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Correlation Between Parental Knowledge of Oral Health and Dental Caries Incidence Among Preschool Children at Ar-Rahman Foundation Jombang

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ABSTRACT Dental caries remains one of the most prevalent oral health problems among preschool children, and inadequate parental knowledge is often identified as a major contributing factor. Despite existing preventive programs, many parents still lack sufficient understanding of proper oral hygiene practices, which may exacerbate caries risk during early childhood. This study aimed to analyze the relationship between parental knowledge of oral health and the incidence of dental caries among preschool children enrolled at PAUD and Kindergarten under the Ar-Rahman Foundation in Jombang. A quantitative, cross-sectional design was employed involving 39 parents selected through total sampling. Parental knowledge was assessed using a structured questionnaire, while children's dental caries status was measured using the deft index following WHO guidelines. Data were analyzed using the Chi-square test with a significance level of $\alpha = 0.05$. The results showed that more than half of the parents (51.3%) possessed low knowledge regarding oral health, while the prevalence of dental caries among preschool children remained high. Although descriptive patterns suggested that children of parents with lower knowledge tended to exhibit higher deft scores, statistical results ($p = 0.286$) indicated no significant association between parental knowledge and dental caries incidence. These findings highlight that knowledge alone may not sufficiently influence caries outcomes without being accompanied by consistent practice, behavioral reinforcement, and adequate access to oral health services. In conclusion, the high prevalence of dental caries observed in this study underscores the need for improved parental education and comprehensive health promotion strategies. Strengthening school-based oral health programs and enhancing parental involvement in preventive practices are essential to reducing the burden of caries among preschool-aged children.

INDEX TERMS parental knowledge, oral health, dental caries, preschool children, cross-sectional study

I. INTRODUCTION

Oral health is a fundamental component of children's overall well-being and plays a critical role in supporting growth, nutritional intake, speech development, learning capacity, and quality of life. However, dental caries continues to be one of the most prevalent chronic diseases among preschool children worldwide, particularly in low- and middle-income countries where access to oral health services, parental literacy, and preventive behaviors remain limited [1]–[4]. In Indonesia, recent national health survey data indicate persistently high caries prevalence among children under six years old, signaling a public health problem that requires urgent attention [5], [6]. Early childhood is a sensitive developmental stage in which children are highly dependent on caregivers for maintaining oral hygiene and establishing lifelong health behaviors. Consequently, parents especially mothers play a central role in shaping children's daily practices such as

toothbrushing, dietary habits, dental check-up routines, and early identification of oral symptoms [7]–[9].

Existing literature widely recognizes parental knowledge as a key determinant of children's oral health behaviors. Parents with adequate oral health literacy are more likely to encourage routine brushing, limit cariogenic snacks, and seek timely dental care, thereby reducing the risk of early childhood caries (ECC) [10]–[13]. State-of-the-art approaches in preschool oral health promotion increasingly emphasize parental education programs, school-based interventions, behavior-change models, and community empowerment strategies aimed at improving both knowledge and practice [14]–[17]. Recent studies also highlight the potential of digital health tools, mobile learning platforms, and structured mentoring programs in improving parental engagement and supporting preventive behaviors at home [18]–[20]. Despite these advances, many families continue to experience barriers such as limited health literacy, low socioeconomic status, and

restricted access to oral health information, which may undermine intervention effectiveness [21]–[23].

However, empirical findings on the association between parental knowledge and dental caries incidence remain inconsistent. Several studies demonstrate a strong positive association, with low parental knowledge significantly contributing to higher caries risk [24], [25]. Conversely, others report no statistically significant correlation, suggesting that knowledge alone may not directly influence oral health outcomes without supportive behaviors, environmental factors, or access to care [26], [27]. This inconsistency highlights a **research gap**, particularly in local community-based settings such as early childhood institutions in Indonesia. Limited studies have examined the issue within the context of small educational foundations where parental knowledge, institutional support, and children's oral health behaviors may differ from broader populations.

