Denta, *Jurnal Kedokteran Gigi*
Accredited No. 79/E/KPT/2023
p-ISSN: 1907-5987 e-ISSN: 2615-1790

RESEARCH ARTICLE

The Influence of Parental Knowledge Level During Pregnancy with Child's Dental Caries Risk at RSGM-P Nala Husada

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Online Submission : 22 Juni 2025
Accept Submission : 16 Juli 2025

ABSTRACT

Background: *Awareness and understanding among pregnant women regarding the importance of maintaining oral and dental health play a crucial role in preventing Early Childhood Caries (ECC). Caries risk assessment is an essential part of a comprehensive and age-appropriate patient care approach. This evaluation aims to estimate the likelihood of an increase in caries incidence over time, as well as the potential progression or activity of existing lesions.* ***Objective:*** *to analyze the relationship between parental knowledge during pregnancy about oral and dental health and risk of the dental caries risk in children at RSGM-P Nala Husada.* ***Materials and Methods:*** *This study employed an analytical observational design with a cross-sectional approach. A total of 45 samples were collected from patients at the integration clinic of RSGM-P Nala Husada. Child patients aged 3-5 years were assessed iin dental caries using CAMBRA, while the patient's mother was given a questionnaire to find out what information was known during pregnancy regarding oral and dental health. The Spearman correlation test was chosen because the data used was ordinal.* ***Results:*** *The Spearman correlation test revealed a significant value ($p < 0.05$) with a strong correlation coefficient (0.666).* ***Conclusion:*** *A strong relationship exists between parental knowledge during pregnancy and the risk of caries in pediatric patients at RSGM-P Nala Husada. Higher levels of maternal knowledge were associated with lower caries risk in children.*

Keywords: *Level of knowledge, pregnancy, caries risk, CAMBRA*

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Denta Jurnal Kedokteran Gigi, Agustus 2025; Vol.19 No.2; Hal 106-115
Available at http://journal-denta.hangtuah.ac.id/index.php/jurnal/issue/view/27
DOI: https://doi.org/10.30649/denta.v19i2.7

INTRODUCTION

According to the World Health Organization (WHO), integrating oral health into maternal and child health programs is essential for the effective prevention and management of oral diseases. Healthcare professionals are expected to provide guidance and information on the safety and benefits of medical and dental care during pregnancy, with the goal of improving maternal oral health. Such education is intended to enhance pregnant women's knowledge and awareness of the importance of maintaining oral and dental health, thereby helping to prevent Early Childhood Caries (ECC) [2]. Furthermore, the Indonesian government, through Regulation No. 89 of 2015, emphasizes oral health care during pregnancy as part of oral and dental health promotion efforts, thereby reinforcing the importance of providing education on oral health throughout pregnancy.[3]

Knowledge and awareness of maintaining oral and dental health are important factors in preventing various diseases that can arise in the oral cavity, including dental caries. Limited awareness of oral care is often reflected in poor oral conditions, insufficient understanding of proper oral hygiene practices (both verbally and in writing), and low utilization of dental health services. The results of research by Saheb, reveal that oral and dental health promotion programs are needed to cover the knowledge gap among mothers regarding the oral care of their children.[4] Education plays an important component of oral health care in the prenatal period and is expected to have a significant effect on maternal and child oral health. Counseling in the early stages of pregnancy includes topics directed towards all patients. For example, eating habits, prevention of injuries, as well as changes in the oral cavity that may occur during pregnancy and the baby's oral healthcare. Research has documented that early oral health promotion that begins during pregnancy can lead to sustained and long-term improvements in children's oral health. This program includes care before, during, and after pregnancy.[5]

The aim of caries risk assessment is to evaluate the probability of a rise in caries occurrence over time—whether through the development of new lesions or the progression of existing ones, including changes in their size and activity. With the ability to detect caries at an early stage (such as non-cavitation lesions or white spots), medical personnel can play a role in preventing cavitation from occurring as early as possible.[6] By conducting a caries risk assessment, such as CAMBRA dentists can comprehensively develop prevention and treatment plans based on the child's age. This activity can be started on the first visit of the child, around the age of one year.[7] This caries risk assessment should be carried out in every child as a routine basic examination.[8] A combination of several factors, including the child's dietary patterns, frequency of fluoride exposure, susceptible hosts, and microflora interacting with various other factors such as social, cultural, and behavioral are involved in the current caries risk assessment process.[7]

By increasing the knowledge of pregnant women, it is hoped that the prevention of dental caries begins before the baby is born, continuing at the neonatal, infant stage and so on until the child is independent enough to prevent dental caries. This study aims to determine the relationship between the level of parental knowledge during pregnancy regarding oral and dental health and the risk of children's dental caries at RSGM-P Nala Husada.

