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Development of a Dental and Oral Health Education Model with an Authoritative Parenting Approach to Prevent Dental Caries in Early Childhood

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Abstract: Development of a Dental and Oral Health Education Model with an Authoritative Parenting Approach to Prevent Dental Caries in Early Childhood. **Objective**: This research aims to develop a dental and oral health education model utilizing an authoritative parenting approach to prevent dental caries in early childhood. **Methods**: This research used Mixed Methods with a research and development (R&D) design adopting the ADDIE model (analysis, design, development, implementation and evaluation). Validation tests were carried out by 2 experts (an expert in the field of dental public health and an expert in the field of early childhood education) and 1 practitioner. Next, one-on-one trials were carried out on 3 mothers who had children aged 3-5 years, small group trials on 9 mothers and their children, field trials on 20 mothers and their children for the intervention group, 20 mothers and their children for the control group. Qualitative data analysis used the Miles-Hubermen analysis technique, quantitative data analysis used the Wilcoxon and Mann Whitney tests. **Findings**: The design stage yielded a dental and oral health education model employing an authoritative parenting approach to prevent dental caries in early childhood. Results from the development stage, including validation by experts and practitioners, affirm the model's suitability for trial. One-on-one and small group tests indicate that the educational model is engaging and easy to comprehend. The field test results demonstrate a significant impact of the provided educational model on enhancing mother's knowledge, attitudes, and improving OHIS value of their children. **Conclusion**: The dental and oral health education model, employing an authoritative parenting approach to prevent dental caries in early childhood, is deemed suitable for implementation and proves effective in enhancing mother's knowledge, attitudes, and OHIS value of their children.

Keywords: dental caries, early childhood, educational model.

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INTRODUCTION

Childhood is an important period for healthy dental growth and development. Dental caries in children is the most common and difficult-to-control public health problem. Although not life-threatening, its impact on children is quite large, causing pain, impaired masticatory function, and affecting child growth and development so that it can reduce the quality of life of children. Children not only experience problems related to oral diseases such as bleeding gums, inflammation, or toothaches, but can also

experience sleep problems (Elamin et al., 2021). Children with poor oral health are almost 12 times more likely to experience limitations in daily activities than healthy children (Montes et al., 2019)(Gasparoni et al., 2013).

Dental caries in children mostly occurs in the maxillary deciduous teeth and molars. The pattern of dental caries in children is called early childhood caries (ECC) (Cameron & Widmer, 2013). ECC is a complex disease involving maxillary deciduous incisors that can occur several months after tooth eruption and spread rapidly to other primary teeth (Prakash et al., 2012). ECC can not only affect the oral health of infants and preschoolers but can also affect the overall health of the child. ECC can also increase the risk of caries in the permanent teeth when the child becomes an adult.Untreated caries can lead to total crown loss (Meyer & Enax, 2018).

The prevalence of dental caries in children aged 3-5 years varies by continent and country. Data from the US shows that 40% of kindergarten-aged children have a higher prevalence of caries than in European countries, while in the UK 12% of 3-year-olds have dental caries (WHO, 2016). Studies conducted in other countries show a high prevalence of caries in children, ranging from 36-85% in Asia, 38-45% in Africa, and 22-61% in the Middle East (Çolak et al., 2013). Findings from Cambodia and Indonesia showed that the prevalence and severity of ECC reached 90% in children aged 3-5 years with a deft index >6 (Prakash et al., 2012).

The results of the 2018 Basic Health Research (Riskesdas) showed that the percentage of oral health problems more than doubled compared to 2013, from 25.9% to 57.6%. The 2018 Riskesdas results also stated that 93% of early childhood, namely the 5-6 year age group, had cavities, meaning that only 7% of children in Indonesia did not have dental caries problems. Children aged 5-6 years have an average of 8 cavities in their oral cavity. According to the age characteristics of the Indonesian population, the proportion of the population experiencing dental health problems in the 3-4 year age group was 41.1%, the 5-9 year age group was 67.3%, and 55.6% in the 10-14 year age group. The average DMF-T index in Indonesia based on the age group of 3-4 years is 6.2 and 8.1 in the age group of 5 years (Kemenkes RI, 2018).

