ORIGINAL ARTICLE

Increasing mothers' knowledge, and attitudes, and children's oral hygiene index simplified (OHI-S): an experimental study on the "EKARINI" educational method

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ABSTRACT

Introduction: The high incidence of dental caries in children is partly due to the lack of parental participation in estabilishing children's tooth-brushing habits. This research aims to see an increase in the variables tested in the EKARINI, an educational model on mothers' knowledge, attitudes, and children's OHIS. **Methods**: This study employs an experimental design, collecting pretest and posttest data from mothers and their children following the intervention. The intervention provided in this study involved the EKARINI educational model, which included a pre-test and post-test in the form of a questionnaire consisting of several questions about maternal knowledge and attitudes toward dental health, and the control group received standard education using media such as leaflets, videos, and phantom models. The sample consisted of two groups: an intervention group with 20 respondents and a control group with 20 respondents. Data analysis was conducted using either the independent t-test or the Mann-Whitney test. **Results**: The findings revealed a significant difference between the posttest scores of the intervention group and the control group The p-values indicate significant differences for each variable: knowledge ($p = 0.006$), attitude ($p = 0.016$), and OHIS ($p = 0.010$), showing that the EKARINI educational model effectively improved maternal knowledge, attitudes, and children's oral hygiene compared to the control group. Based on the average value, the group that received the educational model had a higher average value than the control group. **Conclusion**: The EKARINI educational model is in increasing mothers' knowledge, attitudes, and better OHIS values.

KEYWORDS

dental caries, early childhood, educational model.

INTRODUCTION

Childhood is a crucial period for the growth and development of healthy teeth. Dental caries in children represent a significant public health issue. While it is not life-threatening, its impact on children can be substantial, leading to pain, impaired chewing function, and hindering their overall growth and development, ultimately diminishing their quality of life. Children may experience various oral health problems, including bleeding gums, inflammation, or toothaches, which can contribute to sleep problems.[1] Children with poor oral health are nearly 12 times more likely to experience limitations in daily activities compared to their healthy peers.[2]

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-age children have a higher prevalence of caries than in European countries, while in the UK 12% of children aged 3 years have dental caries. [3]

The results of the 2018 Basic Health Research (Riskesdas) show that the percentage of dental and oral health problems has more than doubled compared to 2013, rising from 25.9% to 57.6%. The 2018 Riskesdas results also stated that 93% of young children, namely the 5–6-year-old group, experienced cavities, meaning that only 7% of children in Indonesia do not have dental caries problems. Children aged 5-6 years on average have 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 is 41.1%, the 5-9 year age group is 67.3%, and 55.6% in the 10-14 year age group. The average DMF-T index in Indonesia based on the 3-4 year age group is 6.2 and 8.1 in the 5 year age group.[4]

According to Riskesdas in 2018, 45% of the population in Jambi Province experienced dental and oral problems, with 37.7% suffering from damage or cavities. The proportion of residents in Jambi City who experience dental and oral health problems reaches 58.5%. The prevalence rate of dental caries in the 3-4 year age group was 81.5%, and in the 5 year age group it was 90.2%.[4] Factors contributing to dental caries in children include characteristics of the children, their family background, oral hygiene practices, and their eating and drinking habits.[1,5,6]

The findings of the study conducted by Duangthip et al. (2019), which focused on dental caries in children's milk teeth aged 3-5 years, revealed that male children from lower-income families with low levels of parental knowledge exhibited higher plaque scores and elevated DMF-T scores ($P < 0.05$).[7] Bottle use, especially at bedtime, is thought to increase the risk of dental caries.[8–10] Additionally, microbial, dietary, and environmental factors are considered the most significant risk factors for the development of ECC.[11,12]

The role of parents is crucial in guiding, providing understanding, reminding, and providing the necessary facilities to children, enabling them to maintain the cleanliness of their teeth and mouth. Parental knowledge is very important in underlying the formation of behavior that supports children's dental and oral hygiene.[13–15]

Ekarini's educational model is an educational model that consists of the constructs of the health belief model theory and the theory of planned behavior. This model comprises 4 stages: encouragement, capability, repetition, and evaluation. The research aims to investigate the impact of the EKARINI educational model on mothers' knowledge, attitudes, and children's OHIS.

