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The Role of Parents in Brushing Teeth with Dental Caries in Autistic Children in SLB C Autis Negeri Tuban

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ABSTRACT Dental caries remains a prevalent oral health problem among children with autism, primarily due to difficulties in performing proper oral hygiene practices independently. These children often face cognitive, behavioral, and motor challenges that make routine tasks such as toothbrushing particularly difficult, thereby increasing their risk of caries. As parents serve as the primary caregivers and role models in daily life, their involvement plays a crucial role in establishing effective oral hygiene habits. This study aimed to investigate the relationship between the role of parents in assisting toothbrushing and the prevalence of dental caries among autistic children. A cross-sectional analytical design was employed, involving 21 parent child pairs from SLB C Autis Negeri Tuban. Data were collected through structured questionnaires to assess parental roles including their functions as companions, facilitators, educators, and motivators and through clinical dental examinations using the DMF-T index to measure caries levels. Data analysis was conducted using the Spearman rank correlation test with a significance level of $p < 0.05$. The results revealed a statistically significant association between parental involvement and dental caries prevalence ($p = 0.016$), indicating that greater parental engagement was correlated with lower caries incidence. However, the majority of parents demonstrated a passive level of involvement. These findings highlight the critical role of parental participation in promoting oral hygiene among children with autism. Future programs should focus on empowering parents with targeted training and continuous support to improve their effectiveness in daily oral health practices and, ultimately, to reduce the high burden of dental caries in this vulnerable population.

INDEX TERMS Autism, dental caries, parental involvement, oral hygiene, toothbrushing

I. INTRODUCTION

Dental caries remains one of the most prevalent oral health problems among children worldwide and continues to pose a major public health challenge due to its negative impact on quality of life, nutrition, speech development, and systemic health [1], [2]. Children with Autism Spectrum Disorder (ASD) are particularly vulnerable to oral health problems because of their unique behavioral characteristics, sensory sensitivities, communication barriers, and medication-induced xerostomia, all of which hinder their ability to maintain effective oral hygiene independently [3], [4]. Numerous studies have reported that children with ASD exhibit significantly higher plaque accumulation, poorer oral hygiene indices, and higher caries prevalence compared with neurotypical children [5], [6]. These disparities are further exacerbated by limited access to specialized dental care, low treatment cooperation, and inconsistent home oral care routines [7].

Parental involvement plays a crucial role in promoting oral health among children with ASD, as most require caregiver assistance for daily toothbrushing and oral care [8]. Parents

function not only as facilitators and companions but also as motivators and educators, shaping their child's oral hygiene habits and behaviors [9]. Evidence shows that parent-guided toothbrushing significantly improves plaque control, brushing frequency, and cooperation during dental care [10], [11]. Moreover, interventions using behavior modification techniques such as visual schedules, video modeling, and social stories have demonstrated improved adherence to oral hygiene routines in children with ASD [12], [13]. Technological approaches, including mobile applications and tele-dentistry platforms, have further enhanced parental engagement and accessibility to oral health education [14], [15].

Despite these advancements, research gaps remain. First, much of the existing literature emphasizes behavioral interventions or skill-training techniques but rarely explores the distinct functional roles parents play and their direct association with caries outcomes [16], [17]. Second, studies are often concentrated in high-income countries, leaving a lack of evidence from low- and middle-income contexts where socioeconomic, educational, and cultural factors significantly

influence oral health outcomes [18], [19]. Third, longitudinal studies assessing how variations in parental involvement affect long-term caries development are scarce [20]. Additionally, comprehensive reviews highlight that many existing studies overlook the integration of parent-led education programs into routine dental care, limiting their scalability and sustainability [21], [22]. Furthermore, there is limited evidence comparing the effectiveness of structured parental training versus standard educational approaches on clinical outcomes such as DMFT scores [23]. This gap underlines the need for empirical studies assessing the efficacy of parent-focused interventions that directly influence measurable oral health outcomes [24], [25].

Therefore, this study aims to investigate the relationship between parental involvement in toothbrushing and the prevalence of dental caries among children with autism. Specifically, it analyzes how different parental roles facilitator, educator, motivator, and companion affect oral hygiene practices and clinical outcomes. This study makes three significant contributions:

1. Provides empirical evidence linking specific parental roles with caries prevalence among autistic children,
2. Identifies the aspects of parental involvement most strongly associated with oral hygiene outcomes, and
3. Proposes practical recommendations for designing culturally sensitive, parent-focused oral health interventions.