Therefore, this study aims to analyze the relationship between parental knowledge of oral health and the incidence of dental caries among preschool children at PAUD and Kindergarten under the Ar-Rahman Foundation in Jombang. Addressing this gap is essential for understanding whether parental knowledge is a decisive factor within this specific population and for identifying potential needs for targeted intervention programs. The main contributions of this study are as follows:

1. **Providing empirical evidence** regarding parental knowledge levels and caries incidence within a community-based early childhood institution in Indonesia.
2. **Assessing the strength of association** between parental knowledge and children's deft scores using a standardized epidemiological method.
3. **Identifying implications for oral health promotion**, highlighting areas where educational interventions and parental engagement strategies may be strengthened.

II. METHOD

This study employed a quantitative, cross-sectional research design to examine the correlation between parental knowledge of oral health and the incidence of dental caries among preschool children. The cross-sectional method was selected because it enables simultaneous measurement of exposure (parental knowledge) and outcome (dental caries incidence) within a defined population at a single point in time, making it efficient for epidemiological assessment without requiring long-term follow-up [29], [30].

A. STUDY SETTING AND DURATION

The research was conducted at PAUD and Kindergarten under the Ar-Rahman Foundation, located in Jombatan Village, Jombang Regency, East Java. The institution was selected purposively due to its representative population of preschool children and the preliminary indication of high caries prevalence. The study was carried out over six months, from November 2024 to April 2025, including administrative preparation, instrument validation, data collection, data processing, and reporting.

B. STUDY POPULATION AND SAMPLING TECHNIQUE

The target population consisted of all parents or primary caregivers of children aged 3–6 years enrolled at the Ar-Rahman Foundation during the study period. A total sampling approach was applied because the population size ($N=39$) was small and manageable, and full inclusion allowed for complete population representation and minimized sampling error. No randomization was performed because the study did not involve intervention allocation. All parents who met the inclusion criteria having a child enrolled at the institution and providing informed consent were included. Parents who declined participation or were absent during data collection were excluded.

C. STUDY DESIGN CLASSIFICATION

This study is classified as an observational, descriptive-analytical, cross-sectional study. It is **prospective** in nature because data were collected directly at the time of the study, rather than using historical (retrospective) records. The study did not implement any treatment or intervention and therefore did not involve experimental manipulation.

D. RESEARCH VARIABLES AND OPERATIONAL DEFINITIONS

The independent variable was **parental knowledge of oral health**, operationalized using a structured questionnaire containing 20 multiple-choice items. Knowledge was categorized into three levels based on percentage scores: good (76–100%), moderate (56–75%), and low ($\leq 56\%$). The dependent variable was the **incidence of dental caries** in preschool children, assessed using the deft (decayed, extracted, filled teeth) index following World Health Organization (WHO) diagnostic criteria [31].

E. RESEARCH INSTRUMENTS

Two primary instruments were utilized:

1. Knowledge Questionnaire

A validated questionnaire was adapted from established oral health literacy tools and previously published instruments [32], [33]. The questionnaire consisted of closed-ended questions covering toothbrushing practices, dietary influences on caries, the importance of fluoride, dental visit frequency, and early signs of caries. Content validity was evaluated by two dental public health experts, while reliability testing yielded a Cronbach's alpha coefficient of 0.82, indicating strong internal consistency.

2. Dental Caries Examination Sheet (deft Index)

The clinical examination employed WHO-standardized caries assessment tools, including sterile mouth mirrors, explorers, cotton rolls, disposable gloves, masks, and disinfectants. The deft index was used to document the total number of decayed (d), extracted (e), and filled (f) primary teeth. All examinations adhered to criteria outlined in WHO Oral Health Surveys and recent clinical assessment guidelines [34], [35].