METHODS

The research was conducted from January to March 2024. The research respondents consisted of 40 mothers and their children aged 3-5 years. The sample size was determined using Lameshow's formula (1997), requiring a minimum of 13 respondents. The inclusion criteria in this study involved mothers with children aged 3-5 years. The questionnaire was administered to these mothers to assess their knowledge and attitudes regarding their children's dental and oral health. The OHIS (Oral Hygiene Index Simplified) examination was conducted directly on the children, assessing their oral hygiene by measuring the presence of debris and calculus on their teeth. The respondents were divided into two groups: the intervention group, which comprised 20 mothers and their children, and the control group, which also included 20 mothers and their children. The intervention group was provided with the EKARINI educational model, while the control group received a standard educational model. The EKARINI education model stages consist of 4 stages (encouragement, capability, repetition, and evaluation).

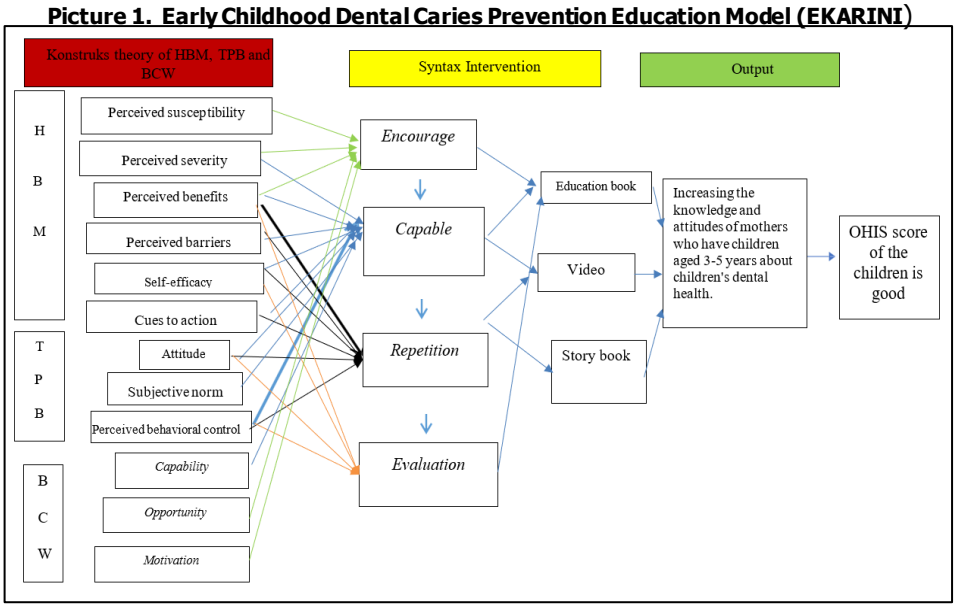
Maternal knowledge was evaluated using a questionnaire with multiple-choice questions about oral and dental health, where higher scores indicated a greater understanding. The attitude component was assessed through a Likert scale questionnaire, where participants rated their level of agreement with statements

related to dental care practices and beliefs. For OHI-S, the children's oral hygiene was measured through a direct clinical assessment, which involved inspecting the presence of debris and calculus on their teeth, with scores categorized into "good," "moderate," or "poor" hygiene based on established OHI-S criteria.

In the encouragement stage, participants engaged in introductory activities, discussions, and experience-sharing sessions about maintaining dental health, followed by a pre-test. This stage was conducted in a single 15-minute session. The capability stage involved providing education on dental and oral health, training on proper tooth brushing techniques, and administering a post-test. This stage utilized educational media such as modules, videos, and phantom models and was held in a pre-kindergarten or Pendidikan Anak Usia Dini (PAUD) An Nahl Jambi City setting for 60 minutes, once a week. During the repetition stage, mothers and children participated in home-based activities, including reading storybooks and watching educational videos related to dental health. The final stage, evaluation, consisted of a post-test to assess changes in maternal knowledge and attitudes, as well as the children's Oral Hygiene Index Simplified (OHIS) scores, followed by follow-up activities to ensure the maintenance of the learned practices.

