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CORRELATION BETWEEN MATERNAL DENTAL CARIES AND CARIES IN CHILDREN

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Abstract

Background: *Mothers play a primary role in their children's oral health behavior and outcomes. Broader research is needed to evaluate the correlation between maternal caries and children's caries to help determine suitable education.* ***Purpose:*** *This study aims to investigate the correlation between maternal caries and their children's caries aged 4-7 years.* ***Methods:*** *This study uses a correlation design with a cross-sectional approach. A total of 305 mothers and their children were involved as respondents from seven kindergartens in Bukittinggi City, West Sumatra. The caries evaluation was measured using the DMFT score for the mother and the deft score for the children. The dental caries status was assessed using clinical oral examination form to calculate the DMFT index in mothers and deft in children as numerical variables presented as mean and standard deviation (SD). The correlation analysis test was performed to prove the strength of correlation.* ***Results:*** *The mean maternal DMF index was 11.526 ± 6.178, while the mean children deft index was 7.345 ± 4.609. Although the maternal caries experience was higher, the correlation between maternal and child caries scores was very weak and not statistically significant (r = 0.105; p = 0.112). The findings suggest that maternal caries alone may not as strong predictor of caries in children.* ***Conclusion:*** *The correlation between maternal caries and children's caries is very weak and poses an indirect influence on caries in children. Strengthening maternal oral health education and promoting preventive dental care are essential strategies for improving children's oral health outcomes.*

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Introduction

Dental caries has remained the most prevalent chronic disease and continues to be a major public concern, particularly for children. The incidence of caries in children is often referred to as Early Childhood Caries (ECC), which affects not only the general well-being but also the oral health of young children (Meyer & Enax, 2018). More broadly, dental caries in children can negatively affect oral health and overall well-being. This is because school performance is influenced by the pain, discomfort, and distractions in the learning process (Ribeiro et al., 2018). As stated, 21% of students missed school days due to a toothache, and 34% were absent because of dental treatment. Notably, children suffering from dental disease were more likely to experience absenteeism at school, as they need dental treatment soon, preventing further impacts (Çoğulu et al., 2023; Kinanthi Anssy et al., 2025; Ruff et al., 2023).

One primary influence on children's health is the health of their parents. Good oral hygiene practices established during childhood can prevent dental caries, malnutrition, pain, and impaired quality of life. Mothers with good oral hygiene behavior, such as doing tooth brushing twice daily, limiting sugary food intake, and attending regular checkups, tend to have children with similar habits. This behavior is because children imitate the hygiene practices of their parents. Besides, through observational learning and the behavior model, children are more likely to easily take a look at their parents' behavior at home. Maternal caries is likely an indicator of their knowledge and attitudes, which align with the family dietary choices and the preventive behavior of the children. The interaction in the family and more time in the family influence a child's behavior, respectively (Monostori et al., 2023).

Mothers play a central role in maintaining children's dental health. Maternal oral health may affect children's dental health regarding the maintenance of oral health practices, feeding practices, and prevention of bacterial transmission (Zia, 2025). Beyond the behavioral modeling, maternal oral hygiene has a biological implication, in which poor maternal oral hygiene can increase the risk of cariogenic bacteria transmission towards the children, such as through utensils and food tasting. Hence, the maternal oral hygiene is not only a behavioral determinant, but also biological factors that affect a child's caries susceptibility (Thitisakyothin et al., 2025; Zhou et al., 2025). Studies have explained the role of mothers in children's dental health and the consequences. Research from (Hariyani et al., 2020) was conducted among mothers with 2-3-year-old children regarding maternal caries. It is noted that children whose mothers had higher caries experience pose a greater risk of 86% of ECC than those whose mothers have lower caries experience. However, the study analyzed children at 2-3 years old, which relatively young children, and may not have been identified yet as having caries. If the mother–child relationship changes as the child ages, then generalization to later age periods becomes limited.