MATERIALS AND METHODS

The study was conducted over a three-month period, from April to June 2025, at the integration clinic of RSGM-P Nala Husada, Surabaya. This research has been declared ethically feasible and has received an ethics feasibility certificate with the number EC/002/KEPK. RSGMNH/IV/2025 dated April

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28, 2025, by the Health Research Ethics Committee of RSGM-P Nala Husada.

An analytical observational method with a cross-sectional design was applied in this research, and the participants were selected using simple random sampling. A total of 45 research samples participated in this study. The research was conducted using a questionnaire to collect primary data on the level of parental knowledge during pregnancy. The questionnaire was divided into two sections: the first covered patient biodata, while the second included 30 questions related to issues that mothers should be aware of during pregnancy. These 30 questions are divided into three sub-questions: six questions about changes in the oral cavity that will be experienced during pregnancy, 10 questions about oral and dental care for pregnant women and 14 questions about information about early childhood dental care. Before being administered, the 30 items underwent validity and reliability testing and were deemed suitable for respondents.

The level of knowledge of parents during pregnancy, will be classified into: high, medium and low. Previously, researchers determined the scores on 30 answers in questionnaire using the Likert scale. Respondents answers scored between 1-5. To determine the highest score of 30 answers, multiplied by 5 and the lowest multiplied by 1, the highest score is 150 and the lowest score is 30 x 1 = 30. Based on the highest and lowest values, an interval range of 40 is then determined, so that the following criteria are obtained:

Table 1. Criteria in level of knowledge during pregnancy

Level of knowledge during pregnancy	Criteria
30 – 70	Low
71 - 110	Moderate
111 - 150	High

The results of Pearson's Validity test show that all questionnaires used as measuring tools have valid or significant results with a Sig value of < 0.05, while the results of the Reliability test (Cronbach's Alpha) show that all questionnaires used as measuring tools have valid or significant results with a value of > 0.60

Before conducting primary data collection, the researchers provided an explanation about the research objectives, research benefits, data collection procedures and benefits for respondents. After the explanation is given to the respondent, the researcher, the respondent and the witness sign the informed consent. Filling out the questionnaire takes about 10 - 15 minutes and is accompanied by dental co-ass students at RSGM-P Nala Husada. The researcher provides an opportunity for respondents to ask questions if there are questions that are not understood in order to get the most accurate data possible. The answers to the 30 questions in the questionnaire will be classified into high, medium and low levels of knowledge.

In addition, the patient's caries risk examination also uses primary data. The researchers used the CAMBRA form aged 0 - 5 years to see the risk of caries in patients. The results of caries risk calculation are classified into: high risk, medium risk, and low risk

RESULT

In this research, 45 eligible samples were collected based on inclusion and exclusion standards. The sample comprised 100% women, reflecting the objective of examining pregnant women's level of knowledge.

In some of the tables below, the distribution of patients based on age, education and also the occupation of the 45 study respondents will be presented.

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Table 2. Classification of patients by age group

Age Group	Number of Respondents	Percentage
≤20 years old	1	2,2%
21 – 30 years old	16	35,6%
31 – 40 years old	18	40%
41 – 50 years old	9	20%
>50 years old	1	2.2%

Table 3. Patient distribution according to educational level

Education	Number of Respondents	Percentage
SD	6	13,3%
SMP	9	20%
SMA	17	37.9%
Diploma/D3	2	4,4%
S1	9	20%
S2	2	4,4%

Table 4. Distribution of patients based on occupation

Occupation	Number of Respondents	Percentage
House-wife	31	68,9%
Employee	5	11,1%
Self employed	4	8,9%
Lecturer/Teacher	4	8,9%
Nurse	1	2,2%

The results of the questionnaire calculation of 45 respondents regarding the level of knowledge of the mother during pregnancy were obtained as follows:

Table 5. Level of knowledge during pregnancy

Level of Knowledge	Number of Respondents	Percentage
High	31	31.1%
Moderate	5	62.2%
Low	4	6,7%

