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# Mother's Knowledge of Toothbrushing Techniques and the Incidence of Dental Caries in Preschool Children: A Systematic Literature Review

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**ABSTRACT**

Dental caries is one of the most common oral health problems among preschool children and can affect children's health, growth, and quality of life. One factor suspected to contribute to the occurrence of dental caries is the mother's level of knowledge regarding proper toothbrushing techniques. This study aimed to analyze the relationship between mothers' knowledge of toothbrushing techniques and the incidence of dental caries in preschool children. The study employed a systematic literature review method by examining various national and international scientific articles obtained from several relevant databases. Data collection was conducted through the stages of literature searching, selection, and analysis based on the relevance to the research topic. The data were analyzed descriptively using a qualitative approach to identify patterns in the relationship between mothers' knowledge, toothbrushing practices, and the incidence of dental caries among preschool children. The findings revealed that mothers' knowledge is associated with children's oral health maintenance behavior, particularly in establishing proper and regular toothbrushing habits. Mothers with higher levels of knowledge tend to implement more optimal dental care practices, thereby reducing the risk of dental caries in children. In conclusion, mothers' knowledge plays an important role in preventing dental caries among preschool children through the implementation of proper and consistent oral health behaviors.

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## INTRODUCTION

Oral health remains one of the most important public health issues, both globally and nationally, with dental caries being the most dominant disease. Recent studies indicate that dental caries is one of the most common chronic diseases worldwide and affects the majority of the population, especially children (Arul et al., 2023). In addition to dental caries, periodontal disease is also categorized as a condition with a significant global burden and has a considerable impact on reducing quality of life (Hashim, 2025). In the Asian region, the

increasing incidence of oral diseases, including oral cancer, has also been associated with lifestyle changes and the rising prevalence of behavioral risk factors within communities (Hakeem et al., 2023). Dental caries itself is a multifactorial disease resulting from the interaction of biological, behavioral, and environmental factors. High consumption of cariogenic foods, low awareness of oral hygiene, limited access to dental healthcare services, and inadequate oral health education from an early age are the main factors contributing to the high prevalence of dental caries, particularly among preschool children who are still highly dependent on their parents in maintaining oral health (Shan, Li, & Zhang, 2023).

In Indonesia, the prevalence of dental caries among children remains high and continues to be a health issue requiring serious attention. A study conducted by Pratiwi et al. (2025) revealed that the majority of preschool children experienced dental caries with varying levels of severity. These findings were supported by Lestary et al. (2022), who reported a high incidence of caries among children with different levels of maternal knowledge. Furthermore, studies by Ermawati et al. (2024) and Mahadewi (2023) demonstrated that more than 50% of early childhood children suffered from active caries, indicating that preventive efforts at the family level are still not optimal. Other studies also emphasized that parental behavior, particularly maternal behavior, plays an important role in determining children's oral health status (Gavic et al., 2022). The high prevalence of dental caries indicates that children's oral health problems are influenced not only by biological factors but also by parents' knowledge, attitudes, and behaviors in implementing healthy lifestyle practices within the family environment.

Oral health is an integral part of general health that significantly affects children's quality of life (O'Brien et al., 2022). Dental caries not only interferes with chewing function but may also affect speech development, nutritional status, and children's psychosocial well-being (Alzahrani et al., 2024). Globally, the prevalence of dental caries among children remains high and continues to be a serious public health problem, particularly in developing countries (Fisher-Owens et al., 2022). In recent years, increasing attention has been given to factors influencing children's oral health behaviors, particularly the role of parents as primary caregivers. Systematic review studies have shown that children's oral health is significantly influenced by parents' knowledge, attitudes, and practices, especially those of mothers, as oral health habits begin to develop early in life and continue throughout childhood (Kaushik & Sood, 2023). Recent studies have also demonstrated a significant relationship between low parental knowledge and increased incidence of dental caries among children (Pratiwi et al., 2025).