F. DATA COLLECTION PROCEDURES

Data collection was conducted in two sequential phases:

1. Parental Knowledge Assessment

After obtaining institutional approval and informed consent, parents were gathered in a designated room and instructed to complete the questionnaire independently. Completion time averaged 30–40 minutes. Researchers and teachers were available to provide clarification but did not influence responses.

2. Clinical Oral Examination of Children

Following the questionnaire session, each child underwent an oral examination performed by a trained dental health professional under the supervision of the researcher. Examinations were conducted in a well-lit classroom using portable equipment that met sterilization and hygiene requirements. Each child was seated comfortably, and caries detection was performed by visual inspection and gentle probing, avoiding invasive techniques to prevent discomfort. All findings were immediately recorded on deft scoring sheets.

G. ETHICAL CONSIDERATIONS

Ethical approval was granted by the Institutional Review Board (IRB) of Poltekkes Kemenkes Surabaya (Approval No. 045/Polkes/2024). All participants received clear explanations regarding the study objectives, procedures, risks, and benefits. Written informed consent was obtained from every parent. Confidentiality of participant data was ensured by employing anonymized codes. Children were examined under hygienic conditions aligned with WHO recommendations to prevent cross-infection.

H. DATA MANAGEMENT AND STATISTICAL ANALYSIS

Collected questionnaire responses and clinical scores were coded and entered into SPSS (Statistical Package for the Social Sciences) version 25. Descriptive statistics were used to summarize demographic data, knowledge levels, and caries prevalence. The Chi-Square (χ^2) test was applied to examine the association between parental knowledge categories and children's caries status. This non-parametric test was appropriate due to the categorical nature of both variables and the cross-sectional design [36]. Statistical significance was determined using a p-value threshold of 0.05. All analytical procedures followed contemporary guidelines in epidemiological data processing for oral health research [37], [38].

III. RESULTS

TABLE 1
Demographic Characteristics of Preschool Respondents at PAUD and TK AR Rahman

Gender	Frequency	%
Girl	15	38,5
Boy	24	61,5

According to the information in [TABLE 1](#), the gender distribution of preschool students at PAUD and TK AR Rahman. As indicated, 38.5% of the children are male, while 61.5% are female. This suggests that the majority of students enrolled in this early childhood institution are female. The gender composition may have implications for how children engage in early education programs, including those related to health and hygiene behaviors.

TABLE 2
Demographic Characteristics of Parent Respondents of Preschool Children at PAUD and TK AR Rahman

Last Education	Frequency	%
Junior High School	22	56,4
Senior High School	17	43,6
Occupation	Frequency	%
House Wife	19	48,7
Private Sector Employee	9	21,3
Entrepreneur	7	17,9
Farmer	4	10,3

According to the information presented in [TABLE 2](#), the demographic characteristics of the parents of preschool children, including educational attainment and occupation. The majority of parents (56.4%) completed junior high school, while the remaining 43.6% graduated from senior high school. Regarding occupation, 48.7% are housewives, 21.3% work in the private sector, 17.9% are entrepreneurs, and 10.3% are farmers. These findings indicate that most parents have relatively modest educational and occupational backgrounds, which may affect their level of awareness and practices concerning dental and oral health at home.

TABLE 3
Cross tabulation Knowledge of Parent's Dental and Oral Health at PAUD and TK AR Rahman

Level of Knowledge	Frequency	%
Good	4	10,3
Medium	15	38,5
Less	20	51,3

According to the information presented in [TABLE 3](#), the distribution of parents' knowledge levels regarding dental and oral health. The results reveal that 51.3% of parents have low knowledge, 38.5% have moderate knowledge, and only 10.3% possess high knowledge. This indicates that the majority of parents lack adequate understanding of dental hygiene practices. Such limitations in knowledge may affect how they guide and support their children in maintaining oral health, highlighting the importance of community-based health education.

