Positive correlation between maternal self-efficacy and the children's oral hygiene behavior

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ABSTRACT

Introduction: Maternal self-efficacy is known to be a strong predictor of children's oral hygiene behavior. Several studies have shown that the majority of children do not have good oral hygiene according to the OHI-S index, which is associated with parental concern for their oral hygiene. Mother's self-efficacy in understanding their children's oral hygiene needs influences tooth brushing habits. The aim of this study was to determine the correlation between maternal self-efficacy and children's oral hygiene behavior in Aceh. **Methods**: This study employed a quasi-experimental design with 124 participants divided into 62 in the intervention group and 62 in the control group. The inclusion criteria were mothers with children aged 4-6 years. Maternal self-efficacy was assessed using a modified Self-Efficacy Scale for Maternal Oral care (SESMO) questionnaire. Children's oral hygiene was measured by the Patient Hygiene Performance plaque index. Data analysis used Spearman correlation test ($p<0.05$). **Results**: This study showed that high maternal self-efficacy is associated with higher levels of maternal education (high school and college). Mothers in the intervention group predominantly reported good to moderate child oral hygiene compared with the control group. A significant correlation was found between maternal self-efficacy and child oral hygiene ($r=0.352$, $p=0.001$). Mothers with low self-efficacy had children with 3.10 times higher odds of having poor oral hygiene (OR=3.10; CI=95%; 1.07-8.98). **Conclusion**: Children's oral hygiene behavior was positively correlated with maternal self-efficacy. The findings of this study suggest that mothers with low self-efficacy are at risk of having children 4-6 years with poor oral hygiene.

Keywords: Maternal, self-efficacy, children, oral hygiene, plaque index

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INTRODUCTION

Nowadays, detecting plaque has a positive effect on oral hygiene status. The mouth is lined with a bacterial biofilm that thrives under favorable temperature, humidity, and nutrient conditions.[1] Oral hygiene is influenced by actions that maintain a clean and healthy mouth, particularly by keeping tooth surfaces free from plaque and calculus.[2] It is important for maintaining and improving oral health, general health and quality of life.[3] The habit of maintaining oral hygiene is closely related to oral health problems.[4]

Data from the Global Burden of Disease Study reported that 3.5 billion cases of oral dental diseases were experienced by people worldwide in 2017.[5] In Indonesia, the results of the 2018 Riskesdas survey show that 93% of children aged 5–6 years had tooth decay, indicating poor oral hygiene from an early age.6 An important factor contributing to various oral diseases is dental plaque.[7]

Dental plaque is a deposit adhering to the tooth surface, and composed of acid-producing bacterial communities that cause enamel demineralization.[8] Moreover, poor oral hygiene habits leading to plaque accumulation are a primary source of dental disease in children.[9] Plaque accumulating on teeth can be detected by disclosing agent solutions or tablets that stain plaque bacteria on the tooth surface.[10] Furthermore, the use of disclosing agents has a positive effect on the oral hygiene status.[11] The study conducted by Andriani in Aceh Besar showed that oral hygiene status, measured by plaque index, indicated that 53.8% of children's teeth were classified as poor.[12] In addition, a study conducted by Abdat in Banda Aceh concluded that only 55% of children brushed their teeth twice a day, presumably influenced by maternal involvement in children's oral hygiene.[13]

Children's oral hygiene can be influenced by several factors, including individual, family, and community factors.[14] Moreover, family factors such as maternal self-efficacy, knowledge of children's oral hygiene, and maternal tooth-brushing habits before bedtime are associated with children's tooth-cleaning practices.[15] Maternal self-efficacy refers to a mother's belief in her ability to effectively care for her child, influenced by confidence, perception of ability, and maternal experience.[16] Maternal self-efficacy can be measured by the Self-Efficacy Scale for Maternal Oral Care (SESMO).[17] The SESMO scale can be used to assess specific maternal self-efficacy on dental health.[17]

Research on the topic of self-efficacy has been conducted in western countries, but remains limited in Indonesia. A previous study conducted by Finlayson et al. concluded that maternal self-efficacy in understanding children's oral hygiene needs was associated with children's tooth brushing habits.[15] Moreover, a study conducted by Soltani et al. showed that children's oral hygiene behavior was significantly associated with maternal self-efficacy.[18] In addition, Morales et al. concluded that a high level of maternal self-efficacy was correlated with better dental health status in primary teeth.[19] These three studies demonstrate that maternal self-efficacy has an important role in children's quality of life, particularly regarding oral hygiene and health. Accordingly, the present study contributes novel insights by investigating the relationship between maternal self-efficacy and children's oral hygiene practices, with the aim of informing the development of family-based intervention strategies in Indonesia. The purpose of the research was to analyze the correlation between maternal self-efficacy and children's oral hygiene in Aceh.