Various studies have demonstrated that parental understanding, particularly maternal knowledge, plays a very important role in influencing children's health behaviors. Cross-sectional studies have shown that low parental understanding is significantly associated with a higher prevalence of dental caries in children, with a much greater risk compared to groups with good levels of knowledge (OR > 18) (Coello Hidalgo et al., 2025). In addition, parents' perceptions and evaluations regarding children's oral health have been proven to influence dental care habits and overall oral health conditions in children.

Nevertheless, the relationship between maternal knowledge and dental caries incidence is not always direct. Several studies have shown that a high level of knowledge does not necessarily correspond to a lower incidence of caries. This condition indicates the involvement of other contributing factors, such as daily health behaviors, dietary patterns, toothbrushing habits, parental stress levels, and family socioeconomic conditions (Mansur, Rothen, & Gao, 2025). Therefore, knowledge alone is insufficient to prevent dental caries unless it is accompanied by the consistent implementation of healthy oral health behaviors in daily life.

On the other hand, various educational-based interventions have demonstrated that improving parental knowledge can enhance children's oral health behaviors, particularly when implemented through sustainable health promotion approaches involving active family participation (Anjani & Mijaata, 2025). However, most previous studies have primarily focused on the direct relationship between maternal knowledge and dental caries incidence without deeply exploring how behavioral and environmental factors mediate this relationship. Furthermore, existing findings still show inconsistencies regarding the strength of the

association between maternal knowledge and caries status among preschool children. Therefore, there remains a research gap regarding the lack of a comprehensive scientific synthesis on the interaction between maternal knowledge, health behaviors, and environmental factors in influencing the incidence of dental caries among preschool children. This study lies in its systematic literature review approach, which not only examines the relationship between maternal knowledge and dental caries incidence but also analyzes the interrelationship of behavioral and environmental factors as holistic determinants of children's oral health. Therefore, this study aims to systematically analyze the relationship between mothers' knowledge of oral health and the incidence of dental caries among preschool children through a systematic literature review approach.

## METHOD

This study employed a systematic literature review (SLR) method to analyze the relationship between mothers' knowledge of oral health and the incidence of dental caries among preschool children. The SLR approach was chosen because it provides a systematic, structured, and comprehensive scientific synthesis of previously published research findings. The preparation of this study referred to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and validity in the literature selection process.

The data used in this study were secondary data obtained from four academic databases, namely Google Scholar, DOAJ (Directory of Open Access Journals), SINTA, and Garuda (Garba Rujukan Digital). The literature search was conducted from January to March 2026 using the Boolean searching technique with the following keyword combinations: "karies" AND "pengetahuan ibu", "dental caries" AND "mother's knowledge", and "oral health knowledge" AND "preschool children". Searches were conducted in both Indonesian and English to obtain relevant national and international articles related to the research topic.

The inclusion criteria in this study were: (1) original research articles with cross-sectional, case-control, cohort, or descriptive study designs; (2) articles discussing the relationship between maternal knowledge and the incidence of dental caries among preschool children aged 3–7 years; (3) articles available in full text; (4) articles published within the last five years; and (5) articles published in either Indonesian or English. Meanwhile, the exclusion criteria included: (1) review articles, editorials, proceedings, and undergraduate theses; (2) articles lacking relevant data related to the research variables; and (3) duplicate publications across different databases.

The article selection process was carried out in stages through identification, screening, eligibility, and inclusion according to the PRISMA flowchart. The initial stage involved identifying all articles found in the databases. Subsequently, screening was conducted based on the relevance of titles and abstracts to the research topic. Eligible articles were then further analyzed through a full-text review. Based on this selection process, 10 articles met the inclusion criteria and were considered suitable for analysis in this study.

Data from the selected articles were extracted and analyzed using a descriptive-narrative approach by comparing findings related to mothers' knowledge levels, oral health behaviors, and the incidence of dental caries among preschool children. The analysis aimed to identify relationship patterns, supporting factors, and research gaps found across the studies. The synthesized data were then presented in tables and narrative descriptions to provide a comprehensive overview of the relationship between maternal knowledge and the incidence of dental caries among preschool children.