According to the 2018 Riskesdas, in Jambi Province, 45% of the population experienced dental and oral problems, with 37.7% of teeth damaged or having cavities. The proportion of the population in Jambi City who experienced oral health problems reached 58.5%. The prevalence rate of dental caries in the 3-4year age group was 81.5%, and in the 5-year age group, it was 90.2%. The high rate of caries in children today can be influenced by several factors, one of which is the behaviour of people who lack awareness and understanding of basic information about the importance of maintaining oral health. The act of brushing teeth, like other behaviour patterns, requires formative phases. These stages need to be taught and adapted to children so that children's behaviour can be controlled early on (Al-Bluwi, 2014)(Splieth et al., 2020).

The application of the problem based learning model in the health sector has been widely carried out. where by implementing this model, someone will be encouraged to realize the importance of dental health problems in early childhood, thus encouraging someone to look for solutions to prevent dental caries in early childhood. The role of parents is very important because parents are the closest people to children in maintaining oral health. Parents must know how to care for their children's teeth and must also guide their children on how to brush their teeth properly. Even though they still have baby teeth, a child must get serious attention from their parents because baby teeth will affect the growth of permanent teeth in children. However, in reality,

many parents think that baby teeth are only temporary and will be replaced by permanent teeth, so they often assume that damage to baby teeth is not a problem.

Parenting plays an important role in shaping children's behaviour. The attitude and behaviour of parents, especially mothers in dental health care, have a significant influence on children's dental health behaviour. The types of parenting patterns are divided into four types of parenting, namely authoritarian, authoritative, permissive, and uninvolved parenting. Authoritative parenting has two-way communication with a parenting style that is not too harsh in parenting but also does not release control over children. The results showed that mothers who had good knowledge of applying authoritative type parenting had low child caries rates compared to other types of parenting. The purpose of this study was to develop an oral health education model with an authoritative parenting approach to prevent dental caries in children.

METHODS

This research used Mixed Methods with a research and development (R&D) design adopting the ADDIE model (analysis, design, development, implementation and evaluation). Validation tests were carried out by 2 experts (an expert in the field of dental public health and an expert in the field of early childhood education) and 1 practitioner. Next, one-on-one trials were carried out on 3 mothers who had children aged 3-5 years, small group trials on 9 mothers and their children, field trials on 20 mothers and their children for the intervention group, 20 mothers and their children for the control group. Qualitative data analysis used the Miles-Hubermen analysis technique, quantitative data analysis used the Wilcoxon and Mann Whitney tests.

RESULTS AND DISCUSSION

After carrying out the stages of analysis, design, and development and being assessed by 3 experts and practitioners, an oral health education model with an authoritative parenting approach was obtained to prevent dental caries in early childhood. The educational model for preventing dental caries in early childhood consists of stage 1 (encourage), stage 2 (capable), stage 3 (repetition), and stage 4 (evaluation) intervention activities. The intervention activities in the educational model developed are related to the constructs of the Health Belief Model theory consisting of perceived vulnerability, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. As well as the Theory of Planned Behavior which consists of attitudes, subjective norms, and behavioural control over behaviour. The intervention stages consist of 4 stages. Stage 1: consists of activities: a. meeting with parents about the importance of maintaining children's dental health b. discussion and sharing experiences in maintaining early childhood dental health. Stage 2: consists of activities: a. providing education for parents who have children aged 3-5 years and children about oral health in early childhood, b. training on how to brush teeth properly and correctly for children, Stage 3: joint activities between mothers and children at home Stage 4: evaluation, b. follow-up plan (maintenance). The educational model was then tested in small groups and field trials.

Table 1. Results of the bivariate analysis on variables of maternal knowledge and attitude and OHIS scores in small-group children

Variabel	Mean	SD	*P-value*	N
Knowledge				
Pretest	64.22	8.13		9
Post-test 1	80.44	11.42	0.000	

Post-test 2*	96.89	5.08	0.007	
Attitude				
Pretest	73.22	7.48		
Pos-tetst 1	86.67	8.41	0.001	9
Post-test 2*	99.56	0.88	0.007	
OHIS Score				
Pretest	4.16	0.66		
Post-test 1	2.67	0.54	0.000	9
Post-test 2	1.08	0.74	0.000	

Based on the table above, it is known that the average pretest result of the small group mothers' knowledge is 64.22 with a standard deviation of 8.13 while the average post-test 1 result is 80.44 with a standard deviation of 11.42. The difference in the average between pretest and post-test 1 is 16.22. Based on the P value of 0.000 (p-value <0.05), it can be concluded that there is a significant difference in knowledge in small groups between the results of pretest and post-test 1. In the post-test 2 results, the average was 96.89 with a standard deviation value of 5.08 and had an average difference with the pretest results of 32.67. Based on the results of statistical tests, it can be concluded that there is a significant difference in the knowledge variable in the pretest and post-test 2 results with a p-value of 0.007 (p-value <0.05).