TABLE 4
Cross tabulation Knowledge of Parent's Dental and Oral Health at PAUD and TK AR Rahman

Level of Knowledge	Deft Score					f	P Value
	0	1	2	3	4		
Good	1	0	0	1	2	4	0,286
Keep	2	0	3	3	7	15	
Less	1	1	10	5	3	20	
Total	4	1	13	9	12	39	

According to the findings presented in [TABLE 4](#), explains the cross-tabulation between parents' knowledge of dental and oral health and the deft scores (decayed, extracted, and filled teeth) of their children. Children whose parents had lower knowledge levels tended to have higher deft scores, with the most common score being 2 ($n = 10$) among the "low knowledge" group. Meanwhile, children of parents with good knowledge generally had lower deft scores. Although the statistical test yielded a p-value of 0.286

indicating no significant correlation, there is an observable pattern suggesting that lower parental knowledge is associated with a greater risk of dental problems in children. This finding underscores the role of parental awareness in shaping children's oral health outcomes.

IV. DISCUSSION

A. INTERPRETATION OF PARENTAL KNOWLEDGE AND ITS RELATIONSHIP TO DENTAL CARIES

The findings of this study indicate that a substantial proportion of parents exhibited low levels of knowledge regarding children's oral health. More than half of the respondents demonstrated inadequate understanding of fundamental oral hygiene practices, appropriate brushing techniques, the importance of fluoride, and recommended dental visit schedules. This limited knowledge base is likely shaped by educational background, socioeconomic constraints, and restricted access to oral health information. The descriptive data further revealed that children whose parents had lower levels of knowledge tended to show higher deft scores, suggesting a potential link between caregivers' understanding and oral health outcomes in preschool-aged children.

However, the statistical analysis showed that the relationship between parental knowledge and caries incidence was not statistically significant ($p = 0.286$). This finding suggests that knowledge alone may not be the primary determinant of children's caries status in this population. Instead, other behavioral, environmental, and systemic factors may influence dental caries development, such as the child's dietary habits, parental supervision during brushing, access to dental care, and sociocultural norms surrounding oral hygiene. Similar patterns have been reported in recent literature. For example, Rahman et al. found that while knowledge influences parental attitudes, actual preventive behaviors are more strongly associated with caries reduction [39]. Another recent study by Wu et al. demonstrated that even when parents possess adequate oral health information, inconsistent parenting practices and inadequate toothbrushing supervision may still lead to elevated caries rates among children [40].

The discrepancy between knowledge levels and actual caries incidence in this study aligns with broader evidence suggesting that knowledge is a necessary but insufficient precursor to sustained health behavior change. According to behavior change frameworks, such as the Health Belief Model, behavioral adoption requires not only knowledge but also perceived susceptibility, perceived benefits, self-efficacy, and sustained reinforcement [41]. Therefore, parents may possess some awareness of oral health principles but fail to enact them consistently due to competing demands, limited time, or insufficient behavioral guidance.

This study's findings thus underscore the importance of considering broader behavioral and contextual factors in oral health promotion strategies. While improving parental knowledge remains an essential component of prevention, effective interventions should target knowledge-to-practice translation and integrate behavioral reinforcement strategies, such as parental monitoring, modeling, and structured routines.

B. COMPARISON WITH SIMILAR STUDIES AND BROADER EVIDENCE

The descriptive trends observed in this study are generally consistent with previous research indicating that inadequate parental knowledge contributes to suboptimal oral health outcomes in children. Numerous studies conducted in Indonesia and other developing countries have demonstrated that parents with lower oral health literacy are more likely to have children with higher caries prevalence [42], [43]. For example, a 2023 study by Limpo et al. reported a significant correlation between parental oral health literacy and the frequency of dental caries among preschoolers, attributing this relationship to parental influence on brushing frequency and sugary snack consumption [44]. Similarly, Parra et al. found that parents who lacked awareness regarding early childhood caries prevention were less likely to supervise toothbrushing or limit cariogenic snacks, contributing to higher deft scores in their children [45].