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## RESULTS AND DISCUSSION

**Table 1.** Percentage of Maternal Knowledge Levels and the Incidence of Dental Caries in Children.

| Authors | Year | Maternal Knowledge of Oral and Dental Health | Percentage | Preschool Children's Dental Caries Incidence | Percentage |
|---|---|---|---|---|---|
| Putri et al. | 2022 | Good | 86.7% | Low | 33.3% |
| Hartini et al. | 2024 | Good | 70% | Low | 40% |
| Anjani & Mijaata | 2024 | Good | 70% | Low | 40% |
| Lestary et al. | 2022 | Moderate | 52.5% | High | 68.8% |
| Mahadewi | 2023 | Moderate | 65.1% | High | 91.8% |
| Pratiwi et al. | 2025 | Moderate | 52% | High | 68% |
| Ermawati et al. | 2024 | Moderate | 55% | High | 65% |
| Anggraeni et al. | 2025 | Moderate | 60% | High | 65% |
| Lin & Yang | 2023 | Low | 50% | High | 70% |
| UAE Maternal Study | 2024 | Good | 66.1% | High | 76.2% |

Based on Table 1, most studies indicate that mothers' knowledge of oral health is associated with the incidence of dental caries among preschool children. Studies by Putri et al. (2022), Hartini et al. (2024), and Anjani & Mijaata (2024) demonstrated that mothers with good levels of knowledge tended to have children with lower caries incidence. In the study by Putri et al. (2022), a good level of maternal knowledge (86.7%) was accompanied by a low caries incidence of 33.3%. Similar findings were reported by Hartini et al. (2024) and Anjani & Mijaata (2024), where good maternal knowledge levels of 70% were associated with low caries incidence in children (40%). These findings suggest that good maternal knowledge plays a role in shaping children's oral health maintenance behaviors, thereby reducing the risk of dental caries.

Conversely, several studies showed that moderate levels of maternal knowledge tended to be associated with high caries incidence among preschool children. Studies by Lestary et al. (2022), Mahadewi (2023), Pratiwi et al. (2025), Ermawati et al. (2024), and Anggraeni et al. (2025) revealed that although maternal knowledge was categorized as moderate, the incidence of dental caries in children remained high, ranging from 65% to 91.8%. Mahadewi (2023) even reported the highest caries incidence of 91.8%, despite maternal knowledge reaching 65.1%. These findings indicate that adequate knowledge does not necessarily translate into the optimal implementation of oral health behaviors in daily life.

The study by Lin & Yang (2023) demonstrated that a low maternal knowledge level of 50% was associated with a high incidence of dental caries in children (70%). This finding strengthens the assumption that limited maternal knowledge may increase the risk of dental caries among preschool children. Mothers with limited understanding of the importance of maintaining children's oral health tend to be less optimal in implementing toothbrushing habits, controlling the consumption of cariogenic foods, and conducting routine dental check-ups.

However, there were also findings showing inconsistencies between maternal knowledge levels and children's caries incidence. Alkaabi et al. (2026) revealed that although mothers had good knowledge levels (66.1%), the incidence of dental caries among children remained high at 76.2%. This finding indicates that the occurrence of dental caries is influenced not only by maternal knowledge but also by other factors such as daily health behaviors, children's dietary

patterns, socioeconomic conditions, access to dental healthcare services, and parental consistency in implementing oral health maintenance practices for children.

## DISCUSSION

Based on the analysis of the 10 articles presented in Table 1, a tendency was found indicating a relationship between mothers' knowledge of oral health and the incidence of dental caries among preschool children. In general, mothers with good levels of knowledge tended to have children with lower caries prevalence. This was demonstrated in the study by Putri et al. (2022), which showed that 86.7% of mothers had good knowledge, accompanied by a low caries incidence of 33.3%. Similar findings were also reported by Hartini et al. (2024) and Anjani & Mijaata (2024), where the predominance of mothers with good knowledge was followed by lower caries incidence in children, around 40%. These findings indicate that maternal knowledge plays an important role in shaping children's oral health maintenance behaviors, such as regular toothbrushing, limiting the consumption of cariogenic foods, and conducting routine dental examinations.

