing habits and the tooth pain experienced in children with ASD in Specialized schools in Yogyakarta with an age range of 6-18 years. The appropriate teeth-brushing habit could reduce the possibility of tooth pain experienced in children with ASD.

DISCLOSURES

Author Contribution

Contributor 1 sets the concept and all roles of the contributor except the literature search conducted by Contributors 2,3,4. Contributors 2 and 4 conducted literature research, clinical studies, analysis data, and statistical analysis and reviewed the manuscript. Contributor 3 conducted all processes except the literature search and the guarantor.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Ethical Approval

This study was approved and given ethical acceptance by the Health Research Ethics Committee, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta (ethical clearance register number: 178/EC-KEPK FKIK UMY/VI/2021).

Consent for Publication

The children's parents or caregiver informed consent was obtained directly. Written consent to participate in the study as well as presentation of data obtained from patients who had agreed to participate in this study were collected and received.

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