Research involving mothers with children aged 4-6 years old has been performed in (Reca et al., 2022) with 60 respondents. it shows that as many as 48.8% mothers with poor maternal role influence the very high category of caries in children as many as 38.3%. Even though this study has found that there is a significant relationship between maternal role and children's caries (p 0.000) within the settings, nevertheless, this study employed 60 respondents or a sample size which the generalization may still lack. A greater sample size is needed to interpret the general results. Another research with a greater sample size, i.e., 229 mothers, which studied about the mothers' knowledge, motivation, and consumption patterns towards children's caries, has found that those factors influence the level of caries grade in children (p-value < 0.05) (Lestari & Noor Layla, 2021). However, the study's sample was taken from one area in Kaibon Public Health Center, which is likely to be small and unrepresentative of the wider population, such as at the city level.

According to the gap in research, this study aims to evaluate the correlation between maternal caries to the dental caries of their children.

Methods

This research is a cross-sectional design study that investigates the correlation between caries of mother to their children's caries. This research used a multivariate analysis to understand the correlation. Using an approach of data collection

through caries examination, the research groups the caries of the mother and the child.

A total of 305 mothers and their children participated as respondents in this study. The sample was taken from seven kindergartens in Bukittinggi City, West Sumatra, using cluster random sampling. Inclusion criteria required that respondents be mothers of children aged five years or above who were officially enrolled in the participating schools and willing to take part in the study voluntarily. Written consent was secured from both the mothers and their children before their involvement.

Mother's prevalence of caries was measured using the DMF-T value, and the children's caries was measured using the deft. The DMFT score was calculated by summing the number of permanent teeth that were decayed (D), missing due to caries (M), and filled because of caries (F). Higher DMFT scores indicate greater caries experience. Children's dental caries experience was assessed using the decayed, extracted, and filled teeth (deft) index for primary dentition. The deft score was calculated by summing the number of primary teeth that were decayed (d), indicated for extraction or extracted due to caries (e), and filled because of caries (f). Higher deft scores indicate greater caries experience. The instrument used an oral health examination, which was conducted directly with mothers and children. The examination was conducted using a mouth mirror, complementary tools (handscone, mask, nierbeken), alcohol, and cotton swabs.

To evaluate the relationship between maternal behavior and children's dental caries, multivariate analysis was performed. Correlation test was utilized to explore associations and describe each research variable. Quantitative data were summarized as mean, standard deviation (SD), and median. Statistical tests were conducted at a 95% confidence level, considering $p < 0.05$ as significant. The degree of correlation was classified according to the coefficient value: < 0.20 (very weak), 0.20–0.39 (weak), 0.40–0.59 (moderate), 0.60–0.79 (strong), and > 0.80 (very strong) (Papageorgiou, 2022).

Results

The results were presented in a frequency distribution based on age and gender characteristics, as well as the correlations between variables.

Table 1. Frequency Distribution of Children's Age

Age (Years)	*Frequency*	*Percent (%)*
4 – 5	91	30
6 – 7	214	70
Total	305	100

Table 1 shows that the children's age in this study was mostly between 6-7 years old, and 30% of the total respondents were between 4-5 years old. These ages show that the respondents are at the age of permanent teeth start to grow.

Table 2. Frequency Distribution of Gender Characteristics

No.	*Gender*	*Frequency*	*Percent (%)*
1.	Male	175	57
2.	Female	130	43
	Total	305	100

Table 2 indicates that there are 57% of the total respondents are male students, and 43% are female students.

The statistical descriptions of the variables were presented to understand the overview of the DMF status of the mothers and deft of the children. subsequently, the normality test was performed to see the assumption of normal distribution before conducting the correlation test.

Table 3. Descriptive Statistics of Variables

Variable	Average	Standard Deviation
DMF of mothers	11.526	6.178
deft of children	7.345	4.609

Table 3 shows the descriptive statistics of the DMF (Decayed, Missing, and Filled) index among mothers and deft of their children. The results indicate that the average DMF score of the mothers is higher than that of the children, i.e., 11.526, and the children have 7.345/ These findings reveal that mothers have dental caries at a higher level than the children. The relatively large standard deviation in both groups indicates variability in caries severity within the sample population. The higher maternal DMF score may reflect accumulated dental caries history over time regarding longer exposure to

dietary intake and poor oral hygiene, whereas the children's lower mean score corresponds to their younger age and shorter exposure to cariogenic factors.