In contrast, among mothers with moderate to low levels of knowledge, there was a tendency toward increased caries prevalence among preschool children. Lestary et al. (2022) reported a caries prevalence of 68.8%, Mahadewi (2023) reported 91.8%, while Pratiwi et al. (2025), Ermawati et al. (2024), and Anggraeni et al. (2025) reported caries incidence rates ranging from 65% to 68%. Furthermore, Lin and Yang (2023) found that low maternal knowledge (50%) was associated with a high prevalence of dental caries in children (70%). These findings support the assumption that limited maternal knowledge may contribute to less optimal caries prevention efforts, including inadequate supervision of children's oral hygiene, unhealthy dietary habits involving sugary foods, and limited utilization of oral healthcare services.

Nevertheless, the review findings also revealed inconsistencies across several studies. Alkaabi et al. (2026) reported that despite mothers having good knowledge levels (66.1%), the incidence of dental caries among children remained high at 76.2%. This finding suggests that maternal knowledge does not always directly correspond to implemented health practices. Good knowledge may not necessarily be followed by consistent behavioral changes in daily life. Various other factors may influence the occurrence of dental caries, including parenting style, family health behaviors, frequency of sugar consumption, socioeconomic conditions, access to dental healthcare services, and children's compliance in maintaining oral hygiene. These factors may act as confounding variables affecting the relationship between maternal knowledge and dental caries incidence in children.

The findings of this study are consistent with health behavior theory, which states that knowledge is a predisposing factor influencing the formation of health attitudes and behaviors. Good knowledge can increase mothers' awareness regarding the importance of maintaining children's oral health, thereby encouraging better preventive practices such as brushing teeth twice daily using proper techniques, using fluoride toothpaste, and regularly visiting dental healthcare facilities. However, the transformation of knowledge into actual behavior is also influenced by supporting factors such as self-efficacy, family support, social environment, and children's habits. Therefore, although knowledge is an important factor, successful caries prevention still requires a comprehensive and sustainable approach.

Furthermore, variations in findings across studies indicate that social, cultural, and environmental contexts also influence the implementation of maternal knowledge in daily health practices. In some situations, mothers with good knowledge still face difficulties in implementing optimal oral health behaviors due to time limitations, lack of family support, and difficulties in managing children's behavior. This demonstrates that caries prevention efforts cannot rely solely on increasing knowledge but must also be accompanied by behavior change strategies and adequate environmental support. Therefore, oral health education programs should be developed using more participatory approaches, including toothbrushing demonstrations, parental assistance, family-based education, and the integration of oral health programs in schools and community health posts (posyandu), so that interventions

become more effective and sustainable in reducing caries prevalence among preschool children.

This study has several limitations. First, most of the analyzed articles used cross-sectional designs; therefore, the identified relationships are associative and cannot fully explain causal relationships. Second, the number of analyzed articles was limited to 10 studies, meaning that the generalization of findings should be interpreted cautiously. Third, variations in methods used to measure maternal knowledge levels and caries incidence across studies may have affected the consistency of the analysis results. Fourth, this study only utilized several specific databases, making it possible that other relevant articles were not identified. Therefore, future studies are recommended to use longitudinal or intervention designs with broader sample coverage to provide a deeper understanding of the influence of maternal knowledge on dental caries incidence among preschool children.

## CONCLUSION

Based on the findings of this systematic literature review, maternal knowledge of oral and dental health is consistently associated with the incidence of dental caries among preschool children. Mothers with better knowledge tend to have children with lower caries prevalence, indicating that maternal knowledge plays an important role in shaping children's oral health behaviors from an early age. However, this relationship is not always direct, as caries incidence is also influenced by other factors, including parenting practices, dietary habits, socioeconomic conditions, self-efficacy, and access to dental healthcare services.

The findings imply that caries prevention efforts should not focus solely on improving maternal knowledge but also on promoting consistent oral health behaviors through comprehensive, family-based preventive and promotive approaches. Therefore, healthcare providers are encouraged to develop interactive oral health education programs for mothers, such as toothbrushing demonstrations, family counseling, and routine dental monitoring for children. Future studies are recommended to use longitudinal or intervention designs with larger sample sizes to better explore the influence of behavioral and environmental factors on dental caries among preschool children.

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