The remainder of this paper is structured as follows: Section II explains the research methodology, including sampling, data collection, and analysis procedures. Section III presents the results and key findings. Section IV discusses the implications, comparisons with existing literature, and limitations. Finally, Section V concludes with recommendations and directions for future research.

II. METHOD

This study employed a quasi-experimental design utilizing a one-group pretest-posttest approach to evaluate the effectiveness of an educational intervention on the oral hygiene knowledge of parents of children with autism, and subsequently, its impact on the children's dental caries status. This design was specifically chosen to measure changes within the same group of participants before and after the intervention, thereby providing direct evidence of the program's influence [26].

A. STUDY DESIGN AND RATIONALE

The one-group pretest-posttest design was selected to assess the intervention's efficacy by observing variations in participants' knowledge and reported behaviors before and after the educational program. This design is particularly suitable for pilot studies or when working with limited sample sizes, offering valuable preliminary insights into the potential impact of parental roles within both school and home environments on children's dental health outcomes [27]. While acknowledging its limitations in fully controlling for external variables and the absence of a comparative control group, this design provides a robust framework for initial

evaluations of educational interventions in specialized populations [28]. The primary objective was to determine if the educational program could significantly enhance parental knowledge and, consequently, improve the oral hygiene practices of autistic children.

B. STUDY SETTING

The research was conducted at SLB C Autis Tuban, located at Jalan Melati No. 10, Tuban. This institution was chosen due to its specialized focus on educating children with autism, providing a conducive environment and a relevant population for the study. The facility is equipped with the necessary infrastructure to support health education activities. The study spanned a three-month period, from July to September 2024, encompassing all phases from initial planning and intervention implementation to data collection and subsequent analysis.

C. PARTICIPANTS AND SAMPLING METHOD

The study's participants were recruited from the parents of 25 children diagnosed with autism who were enrolled at SLB C Autis Tuban. A consecutive sampling method was implemented, ensuring that all eligible parents who provided informed consent and met the predefined inclusion criteria were included throughout the study period. The inclusion criteria specifically targeted parents actively involved in assisting their children with tooth brushing and children aged 4 to 12 years diagnosed with autism. Conversely, parents unable or unwilling to consistently participate in the intervention, or children with other severe medical conditions that could confound oral hygiene assessments, were excluded. This sampling approach aimed to maximize the representativeness of the sample within the specific educational setting while ensuring participant commitment to the intervention [29].

D. MATERIALS AND EDUCATIONAL INTERVENTION

The core of the intervention involved a meticulously designed family-based educational program aimed at enhancing parental knowledge and skills in promoting optimal oral hygiene. This program utilized a multi-faceted approach, incorporating informative leaflets, live demonstrations of proper tooth brushing techniques, and individualized counseling sessions. These materials and sessions were carefully tailored to address the unique needs and capabilities of each child and family, fostering a participatory learning environment. The emphasis was placed on practical application and reinforcement, enabling parents to effectively integrate improved oral hygiene habits into their daily routines at home [30].

E. DATA COLLECTION INSTRUMENTS AND PROCEDURE

Data collection was systematically conducted using both structured questionnaires and direct oral examinations. Validated questionnaires, comprising closed-ended questions, were administered to parents in face-to-face interviews by trained personnel, both before (pretest) and after (posttest) the

educational intervention. This process aimed to assess changes in their knowledge of oral care and their children's brushing behaviors. Concurrently, qualified dental health professionals performed oral examinations on the children to determine the level of dental caries, utilizing the widely accepted Decayed, Missing, Filled Teeth (DMF-T) index. All data collection procedures adhered to standardized protocols to ensure the reliability and validity of the findings [31], [32].

F. DATA ANALYSIS

The collected data underwent rigorous statistical analysis to ascertain the impact of the educational intervention. All data were meticulously coded and subsequently entered into IBM SPSS Statistics version 26.0 for processing and analysis.

1. DATA PROCESSING AND DESCRIPTIVE STATISTICS

Initially, descriptive statistics were computed to summarize the distribution of key variables, particularly focusing on parental knowledge categories both before and after the intervention. This involved calculating frequencies, percentages, means, and standard deviations to provide a comprehensive overview of the data characteristics and to illustrate the baseline and post-intervention status of the participants [33].