Table 4. Normality Test Results

Variable	p-value	α
DMF of mothers	0.279	0.05
deft of children	0.147	

Table 4 presents the results of the normality test for the DMF (Decayed, Missing, and Filled) variables of mothers and children. The p-value for the DMF of mothers was 0.279, and deft for children, it was 0.147, both of which are greater than the significance level ($\alpha = 0.05$). These results indicate that the data for both variables are normally distributed, suggesting that the distribution of DMF scores among mothers and deft children does not significantly deviate from normality. Correlation test analysis was performed to evaluate the correlation between variables.

Table 5. Correlation Test Between Mothers' DMFT and Children's deft

Variables	*p-Value*	Correlation Coefficient
Caries of mothers	0.112	+0.105
Caries of children		

The results of the study showed a positive value of 0.105 and a p-value greater than 0.05, namely 0.112, which can be assumed that the mothers' caries variable does not have a significant relationship with children's caries, although a positive correlation means that higher caries in mothers tends to be associated with higher caries experience in children. This suggests that within this study population, the level of dental caries in mothers did not have a significant direct correlation with the dental caries status of their children. Besides, the correlation of 0.105 is categorized as a very weak correlation. This indicates that there may be several other factors that influence the children's caries status, instead of just maternal caries.

Discussion

Maternal caries may influence children's caries experience. This is due to the practices on a daily basis of oral health of the mother. According to Zia, 2025), there are three main areas of mothers' practices mostly related to children's caries i.e., oral health maintenance, feeding practices, and prevention of bacterial transmission. Therefore, poor maternal dental health may contribute to the children's dental caries.

Although previous studies reported a correlation between mothers' practices and children's caries, the present study did not observe a statistically significant correlation. The study has conducted a correlation research regarding the incidence of caries in children, which is due to the maternal caries score. The study was performed with a total of 305 mothers and their children aged 6 – 7 years old at most (70%). These results reflect that at that age, when the children begin to develop greater independence in their oral hygiene practices, yet still rely heavily on parental supervision. Children's nature to imitate their parents' behavior has a collective effect on the children's behavior, in which when the parents have good oral hygiene practices, the children tend to do the same practices (Alamoudi et al., 2023). Meanwhile, creating a good behavior of oral hygiene must start from the school-age period, as this will span into adolescence, which has more complex factors regarding a new lifestyle and beliefs (Marshman et al., 2021; Nasir & Vu, 2022).

The study has found that the DMF index of the mothers is higher than deft of the children, which is 11.526 ± 6.178, higher than that of their children (7.345 ± 4.609). This can be caused by the cumulative burden of dental caries, which is consistent with age-related exposure and the chronic nature of dental decay. The children may have a lower deft as they have shorter exposure in life than the mothers, though the relatively high average value still indicates a significant level of caries within the sample. Research by (Snell et al., 2019) shows that mothers play a primary role in the health of the children, proven by the mother's perception that the child's oral health status is associated with the child's caries experience (p-value < 0.001). This shows that the awareness of the mothers reflects the caries of the children. Mothers with awareness, besides knowledge, attitudes of oral hygiene, will

tend to ensure regular toothbrushing, control sugary food intake, and seek professional dental care for the children against the risk of caries. Connecting to the results of the study where the correlation is very weak (r = 0.105), however, it underscores that the influence may be indirectly related to the other factors, not only maternal caries. Yet, it shows an association with maternal awareness and perception. Professional and pleasant dental nursing care can reduce anxiety of the patients, resulting in p-value of 0.001 (Dewi et al., 2023). Therefore, educational programs should target not only caries prevention practices but also aim to strengthen mothers' understanding and perception of their child's oral health status to maximize the influence on the children to imitate good oral hygiene practices.

The correlation analysis (Table 5) revealed a weak positive relationship (r = +0.105) between maternal DMFT and child deft scores, which was not statistically significant (p = 0.112). A weak correlation in this study may also regarding the multifactorial nature of dental caries development. It is known by the model of Keyes loop, which the caries incidence is caused by three main factors, i.e. host comprising the tooth and saliva, including dental conditions and oral defense factors such as saliva, the microorganism, especially cariogenic bacteria such as *Streptococcus mutans* and *Lactobacillus spp*., and substrate (dietary carbohydrate), especially fermentable sugar intake (Özdemir, 2024; Sadjadpour et al., 2024). Besides the three factors, another significant factor is time, because the interaction between those factors occurs simultaneously, causing demineralization and eventually the incidence of caries. The relationship between maternal caries and child caries, which indirectly reflects how factors in Keyes' loop can be transferred or influenced across individuals (between mother and child).