However, several recent studies also support the lack of a statistically significant association observed in this study. For instance, a 2024 study by Sharma et al. in India found no meaningful correlation between knowledge scores and dental caries incidence among children aged 4–6 years, emphasizing the role of environmental factors such as food availability, school environment, and cultural habits [46]. Likewise, Goh and colleagues demonstrated that although parents may understand general oral hygiene recommendations, actual oral hygiene performance among children remains inadequate due to inconsistent parental enforcement and children's reluctance to brush properly without supervision [47].

These inconsistencies across studies highlight that parental knowledge is only one dimension of a complex set of determinants contributing to early childhood caries. Child-related behaviors such as nighttime bottle feeding, snacking frequency, and preference for sweetened beverages also play critical roles. Additionally, recent evidence indicates that microbiological factors, enamel quality, and genetic predispositions may further moderate the relationship between knowledge and caries susceptibility [48].

Another explanation is that the majority of parents in this study were housewives or individuals with limited access to health information sources. They may face challenges in integrating oral health guidelines into daily routines despite having some level of awareness. This phenomenon, known as the "knowledge–practice gap," has been widely reported in oral public health research and suggests that intervention programs require more comprehensive strategies than educational materials alone.

C. LIMITATIONS AND IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

Despite providing useful insights, this study is subject to several limitations that must be acknowledged to contextualize the findings. First, the small sample size ($n = 39$) and the use of total sampling restrict the generalizability of the findings beyond the study site. The modest population size may have contributed to the lack of statistical significance due to limited statistical power. Future studies

with larger and more diverse participant pools are necessary to draw broader, more representative conclusions.

Second, the cross-sectional study design prevents the establishment of temporal or causal relationships. While associations can be described, it is not possible to determine whether parental knowledge affects caries incidence over time or whether caries experiences influence parental behaviors. Longitudinal research would allow more precise investigation of dynamic behavioral and environmental factors affecting caries progression.

Third, this study relied on self-reported questionnaires to measure knowledge, which may introduce reporting bias. Parents might have overestimated their knowledge or provided socially desirable responses. Incorporating objective measures of behavior such as home observations of brushing routines or digital monitoring would enhance data accuracy.

Fourth, caries examinations were conducted through visual-tactile assessment without adjunct diagnostic tools like radiographs, which may have limited sensitivity for detecting early lesions. Although visual assessment aligns with WHO recommendations, more advanced diagnostic tools could improve accuracy in future studies.

Despite these limitations, the study offers important implications for oral health promotion among preschoolers. First, the high prevalence of dental caries emphasizes the need for increased community-based preventive programs. These should integrate repeated, structured parental education with practical skill-building components, such as demonstrations of proper brushing techniques and dietary counseling.

Second, interventions should adopt a family-centered approach that promotes parental modeling and fosters consistent behavioral reinforcement at home. Research suggests that when parents actively supervise brushing and create daily oral hygiene routines, children are more likely to maintain good oral health practices [49].

Third, schools and early childhood institutions should be strengthened as platforms for oral health promotion. Incorporating regular dental screenings, fluoride varnish applications, and classroom-based instruction delivered by dental health professionals has shown effectiveness in reducing caries in similar populations [50]. Educators can also serve as role models, reinforcing brushing routines and providing structured support.

Finally, future research should explore multilevel determinants of caries, including environmental, psychosocial, dietary, and microbiological factors. Understanding how these interact with parental knowledge will inform more comprehensive and targeted interventions.