These results are in line with the results of research conducted by Maria et al. Maria conducted research entitled Increasing knowledge, attitudes and practices related to dental caries in mothers and child caregivers through neuroeducation strategies. The strategy includes experiential moments that stimulate different emotions. For this reason, two meetings were held. There are three learning moments: (1) Experience, where efforts are made to evoke feelings of motherhood, love, and protection (using sensitive phrases and aromas) to increase attention when watching animated stories (videos) and experiments in simulations. microbiology laboratory. (2) Surprise and play, which seeks to encourage interpretation and reasoning through observation of experimental results and involves games played directly to stimulate attention and concentration before the moment. (3) Learn, which provides guidance on healthy habits. Children are consistently present throughout the intervention. The strategy used by Maria et al has several similarities with this research. The results of the research showed that there was an increase in maternal knowledge after the intervention. (Angarita-Díaz et al., 2024)

In the attitude variable, it is known that the pretest results have an average attitude of 73.22 with a standard deviation value of 7.48. The post-test 1 results have an average value of 86.67 with a standard deviation value of 8.41. The average difference between pretest and post-test 1 results is 13.45. Based on the p-value of 0.001 (p-value <0.05), it can be concluded that there is a significant difference between the results of the attitude pretest and the results of the attitude post-test 1. In post-test 2, it is known that the average is 99.56 and has a difference with the pretest results of 26.34. The statistical test results show that there is a significant difference between the results of the pretest of attitude variables and the results of post-test 2 of attitude variables with a p-value of 0.007 (p-value <0.05) in Melati small group students.

The results of this study indicate a significant difference in the pretest and posttest results of maternal attitudes. This study has results that are in line with the results of research conducted by Reca and Intan in a study entitled The Effectiveness of Family Dental Nursing Care on

Children's Dental Health and Caries Status. Based on his research, it was found that there was a significant difference in the mother's attitude score before and after being given an intervention in the form of dental nursing care, with a p-value of 0.001.(Reca & Restuning, 2022)

Attitude is a reaction or response that is still closed from a person to a stimulus or object. The manifestation of attitude cannot be seen directly but can only be interpreted first through closed behaviour. Attitude clearly shows the connotation of the suitability of reactions to certain stimuli which in everyday life are emotional reactions to social stimuli. Attitude is also an evaluation or reaction to feelings (favourable) or feelings toward (unfavourable) certain objects (Notoadmojo, 2014). In a family, the role of parents is very important in guiding, providing understanding, reminding, and providing facilities for children so that children can maintain health, especially oral hygiene. Parents' knowledge underlies the formation of behaviour that supports children's dental and oral hygiene(Margareta, 2012).

Cultivating the habit of maintaining good oral health in children can be done by parents in various ways through habituation. Habituation is something that is deliberately done repeatedly so that something can become a habit, and then exemplary. Parents model good and correct habits about how to brush their teeth and healthy food consumption patterns, and diligently check their oral health with the dentist.

In the table above, it can be seen that the average value of the pretest results on the OHIS scores of small group children is 4.16 with a standard deviation value of 0.66. The average value of post-test 1 results is 2.67 with a standard deviation of 0.54. The average difference between pretest results and post-test 1 results is 1.49. Based on the results of statistical tests, it can be seen that there is a difference in children's OHIS scores in pretest and post-test 1 with a p-value of 0.000 (p-value <0.05). Meanwhile, the results of post-test 2 have an average value of 1.08 with a standard deviation value of 0.74. The difference between the mean value of pretest and post-test 2 is 3.08. Based on the statistical value, it can be concluded that there is a significant difference between the OHIS scores of children in the pretest and post-test 2 with a p-value of 0.000 (p-value <0.05).

This study shows that there is a significant difference between students' OHIS scores before and after the educational media intervention. The results of this study are in line with research conducted by Wanda et al. who studied the effect of parental assistance in brushing teeth on OHIS scores in children. The results of his research show that there is a significant difference in children's OHIS scores after parental assistance, with a p-value of 0.000. (Aida et al., 2022).At the training stage, the correct way to brush your teeth and a list of activities that mothers and children can do at home have an effect on the child's OHIS score. Mother and child activities at home in the form of reading story books, playing snakes and ladders, watching educational videos together can increase the closeness between mother and child and make brushing teeth fun. This forms the child's habit of brushing their teeth after breakfast and before bed.