For the control group, standard dental and oral health education was provided without the structured EKARINI model. This group received general education on maintaining dental and oral health, which included basic information on proper tooth brushing techniques and the importance of regular dental check-ups. However, unlike the intervention group, the control group did not engage in the structured, multi-stage educational approach that included interactive sessions, specific training, or follow-up activities. The implementation stage are:

Picture 1. Early Childhood Dental Caries Prevention Education Model (EKARINI)



The education provided to the control group was limited to a single session, during which the content was delivered in a lecture format with minimal interaction. Data were collected from pretests and posttests. After collecting the pretest and posttest data, the data were processed using SPSS version 23 software. The test used in this research was the independent t-test to determine whether there was a significant difference between the post-test results of the intervention group and the control group for normally distributed data. Conversely, data that were not normally distributed were subjected to an alternative test, specifically the Mann-Whitney test.[17]

RESULTS

The following is a table of pretest, posttest 1 and post test 2 in the intervention group and control group

Table 1. Comparison of Pretest results between the experimental group and the control group

Variable	Mean	SD	n
Knowledge*			
intervention	65,95	7,78	20
Control	69,85	8,81	20
Attitude			
Intervention	72,75	6,71	20
Control	72,60	7,24	20
OHIS *			
Intervention	3,05	1,42	20
Control	3,30	0,91	20

Based on the table above, the intervention group exhibited an average knowledge score of 65.95, with a standard deviation of 7.78. Conversely, the control group achieved an average of 69.85, with a standard deviation of 8.81. The attitude variable, the intervention group had an average value of 72.75 and a standard deviation of 6.71, while the control group had an average of 72.60 with a standard deviation of 7.24 The OHIS value for the intervention group had a mean of 3.05 and a standard deviation of 1.42. The control group, had a mean of 3.30 with a standard deviation of 0.91.

Table 2. Comparison of Posttest 1 results between the experimental group and the control group

Variable	Mean	SD	*P-value*	n
Knowledge*				
Intervention	82,05	9,56	0,006	20
Control	74,75	5,01		20
Attitude				
Intervention	88,05	8,14	0,016	20
Control	81,20	10,44		20
OHIS *				
Intervention	1,89	1,11	0,010	20
Control	4,00	2,80		20

*: Mann-Whitney test

In the table above, the average knowledge score for the intervention group was 82.05, with a standard deviation of 9.56, while the average knowledge score for the control group was 74.75, with a standard deviation of 5.01. The statistical test results showed a p-value of 0.006 <0.05, indicating a significant difference in the knowledge levels of mothers between the intervention and control groups. The average attitude variable for the intervention group was 88.05, with a standard deviation of 8.14.

In the control group, the mean was 81.20 with a standard deviation of 10.44. Based on the results of the analysis, it was found that the p-value was 0.027 <0.05, signifying a significant difference between the attitudes of mothers in the intervention group and the control group. The OHIS value for the intervention group had a mean of 1.89 and a standard deviation of 1.11. The control group, on the other hand, had an average value of 4.00 with a standard deviation of 2.80. Based on the statistical test results, the p-value was 0.010 (p-value <0.05), indicating a significant difference in the OHIS values between the intervention and control groups.

Table 3. Comparison of Posttest 2 results between the intervention group and the control Group

Variable	Mean	SD	*P-value*	N
Knowledge*				
Intervention	98,60	2,87	0,000	20
Control	76,85	3,57		20
Attitude*				
Intervention	99,60	0,82	0,000	20
Control	81,55	10,26		20
OHIS *				
Intervention	1,07	0,67	0,000	20
Control	3,80	2,68		20

*: Mann-Whitney test

Based on the table above, the intervention group exhibited an average knowledge score of 98.60, with a standard deviation of 2.87. Conversely, the control group achieved an average of 76.85, with a standard deviation of 3.57. The statistical test results showed a p-value of 0.000 <0.05. Therefore, it can be concluded that there was a significant difference in the knowledge variable between the intervention and the control groups. Regarding 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 81.55 with a standard deviation of 10.26.

The P-value was 0.000 (p-value <0.05), signifying a significant difference in the attitudes between the intervention and control groups. 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 3.80 and a standard deviation of 2.68. The results of the statistical test confirmed a p-value of 0.000 <0.05, thus concluding that there was a significant difference between the OHIS scores of the intervention group and the control group.

DISCUSSION

This study aimed to assess the effectiveness of interventions designed to improve parents' health literacy regarding children's oral and dental health. The interventions were carried out in two ways: the first group received an educational model based on authoritative parenting, while the control group was provided with health information through leaflets. In the research that has been conducted, interventions were carried out to increase parents' health literacy regarding children's oral and dental health.