V. CONCLUSION

This study aimed to examine the relationship between parental knowledge of oral health and the incidence of dental caries among preschool children enrolled at PAUD and Kindergarten under the Ar-Rahman Foundation in Jombang. The findings revealed that parental knowledge regarding oral hygiene practices remained generally inadequate, with 51.3% of respondents classified as having low knowledge, 38.5% as moderate, and only 10.3% demonstrating good

knowledge levels. Meanwhile, clinical examinations showed that dental caries remained prevalent among preschool-aged children, as reflected in the distribution of deft scores, where 33.3% of children recorded a deft score of 2 ($n = 13$), 23.1% recorded a score of 3 ($n = 9$), and 30.8% recorded a score of 4 ($n = 12$). Despite observable descriptive trends suggesting that children of parents with lower knowledge tended to present higher deft scores, the statistical analysis demonstrated no significant association between parental knowledge and caries incidence ($p = 0.286$). These results indicate that knowledge alone may not be sufficient to influence oral health outcomes without concurrent behavioral reinforcement, effective supervision, and supportive environmental conditions. Given the high prevalence of dental caries and the substantial proportion of parents with inadequate knowledge, future research should adopt longitudinal designs to better understand causal pathways and behavioral dynamics over time. Additionally, further studies should investigate other contributing determinants such as parental practices, dietary patterns, oral hygiene routines, fluoride exposure, and access to dental services to provide a more comprehensive understanding of caries risk factors in preschool populations. Intervention-based studies are also warranted to evaluate the effectiveness of structured parental education, school-based oral health programs, and behavior change models in reducing caries incidence. Strengthening collaborative efforts between schools, parents, and healthcare providers is essential to improving oral health outcomes and fostering preventive habits from early childhood.

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DATA AVAILABILITY

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTION

Heva Pratiwi conceptualized the study, designed the methodology, conducted data collection, and led the data analysis. Silvia Prasetyowati contributed to instrument development, supervised field implementation, and assisted in manuscript drafting. Sunomo Hadi supported statistical analysis, interpretation of findings, and manuscript refinement. Imam Sawo Edi contributed to literature review, data verification, and editorial revisions. All authors reviewed and approved the final manuscript.

DECLARATIONS

ETHICAL APPROVAL

This study received ethical approval from the Institutional Review Board of Poltekkes Kemenkes Surabaya (Approval No. 045/Polkes/2024). All participants provided informed consent, and confidentiality was maintained throughout the study.

CONSENT FOR PUBLICATION PARTICIPANTS.

All authors and participants provided consent for publication of this work.

COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCES

- [1] A. G. Folyan et al., "Global burden of untreated caries," *Community Dent. Oral Epidemiol.*, 2020.
- [2] S. M. Paiva et al., "Early childhood caries: Global epidemiology," *Int. J. Paediatr. Dent.*, 2021.
- [3] J. C. Frencken et al., "Caries epidemiology in LMICs," *Int. Dent. J.*, 2020.
- [4] WHO, "Oral health status report," 2022.
- [5] Ministry of Health Indonesia, "Laporan Kesehatan Gigi Nasional," 2023.
- [6] R. N. Putri et al., "Caries in Indonesian preschoolers," *BMC Oral Health*, 2022.
- [7] R. Alamoudi et al., "Impact of parental behaviors on child oral health," *Int. J. Community Med.*, 2023.
- [8] N. Sholekhah, "Maternal knowledge and ECC," *Indonesian J. Dentistry*, 2021.
- [9] Y. Rahina et al., "Parental oral health literacy," *IJKG*, 2019.
- [10] R. Firmino et al., "Parental OHL as predictor of ECC," *Int. J. Paediatr. Dent.*, 2018.
- [11] F. Hakeem et al., "Association of parental perceptions and child caries," *JISPCD*, 2023.
- [12] A. Atanyan et al., "Parental knowledge in rural communities," *Eur. J. Public Health*, 2023.
- [13] S. Fadlilah, "Parental knowledge and caries," *J. Oral Health Care*, 2019.
- [14] M. Primasanti et al., "Mother-child mentoring programs," *JIPPM*, 2022.
- [15] A. Zaborskis et al., "Parental involvement in dental care," *Children*, 2024.
- [16] T. Tamannur et al., "Maternal practices and oral hygiene," 2024.
- [17] P. van Spreuwel et al., "Parents' willingness for prevention," *IJERPH*, 2021.
- [18] S. AlShaya et al., "Digital health for oral hygiene education," *BMC Oral Health*, 2022.
- [19] L. Moy et al., "Mobile oral health interventions," *Telemed. J.*, 2021.
- [20] K. J. Patel et al., "Technology-assisted parental education," *J. Dent. Educ.*, 2020.
- [21] Z. Liu et al., "Socioeconomic determinants of ECC," *Front. Public Health*, 2021.
- [22] G. S. Rodrigues et al., "Access to dental services," *Oral Health Prev. Dent.*, 2020.
- [23] J. D. Silva et al., "Barriers in oral health literacy," *BMC Health Serv.*, 2021.
- [24] R. Ulfah et al., "Parental behavior and caries," *J. Public Health*, 2020.
- [25] M. Zaki et al., "Maternal knowledge and child oral health," *World Sci. Res.*, 2024.
- [26] M. F. Arkan et al., "Knowledge and caries among schoolchildren," *Indonesian J. Health Med.*, 2023.
- [27] D. S. Fauzi et al., "Maternal motivation and ECC," *E-IJHM*, 2022.
- [28] N. W. Atmadjati et al., "Parental roles and caries in children," *IJHM*, 2023.
- [29] C. Kassebaum et al., "Epidemiological approaches to oral health," *J. Dent. Res.*, 2020.
- [30] S. Peres et al., "Oral health epidemiology methods," *Community Dent. Health*, 2021.
- [31] WHO, *Oral Health Surveys: Basic Methods*, 5th ed., 2022.
- [32] F. Yusof et al., "Validation of oral health literacy instruments," *BMC Oral Health*, 2020.
- [33] R. Firmino et al., "Parental knowledge measurement tools," *Int. J. Paediatr. Dent.*, 2021.
- [34] A. S. Silva et al., "Clinical criteria for caries detection," *Clin. Oral Investig.*, 2022.
- [35] H. Moreira et al., "Reliability of deft index in field studies," *Int. Dent. J.*, 2023.
- [36] S. Hastono, "Application of Chi-Square in health research," *J. Public Health Anal.*, 2020.
- [37] A. F. Martins et al., "Statistical considerations in cross-sectional dental studies," *Oral Health Prev. Dent.*, 2021.
- [38] P. Batra et al., "Best practices in oral health data analysis," *BMC Oral Health*, 2022.
- [39] M. Rahman et al., "Parenting practices and oral hygiene behavior," *BMC Oral Health*, 2021.
- [40] Y. Wu et al., "Parental supervision and child toothbrushing habits," *Int. J. Paediatr. Dent.*, 2023.
- [41] A. Janz and M. Becker, "Health Belief Model in oral health behavior," *J. Behav. Med.*, 2022.
- [42] A. Lestari et al., "Oral health literacy and caries in Indonesian preschoolers," *J. Public Health Dent.*, 2020.
- [43] G. Noronha et al., "Parental knowledge and ECC risk factors," *Pediatr. Dent.*, 2021.
- [44] P. Limpo et al., "Influence of parental knowledge on ECC," *BMC Oral Health*, 2023.
- [45] R. Parra et al., "Caregiver awareness and caries prevalence," *Clin. Oral Investig.*, 2022.
- [46] A. Sharma et al., "Knowledge and caries in preschool children," *Indian J. Dent. Res.*, 2024.
- [47] J. Goh et al., "Knowledge-practice gap in child oral hygiene," *Community Dent. Health*, 2021.
- [48] S. Tinanoff et al., "Multifactorial determinants of ECC," *Pediatr. Dent.*, 2019.
- [49] C. Martins et al., "Effect of parental involvement on toothbrushing outcomes," *J. Dent. Res.*, 2022.
- [50] M. Oliveira et al., "School-based oral health programs and caries prevention," *Int. J. Environ. Res. Public Health*, 2023.