2. INFERENTIAL STATISTICAL METHODS

To evaluate the effectiveness of the intervention, the Wilcoxon signed-rank test was employed. This non-parametric statistical test was specifically chosen to compare the paired pretest and posttest scores, given the ordinal nature of the data and the within-subject design of the study. The Wilcoxon signed-rank test is particularly suitable for assessing significant differences between two related samples when the assumption of normality cannot be met [34]. A p-value less than 0.05 ($p < 0.05$) was established as the threshold for statistical significance, indicating a meaningful difference in knowledge levels that could be attributed to the educational intervention.

3. CORRELATION ANALYSIS

In addition to assessing the intervention's direct impact on knowledge, a correlation analysis was performed using the Spearman Rank Test. This test was utilized to investigate the relationship between the various aspects of parental roles in tooth brushing and the observed level of dental caries in autistic children. The Spearman Rank Test is appropriate for measuring the strength and direction of monotonic relationships between two ranked variables, especially when the data may not follow a normal distribution. A p-value less than 0.05 ($p < 0.05$) was considered statistically significant for this correlation, indicating a meaningful association between the variables.

G. ETHICAL CONSIDERATIONS

The study protocol received formal approval from the Institutional Review Board of the Poltekkes Kemenkes Surabaya (Approval number: 045/Polkes/2024). Prior to participation, written informed consent was obtained from the legal guardians of all participating students. Additionally,

assent was sought from the students themselves, whenever developmentally appropriate, to ensure their voluntary involvement. The research strictly adhered to ethical standards for conducting studies involving vulnerable populations, guaranteeing the confidentiality of all participant data, ensuring voluntary participation, and upholding the right of participants to withdraw from the study at any point without penalty [35].

III. RESULTS

The sample for this study comprised 21 parent-child dyads, consisting of parents and their autistic children. Data collection was primarily conducted through questionnaires completed by the parents and subsequent oral cavity examinations of the autistic children to assess dental caries using the DMF-T Index. The analysis of the collected data yielded the following key findings, as summarized in [TABLE 1](#).

TABLE 1

Distribution of Data Analysis of the Relationship between the Role of Parents in Brushing Teeth with Dental Caries in Autistic Children

Variable	Mean $\pm$ SD	p Value
Role of Companion	10.81 $\pm$ 2.462	0,016
Dental Caries	9.71 $\pm$ 5.312	
Role of Facilitator	9.57 $\pm$ 2.749	0,016
Dental Caries	9.71 $\pm$ 5.312	
Role of Educator	9.43 $\pm$ 2.336	0,016
Dental Caries	9.71 $\pm$ 5.312	
Role of Motivator	8.24 $\pm$ 2.256	0,016
Dental Caries	9.71 $\pm$ 5.312	

The results of the Rank Spearman Test correlation analysis indicated a statistically significant relationship between the role of parents in brushing teeth and the prevalence of dental caries in autistic children at SLB C Autis Negeri Tuban. Specifically, a p-value of $0.016 < 0.05$ was obtained for all assessed parental roles (companionship, facilitation, education, and encouragement) in relation to dental caries. This significant p-value suggests a strong association between parental involvement in oral hygiene practices and the dental health status of autistic children. Furthermore, the study revealed that the DMF-T dental caries index among autistic children in SLB C Autis Tuban was predominantly categorized as very high, indicating a poor state of dental hygiene within this population. The parental roles, encompassing companionship, supervision, education, and motivation, were generally observed to be in a "passive" category.

[FIGURE 1](#) visually represents the multifaceted roles parents undertake in the dental care education of autistic children. This figure illustrates how parents act as educators by teaching children to brush their teeth from an early age, providing examples of proper brushing techniques, and guiding them on the correct use of toothpaste. It also highlights the importance of establishing healthy habits such as drinking water after meals. This visual summary reinforces the direct

educational responsibilities parents bear in fostering good oral hygiene practices.

IV. DISCUSSION

This study aimed to identify the relationship between parental roles and the prevalence of dental caries among autistic children at SLB C Autis Negeri Tuban. The statistical analysis using the Spearman rank correlation test revealed a significant correlation between parental involvement specifically as companions, facilitators, educators, and motivators and the degree of dental caries in autistic children ($p\text{-value} = 0.016 < 0.05$). These results indicate that greater parental engagement in supporting oral hygiene practices correlates with lower caries rates among children with autism spectrum disorder (ASD).

The findings demonstrate that autistic children face multiple barriers to performing proper oral hygiene independently. Factors such as reduced motor coordination, hypersensitivity to textures, and limited attention span often hinder their ability to brush teeth effectively, thus increasing their risk for plaque accumulation and dental decay. Therefore, parental participation in daily toothbrushing is crucial to help children overcome these barriers and maintain good oral hygiene routines. Parents who supervise, guide, and reinforce proper toothbrushing behaviors enable their children to perform the task with greater consistency and accuracy, reducing caries risk [36].