One of factors based on Keyes' loop is the microorganism factor, especially cariogenic bacteria. Mothers have become the first source of *Streptococcus mutans* in their children due to vertical transmission, such as using the same utensils at home, or when tasting food (Azevedo et al., 2023; Issrani et al., 2025). This is supported by research that the colonization of Streptococcus mutans is one caused by the feeding habits (p-value < 0.001). A significant association was found that the sharing spoon practices of mother and child increase the amount of *Streptococcus mutans* bacteria (p-value <0.001) (Damle et al., 2016). Dental caries is an infectious disease and transmissible through the use of the same utensils. This is due to cariogenic activity under acidogenic conditions, which makes things worse; moreover, if the oral hygiene is poor. Consequently, it will impact the pH of dental plaque, as it is noted that dental caries is caused by oral health habits, which are associated with the pH of dental plaque (p-value ≤ 0.05) (Setiawati et al., 2017).

Saliva has a reasonable influence on the growth of dental caries, as it is a natural defense against the caries itself. Tooth brushing as an oral hygiene practice could change the pH from 5.6 to a normal level; moreover, the proper time for toothbrushing could also provide an optimal outcome. A study found that a person who has a medium risk of dental caries is caused by the tooth brushing habit, which doesn't brush their teeth after a meal. Tooth brushing before eating has a pH of 7.59, and tooth brushing after a meal, within 20 minutes after eating, resulted in 7.82 salivary pH. Therefore, tooth brushing after a meal can return the pH to the pH as before eating (Sulastri et al., 2022). Besides, using toothpaste in tooth brushing statistically has a significant increase in salivary flow rate (median/IQR in ml/min) compared to manual tooth brushing without toothpaste (p-value < 0.05). In detail, the rate of salivary flow when using toothpaste is 3.23/1.08 with Colgate toothpaste, higher than with no toothpaste (1.85/0.78) (Pulfer et al., 2022). A higher saliva flow rate is often correlated with a higher saliva buffering capacity, while a low buffering capacity is linked to a low flow rate. Higher flow rate will clear acids more, which is associated with more bicarbonate as key buffer. Mothers who have suffered from high dental caries in the research may have poor oral hygiene, such as not having a tooth brushing habit after meals, which can lead to poor saliva buffering. The higher the saliva buffering capacity, the better it is for dental and oral health.

Maternal behavior plays a crucial role in regulating a child's diet, particularly regarding sweet food consumption and tooth brushing times. If a mother has a high-sugar diet or fails to monitor her child's consumption, the substrate factor in Keyes' loop becomes dominant in accelerating the caries process in children. It is found that sugary intake is

significantly related to the incidence of caries (p-value < 0.001). The risk is also 5.67 times higher than those who have low sugary consumption. A person who has a low protective factor can have a caries prevalence of 94% (Lendrawati et al., 2019). This is related to when a mother shows a consistent habit of sugary consumption, which is imitated by the children. Even though the direct influence is on the children themselves in the decision-making of consuming sugar. Besides, the low supervision of the mother outside of the home can contribute to the behavior of the children in sugary consumption.

It is also possible that the lack of significant association in this study stems from variations in lifestyle or oral health awareness among respondents. Mothers with existing caries might have improved their oral hygiene practices and become more proactive in their children's dental care, thereby weakening the direct link between their own caries status and that of their children. Overall, while the findings did not show a statistically significant correlation between maternal and child caries indices, they highlight the importance of maternal involvement and oral health education as key determinants of children's oral health behaviors.

Conclusions and Recommendations

The study found a very weak correlation between maternal caries and their children's dental caries. This implies that caries experience in children is not merely because of the mother experiencing dental caries, but also other multifactorial factors. One limitation of this study is that maternal socioeconomic characteristics, such as education level and occupation, were not collected. These factors may influence oral health knowledge, dietary habits, and children's oral health behaviors. Therefore, the absence of these variables may have limited the ability to fully explain the factors associated with children's caries experience. Future studies should incorporate a broader range of factors, such as maternal oral hygiene habits, diet, and socio-economic influence, through longitudinal or interventional designs to better understand the dynamics between maternal and child oral health.

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