METHODS

This quasi-experimental study involved 124 participants. divided into 62 in the intervention group and 62 in the control group. The study was conducted from November 4 - December 18, 2021, in the working area of the Darussalam Public Health Center, Aceh Besar. The inclusion criteria were mothers recruited from the Integrated Healthcare Center (Posyandu) in the working area of the Darussalam Public Health Center, who had children aged 4-6 years, and who provided informed consent. Exclusion criteria were uncooperative mothers or those with children having special needs. Participant recruitment involved collecting initial data (names, addresses, and telephone numbers) from Posyandu cadres in the study area. Mothers as participants were divided into intervention groups and control

groups. The intervention group received an educational video about how to brush their teeth properly and how to maintain oral health, while the control group did not receive educational videos. The researcher instructed participants on applying a disclosing agent solution to their children's teeth, using a cheek retractor, and taking photographs. Disclosing agent solutions and cheek retractors were

efficacy using the validated SESMO questionnaire ($\alpha<0.05$ for all questionnaire items).17 Reliability testing showed Cronbach's Alpha=0.913>0.361 (r table) with a significance level of 5%. Maternal self-efficacy data scores were categorized as low (15-45) or high (46-75). Children's dental health was assessed using the Patient Hygiene Performance plaque index. before applying the disclosing agent, a cheek retractor was placed. The disclosing solution was then applied to the child's teeth to identify dental plaque, followed by photographing the teeth and sending the images to the researcher via WhatsApp. Posyandu staff provided assistance when participants encountered difficulties. The measurement results were recorded as follows: very good (score = 0), good (0.1–1.7), moderate (1.8–3.4), and poor (3.5–5.0). Data analysis was conducted with the help of the IBM Statistical Product and the application of Social Science (SPSS) version 25. Spearman correlation testing was applied to examine the relationship between maternal self-efficacy and children's oral hygiene. This study was approved by the Ethics Commission of the Faculty of Dentistry, Syiah Kuala University (No. 316/KE/FKG/2021).

RESULTS

Based on Table 1, most of the subjects in this study were in the young adult age group (26-35 years), with 69 participants (55.6%). Maternal age and health are important factors influencing the mother's ability to care for children. The majority of the research subjects had a high school education (n=54, 43.5%). Maternal education plays an important role in children's development, upbringing, and parenting knowledge.

Based on Table 2, most mothers with high school and college education demonstrated high self-efficacy. This finding shows that maternal self-efficacy is related to education level. Based on Table 3, most children's oral hygiene was in the moderate or good category at the ages of 4, 5, and 6 years. However, this study also identified a considerable number of children with poor oral hygiene, especially at the ages of 4 and 5 years.

Based on Table 4, maternal self-efficacy in the high category was observed more frequently in the intervention group (39.5%) than in the control group. In contrast, the control group was dominated by mothers with low self-efficacy (29.8%).

Table 1. Background sample characteristics for mother by age group and education level

Age group (years)	Number (n=124)	%
17-25 years	7	5.6
26-35 years	69	55.6
36-45 years	42	33.9
46-55 years	6	4.8
Level of education		
Elementary school	10	8.1
Middle school	29	23.4
High school	54	43.5
College	31	25.0

Table 2. Distribution of the maternal self-efficacy based on education level

Level of education	Maternal self-efficacy		
	High (n=74)	Low (n=50)	Total (n=124)
Elementary school	7	3	10
Middle school	16	13	29
High school	31	23	54
College	20	11	31

Table 3. Distribution of the oral hygiene level based on children's age

Age (n=124)	Children's oral hygiene		
	Good (n=25)	Moderate (n=55)	Poor (n=44)
4 years (n=50)	8 (6.4%)	23 (18.6%)	19 (15.3%)
5 years (n=50)	13 (10.5%)	20 (16.1%)	17 (13.7%)
6 years (n=24)	4 (3.2%)	12 (9.7%)	8 (6.5%)

Table 4. Distribution of maternal self-efficacy in the intervention group and the control group

Maternal self efficacy	Group		
	Intervention (n=62)	Control (n=62)	Total (n=124)
High	49 (39.5%)	25 (20.2%)	74 (59.7%)
Low	13 (10.5%)	37 (29.8%)	50 (40.3%)

Table 5. Correlation between maternal self-efficacy level with children's oral hygiene behavior level

	High maternal self efficacy (N=74)		Low maternal self efficacy (N=50)			
Children's oral hygiene	Intervention (N=49)	Control (N=25)	Intervention (N=13)	Control (N=37)	r	p value
Good	13 (10.5%)	7 (5.6%)	2 (1.6%)	3(2.4%)		
Moderate	25 (20.3%)	13 (10.5%)	2 (1.6%)	15 (12.1%)	0.352	0.001**
Poor	11 (8.9%)	5 (4.1%)	9 (7.3%)	19 (15.3%)		