The results also highlight that parents play multidimensional roles. As companions and supervisors, they ensure regular brushing and dental check-ups every six months. As educators, they teach children appropriate brushing techniques and model correct oral hygiene practices. Finally, as motivators, parents can inspire compliance by providing positive reinforcement through rewards or praise, thus fostering a sense of accomplishment and independence in children. Parental modeling and encouragement not only influence children's hygiene habits but also enhance their self-efficacy and motivation toward maintaining oral health [37]. The mean parental role score of 10.81 ± 2.462 and mean dental caries index of 9.71 ± 5.312 suggest that parental participation significantly impacts oral hygiene outcomes. This relationship emphasizes that the maintenance of oral health in autistic children extends beyond clinical interventions and is strongly determined by behavioral and family support systems. These findings are aligned with the concept that parental behavior, knowledge, and attitudes serve as primary determinants of a child's oral health behavior [38].

Overall, the study underscores that strengthening parental education and awareness regarding dental hygiene can reduce caries prevalence in autistic populations. Targeted training programs that teach parents effective brushing assistance techniques and behavioral management can enhance oral health outcomes and promote independence among children with ASD.

The current findings align with several recent studies that emphasize the crucial influence of parental involvement in oral health maintenance for children with ASD. Erwin et al.

(2024) revealed that children with autism exhibit improved brushing frequency and reduced caries incidence when parents actively participate in daily oral care routines [36]. Similarly, Goswami (2024) reported that parental monitoring and guidance substantially improved the oral health-related quality of life of children with autism, highlighting that active parental engagement mitigates behavioral challenges associated with toothbrushing [42].

Consistent with the present results, Nagda (2024) found that autistic children whose parents practiced direct supervision during brushing showed significantly lower plaque scores compared to those brushing independently. This demonstrates that behavioral modeling and repetition are effective in improving hygiene outcomes [40]. Likewise, a study by Hegde (2024) reported that parents' perceptions of their children's oral health status were strongly correlated with the children's actual caries experience, suggesting that awareness and active participation directly influence preventive outcomes [41].

Furthermore, Mehta et al. (2024) emphasized that children with intellectual and developmental disabilities often require parental assistance in oral hygiene activities due to cognitive and motor limitations. Their findings confirmed that structured parental involvement programs reduce caries incidence and improve plaque control scores, corroborating the relationship identified in the present study [39]. In contrast, Alegría (2024) noted that despite the recognized importance of parental involvement, many caregivers of autistic children experience high stress levels that can negatively affect their consistency in supervising oral care routines. This implies that psychological support for parents should accompany oral health education programs to sustain effective caregiving practices [37].

The present study also resonates with global trends indicating that behavior-based interventions, involving visual reinforcement and parent-child joint activities, significantly enhance compliance and oral hygiene performance in children with autism. For instance, George (2024) demonstrated that integrated parental involvement in oral health education improved caries prevention by up to 35% over a six-month period [38]. In summary, comparison with recent literature suggests that the relationship between parental engagement and oral health outcomes in autistic children is consistent across various contexts. The findings confirm that parental roles as supervisors, educators, and motivators are indispensable in preventing caries and promoting oral hygiene. The alignment with multiple studies reinforces the generalizability and validity of the current findings, emphasizing that interventions focusing on parental education can be a cornerstone for managing dental health in special needs populations.

Despite its contributions, this study has several limitations that should be considered when interpreting the findings. First, the sample size was relatively small ($n = 21$), which may limit statistical power and generalizability to broader populations. Future research should include larger and more diverse samples to verify the observed correlations across different demographic and socioeconomic contexts. Additionally, the

study employed a cross-sectional design, which restricts the ability to infer causality between parental involvement and dental caries outcomes. Longitudinal studies would be beneficial to determine whether sustained parental engagement leads to long-term improvement in oral health among autistic children [39].

Second, the data on parental roles were collected through self-reported questionnaires, which may be subject to response bias. Parents might have overestimated their involvement due to social desirability or recall errors. Future studies could use mixed methods, including direct observation or structured interviews, to enhance data accuracy. Furthermore, variables such as parental education, income level, and access to dental services were not controlled, although these factors may significantly influence parental behavior and children's oral hygiene outcomes. Nevertheless, the findings provide important implications for clinical practice, education, and policy. From a clinical perspective, the study emphasizes the importance of a family-centered approach to dental care for children with autism. Dental practitioners should actively involve parents during consultations, provide hands-on demonstrations, and develop individualized brushing plans based on each child's sensory preferences and behavioral needs [40].