There were two methods of intervention: the first group engaged with a specifically designed educational model, while the control group received leaflets aimed at improving health literacy. As a result, both interventions could increase parental health literacy, as evidenced by the increasing parental knowledge and behavior as well as the decreasing scores on the children's OHIS. However, the educational model based on authoritative parenting proved to be more effective in increasing maternal knowledge and behavior, as well as in reducing children's OHIS scores compared to the leaflet distribution intervention. This is reflected in the mean scores, where the intervention group utilizing the authoritative parenting model exhibited higher levels of maternal knowledge and behavior and lower children's OHIS scores in comparison to the control group.

As indicated in Table 1, The intervention group significantly outperformed the control group in knowledge, attitudes, and oral hygiene, highlighting the effectiveness of the intervention. The findings indicate that the intervention was effective in enhancing knowledge, improving attitudes, and bettering oral hygiene compared to the control group. These results align with previous studies that have demonstrated the positive impact of targeted educational interventions on health outcomes. For instance, similar studies have reported that structured educational

programs can significantly boost knowledge and attitudes while improving practical outcomes like oral hygiene. These findings suggest that the educational model based on authoritative parenting is more effective in improving knowledge, attitudes, and oral health outcomes than the distribution of leaflets.

Further analysis presented in Table 2 indicates that in posttest 2, the intervention group showed significantly higher improvements in knowledge, attitudes, and oral hygiene compared to the control group, demonstrating the intervention's strong impact. The substantial enhancements observed in the intervention group align with findings from similar studies, which often highlight the effectiveness of well-structured educational interventions in improving health-related outcomes. These results underscore the intervention's success in significantly boosting knowledge and attitudes while improving oral hygiene, supporting its broader application in comparable settings.

Knowledge is the result of knowing, and this occurs after people sense a particular object. Sensing can be done through human senses, namely the senses of sight, hearing, smell, taste, and touch. Most human knowledge comes from sight and hearing. [18] Knowledge is also a treasure of mental wealth that directly or indirectly helps enrich our lives. Every knowledge has specific characteristics regarding what (ontology), how (epistemology), and what it is for (axiology).[18] The knowledge a person has influences his behavior; the better a person's knowledge, the better his behavior. [19]

Attitude is a reaction or response that an individual exhibits toward a stimulus or object. The manifestation of attitudes cannot be observed directly; rather, it must be interpreted through observable behavior. Attitude clearly shows the connotation of appropriate reactions to certain stimuli, which in everyday life is an emotional reaction to social stimuli. Attitude is also an evaluation or reaction of feelings of support or partiality (favorable) or feelings of impartiality (unfavorable) towards a particular object.[18] Parents can instill good dental and oral health habits in their children in various ways through habituation. A habit is something that is intentionally repeated until it becomes a routine, often through example. For instance, parents set a good example by demonstrating proper habits, such as brushing their teeth correctly, eating healthy food regularly, and consistently having their teeth and mouth checked at the dentist. (Mulyasa, 2011).

Various studies have demonstrated a correlation between health literacy and a person's clinical condition. As a person's knowledge about health increases, the quality of a person's health increases. [20] This is proven by research conducted by Brega et al., which examined the relationship between parental health literacy and children's oral health. The research findings reveal that parental health literacy is related to habits and knowledge of children's dental health (p-value <0.0001). Parents with a high level of health literacy believe that children's oral and dental health is their responsibility as parents (p-value< 0.0001).

These parents take their children's oral and dental health problems seriously, which influences their actions in creating habits aimed at preventing dental health problems in their children.[21,14] Based on research, Abdul et al. explained that parental literacy is related to the condition of their children's oral health at preschool (p< 0.000). [22]

The limitations of this research include several important aspects. First, this study is based on meetings with parents during school parenting activities, making the implementation of early childhood dental and oral health education highly dependent on the support and cooperation of various parties, including schools, parents, and the home and school environment. Second, the success of this educational effort also relies on the skills of teachers and parents in utilizing the developed educational models and media. Lastly, the sample in this research is limited in both number and respondent criteria, meaning that the findings may not fully represent the broader population. Therefore, further research with a larger and more representative sample is needed to ensure the generalizability of the results.

CONCLUSION

The "EKARINI" model of oral health education, which is based on authoritative parenting, significantly impacts maternal knowledge, maternal attitudes, and children's OHIS values. This underscores the effectiveness of the EKARINI model in early childhood settings as a strategy for improving dental and oral health outcomes. The study emphasizes the value of integrating the EKARINI model with health education to promote healthier behaviors in children from an early age.The implication of this research based on the EKARINI model of oral health education has a significant impact on maternal knowledge and attitude.

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