When individuals take action to prevent disease or maintain health, they are influenced by perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and action cues can influence a person's ability to function healthily (HBM Theory). Perceived vulnerability is related to disease susceptibility, perceived seriousness is related to the severity of the disease, perceived benefits and obstacles. Personal judgments or beliefs about the perceived benefits and harms of taking preventive measures against disease. Self-efficacy is also related to belief in one's ability to take action. This explains the existence of beliefs about signs that encourage someone to take action to prevent disease. In this research, the educational

model provided begins with a discussion stage and sharing experiences with parents as well as providing education about dental caries in children to mother and child activities at home. It is at this stage that the intervention provided can influence perceived vulnerability, perceived severity, perceived benefits, barriers and self-efficacy so that it can encourage increased knowledge and maternal attitudes and have implications for the child's OHIS score.

Table 2. Comparison of post-test results between the intervention group and control group

Variable	Mean	SD	*P-value*	N
Knowledge*				
Intervention	98.60	2.87	0.000	20
Control	80.70	6.49		20
Attitude*				
Intervention	99.60	.821	0.000	20
Control	77.85	5.41		20
OHIS Score*				
Intervention	1.07	0.67	0.000	20
Control	2.88	0.93		20

*: Mann-Whitney test

Based on the table above, it can be seen that the intervention group's knowledge variable has an average of 98.60 with a standard deviation of 2.87. Meanwhile, the control group had an average of 80.70 with a standard deviation of 6.49. The statistical test results showed a p-value of 0.000 <0.05. So it can be concluded that there is a significant difference in the knowledge variable between the intervention group and the control group. In the attitude variable, the intervention group had an average value of 99.60 and a standard deviation of 0.82 while the control group had an average of 77.85 with a standard deviation of 5.41. The p-value is 0.000 (p-value <0.05) which means that there is a significant difference between the attitudes of the intervention group and the control group. The intervention group had an average OHIS score of 1.07 and a standard deviation of 0.67. While the control group had an average of 2.88 with a standard deviation of 0.93. The statistical test results showed a p-value of 0.000 <0.05. So it can be concluded that there is a significant difference between the OHIS values of the intervention group and the control group.

Research conducted by Sanaeinasab et al (2022) concluded that educational programs based on HBM are more effective than previously used methods for educating children and their parents about optimal oral health behavior. This study found that HBM-based programs designed to educate children and their parents about oral health prevention can result in better oral health outcomes such as access to restorative dental care, gingival health, and related beliefs and behaviors compared with clinic-based education a more traditional one. Because many children and their parents may not feel vulnerable to oral health problems, using HBM-based educational programs can increase awareness of vulnerability to such problems, resulting in better oral health care. Combining educational programs taught in dental health clinics and in schools can help improve the oral health status of school-aged children. Further studies of the HBM-based programs examined here in different cultural and socioeconomic settings would be useful in determining how these factors may influence the outcomes of such programs. Also, assessment of dental outcomes over a longer period of time

is needed to determine how long the benefits of the intervention last (Sanaeinasab et al., 2022).

Based on the average score of maternal knowledge, maternal attitudes and children's OHIS scores, it can be seen that the educational model had more influence on increasing maternal knowledge, maternal attitudes and children's OHIS scores compared to the control group which only had intervention in the form of distributing leaflets. The educational model designed is more complex than leaflets which only contain some material but do not provide discussion sessions and experience sharing. The mothers were less inspired to read the material in the leaflet compared to the material presented through discussions and sharing experiences. This is in line with research conducted by Sri Aulia et al which stated that leaflet media did not succeed in reducing children's OHIS scores. This is due to environmental factors, namely children still consume school snacks that are high in sugar (Rahmi et al., 2023).

This research is in line with research by Surtimanah, et al using an outreach method entitled counseling method using video and puzzle media to pre-school children regarding dental health (Surtimanah et al., 2020). The research results show that there is a significant influence between the counseling intervention model and improving dental health in elementary school children in Bandung.

CONCLUSIONS

The educational model for preventing dental caries in early childhood using an authoritative parenting approach has proven to be influential in increasing the level of maternal knowledge, maternal attitudes and reducing children's OHIS scores. The educational model developed was proven to be more influential in increasing the average knowledge, attitudes of mothers and children's dental hygiene compared to providing education using leaflets. The dissemination of information uses an educational model designed to enable mothers to understand the material provided more deeply due to interactive discussions and fun activity plans to teach children to brush their teeth properly.

It is hoped that the results of this research can be taken into consideration in providing children's dental health education so that it can have an impact on reducing the incidence of dental caries in children.

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