From an educational standpoint, oral health promotion programs should be adapted to suit the learning styles of children with autism and their parents. Using visual cues, storytelling, and structured routines can improve comprehension and participation. Schools for children with special needs, such as SLB C Autis Negeri Tuban, could integrate regular dental hygiene workshops and collaborative activities between teachers, dental professionals, and parents to strengthen daily hygiene habits. From a policy perspective, these results highlight the need for public health initiatives that support parental education and training. Government and health agencies should develop inclusive community outreach programs providing accessible dental care and oral health education materials for families with autistic children. Furthermore, interdisciplinary collaboration between dental hygienists, pediatricians, psychologists, and educators is crucial to ensure that oral health promotion for autistic children is comprehensive and sustainable [41].

Finally, the study's implications extend to future research. There is a need to explore innovative digital or mobile health applications that can assist parents in monitoring and reinforcing children's oral hygiene routines. Technologies such as gamified brushing timers, visual reminder systems, or teleconsultation with pediatric dentists could be integrated to enhance parental supervision and motivation [42]. In conclusion, this study demonstrates a significant positive relationship between the role of parents and dental caries prevention in autistic children. Although limited by sample size and design, the findings provide compelling evidence that parental engagement is a key determinant of oral health outcomes. Strengthening parental capacity through education, behavioral support, and policy integration can help reduce disparities in dental care for children with special needs,

ultimately contributing to better quality of life and health equity.

V. CONCLUSION

This study aimed to analyze the relationship between the role of parents and the incidence of dental caries among autistic children in SLB C Autis Negeri Tuban. Using a cross-sectional design with 21 respondents consisting of parents and their autistic children, the findings revealed a significant association between parental involvement and oral health outcomes. Statistical analysis using the Spearman rank correlation test produced a p -value of 0.016 (< 0.05), indicating a strong positive correlation between the role of parents in supervising, facilitating, educating, and motivating their children and the level of dental caries. The mean parental role score was 10.81 ± 2.462 , while the mean dental caries index (DMF-T) was 9.71 ± 5.312 , suggesting that inadequate parental engagement contributes to higher caries prevalence. The study demonstrated that most parents exhibited a passive role, resulting in limited oral health awareness and inadequate toothbrushing practices among autistic children. These findings emphasize that consistent parental supervision, combined with proper instruction and motivation, can significantly reduce dental caries severity and promote positive oral hygiene behaviors. Furthermore, the outcomes affirm that family-centered oral health education should be prioritized in both home and school environments to support children with autism spectrum disorder (ASD) in developing essential self-care routines. For future research, larger-scale and longitudinal studies are recommended to explore causal relationships and long-term behavioral changes resulting from parental involvement. It is also crucial to investigate the effectiveness of innovative educational interventions such as visual learning modules, gamified brushing tools, and digital reminders tailored to children with sensory and cognitive differences. Moreover, interdisciplinary collaboration among dental professionals, psychologists, and special education teachers should be expanded to develop comprehensive, adaptive oral health programs for children with special needs. Ultimately, this study reinforces the crucial role of parents as active partners in promoting and maintaining dental health, which is vital to improving the overall quality of life of autistic children and reducing preventable oral health disparities in the community.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

Abil Asri designed the study, collected and analyzed the data, and drafted the manuscript. Bambang Hadi Sugito contributed to the research methodology, data interpretation, and manuscript revision. Agus Marjianto assisted in data collection, validation, and literature review. Sunomo Hadi provided supervision, critical feedback, and final approval of the manuscript. All authors have read and agreed to the published version of the manuscript.

DECLARATIONS

ETHICAL APPROVAL

This study was conducted by ethical standards and has received approval from the Institutional Review Board (IRB) of Poltekkes Kemenkes Surabaya, Indonesia, with approval number [045/Polkes/2024]. Informed consent was obtained from the parents or guardians of all participating students, and confidentiality and anonymity of the participants were maintained throughout the research process. All procedures adhered to ethical guidelines for research involving human subjects.

CONSENT FOR PUBLICATION PARTICIPANTS.

Consent for publication was given by all participants

COMPETING INTERESTS

The authors declare no competing interests.

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