Based on the results of the Spearman correlation test in Table 5, the correlation value was r=0.352, indicating a positive correlation direction. This means that as one variable increases, the other also tends to increase. Moreover, the value of p=0.000 (p<0.05) indicates a significant relationship between maternal self-efficacy and the child's oral hygiene. When analyzed separately, the Spearman correlation coefficients were r=0.325 in the intervention group and r=0.356 in the control group, both showing significant correlations (p < 0.05). The Spearman correlation value (r=0.352) shows that correlation strength was sufficient. Based on the Odds Ratio value, mothers with low self-efficacy are had a higher risk of having children with poor oral hygiene(OR=3.10; CI=95%; 1.07-8.98)

DISCUSSION

The findings of this study showed that mothers with high self-efficacy were more likely to have children with good or moderate

oral hygiene, whereas mothers with low self-efficacy tended to have children with poor oral hygiene (Table 5). This result is consistent with other studies that reported self-efficacy in the intervention group improved the plaque index score and duration of toothbrushing compared to the control group. Mothers play an important role in influencing the habits and health status of their children, since children depend on their mothers to meet their oral health needs.[14]

Most of the subjects in this study were young adults aged 26-35 years (n=69, 55.6%). This finding is in line with research by Alice Goisis, which demonstrated that the association between maternal age and children's well-being is largely driven by socio-demographic characteristics.[20] More educated mothers are more likely to have a better understanding of children's health needs, provide a more stimulating home environment, and access reliable information, ultimately fostering a positive environment for their children's growth.[21]

The results showed that high maternal self efficacy was most common among mothers with high school and college education. Education was identified as a significant predictor of maternal self-efficacy.[22] This finding is in line with research conducted by Soltani et al.,[18] who found that higher maternal self-efficacy was associated with mothers with higher levels of education. In addition, research conducted by Morales showed that children of mothers with low education exhibited poorer oral hygiene than children of mothers with higher education.[19]

The results indicated that most mothers had high self-efficacy (n=74, 59.7%). This is supported by the finding that mothers in intervention had higher self-efficacy than those in the control group. For example, antenatal breastfeeding education has also been shown to increase maternal self-efficacy and improve breastfeeding success in the first postpartum week.[23] Maternal self-efficacy is a prerequisite for improving children's oral hygiene. Moreover, an increase in maternal self-efficacy can promote oral hygiene habits among children.[15] Therefore, interventions in the form of education aimed at enhancing self-efficacy can help to improve preventive behavior regarding children's oral hygiene. In addition, Jamieson reported that in the intervention group there was an increase in plaque index scores and duration of brushing compared to the control group.[24] Based on the findings of this study, mothers in the intervention group had children with better oral hygiene outcomes than those in the control group.

A cross-sectional study of 2–6-year-old children in Australia demonstrated that higher parental self-efficacy was associated with better child toothbrushing practices and more consistent dental visits.[25] Moreover, another study on 3–5-year-old children reported that most had fair to poor oral hygiene, with parental factors

significantly influencing oral hygiene status.[26] Collectively, these studies indicate that mothers with higher self-efficacy are more likely to support and maintain better oral hygiene in their children, thereby reducing the likelihood of poor oral hygiene outcomes.

Supported by the results of the Spearman correlation statistical test between maternal self-efficacy and child's oral hygiene, p=0.000 (sig<0.005) means that both variables show a significant correlation with r=0.352 in a positive direction. These findings are consistent with those of Soltani et al.,[18] who reported a significant positive relationship between maternal self-efficacy and children's oral hygiene, as well as with Kakudate et al.,[17] who observed a correlation between maternal self-efficacy, children's dental caries, and toothbrushing frequency. The results of this study show that mothers with low self-efficacy had three times the risk of having children with poor oral hygiene(OR=3.10; CI=95%; 1.07-8.98). In addition, research conducted by Jamieson showed that mothers who have low self-efficacy were 2.4 times more likely to assess their children's dental

health as poor (OR=2.40; CI = 95%; 1.54-3.74).24 Therefore, interventions in the form of education to strengthen maternal self-efficacy can help to improve preventive behaviors for children's oral hygiene. Such interventions are particularly appropriate when delivered through community health centers and routine Posyandu activities. The children's oral hygiene behavior was positively correlated with maternal self-efficacy. The findings of this study suggest that mothers with low self-efficacy are at risk of having children 4-6 years with poor oral hygiene .

These results underscore the importance of adopting a family-centered approach to oral health promotion, with mothers as key targets for intervention. The limitations of this study stem from the Covid-19 pandemic, which made video-based interventions less effective than face-to-face delivery. In addition, the assessment of children's oral hygiene relied on photographs sent by mothers via Whatsapp, and the accuracy of photo capture may have affected the results. Future research should consider employing a longitudinal design to examine more rigorously the causal relationship between maternal self-efficacy and children's oral hygiene behaviors. In addition, incorporating face-to-face education, digital platforms, and community-based strategies may enhance the effectiveness of future interventions.

CONCLUSION

There was a positive correlation between maternal self-efficacy and children's oral hygiene behavior. The implications of this study suggest that maternal self-efficacy should be explicitly addressed in the design of interventions to improve children's oral hygiene behavior.

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