In this study, in addition to taking data on the level of parental knowledge, caries risk measurements were also carried out in children (whose mothers had filled out questionnaires) to see the patient's caries risk. The measured pediatric patients were 3-5 years old. The following results of the calculation of 45 respondents regarding the risk of caries in patients aged 3-5 years were obtained as follows:

Table 6. Child's Caries Risk in patients

Child's Caries Risk	Number of Respondents	Percentage
Low	11	24,5%
Moderate	19	42,2%
High	15	33,3%

The data obtained on the level of parental knowledge during pregnancy and the results of the calculation of the risk of caries in pediatric patients were carried out in a correlation test using Spearman. The Spearman correlation test indicated that the variables demonstrated statistical significance ($p < 0.05$) and had a strong correlation coefficient (0.666), which means that there was a strong relationship between the level of parental knowledge during pregnancy and the risk of dental caries in patients aged 3–5 years at RSGM-P Nala Husada.

Table 7. Correlation analysis using Spearman's test

			Level of Know ledge	Caries Risk
Spearman's rho	Level of Knowledge	Correlation Coefficient	1.000	.666**
		Sig. (2-tailed)	.	.000
		N	45	45
	Caries Risk	Correlation Coefficient	.666**	1.000
		Sig. (2-tailed)	.000	.
		N	45	45

**Correlation is significant at the 0.01 level (2-tailed).

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DISCUSSION

Comprehensive care during pregnancy and optimal oral health of pregnant women during pregnancy will affect the degree of health and well-being in the child.[9,10] The relationship between the oral cavity health status of parents, pregnancy conditions and the health of the child's oral cavity is very close. Various studies reveal that the oral health status of parents is a predictor of their child's health and mouth in the future. Over the past few years, various efforts to maintain oral and dental health during pregnancy have received attention and recognition from educators, clinicians, policy makers, and also national organizations.[10] The Government of Indonesia through Permenkes No. 89 of 2015 has regulated oral and dental health services for pregnant women. Oral and dental health services for pregnant women include: health counseling in the form of providing Communication, Information and Education (KIE) regarding oral and dental health, especially during pregnancy; early detection of oral and dental disorders/diseases in pregnant women; and referring pregnant women in terms of the condition of the teeth and mouth of pregnant women requires a curative approach.[3]

Knowledge, attitudes, awareness and participation of parents in carrying out the habits of maintaining oral health will affect the health of the child's oral cavity.[11] Oral health and its relationship to overall health are considered to be key factors that contribute to the health of pregnant parents, their babies, and toddlers.[10,12] Maintain dental health during pregnancy, for example doing regular checkups, going to the dentist for preventive care, and applying how to maintain good oral hygiene at home. These things aim to reduce risks and optimize overall health during pregnancy. Dentists have an important role in maintaining dental and oral health for pregnant women and unborn babies. [13] In the first part of the questionnaire, the researcher asked questions about changes in the oral cavity that occur in pregnant women and in the second part about oral health care during pregnancy. It is hoped that from this question, it can be known that the process of maintaining optimal oral and dental health for pregnant women is expected to have an impact on the good growth and development of the fetus.

Poor oral health during pregnancy is also associated with problematic birth processes, including low birth weight and prematurity.[14] This will certainly cause health problems for parents and children, so attention to oral health needs to be considered, especially during the prenatal period.[10] Pregnant women are more susceptible to oral cavity problems because during pregnancy there are changes in hormone levels, such as estrogen and progesterone which will lead to changes in habits and behavior in maintaining the cleanliness of the oral cavity. In the future, this problem will have a negative impact on children's oral health.[15] Hormonal changes in pregnant women are the etiology of the occurrence of oral lesions that may occur during pregnancy. Increased production of progesterone and estrogen will cause dilatation of blood vessels in the gingival region. This will trigger edematous in the gingival tissue. In pregnancy, there are also changes that come from the normal flora of the oral cavity, this change comes from discomfort and nausea that is often felt during pregnancy so that pregnant women will reduce the frequency of brushing their teeth and have an impact on the cleanliness of their oral cavity. Hormonal changes and changes in the normal flora of the oral cavity in pregnant women will contribute to the appearance of bleeding and inflammation or temporomandibular disorders.[16] The immune system will undergo adjustments during pregnancy that can affect the body's ability to respond to oral infections. From Yilmaz's (2024) research, it was shown that the pH of unstimmulated saliva will decrease significantly during pregnancy. Some studies report that the cause of lower saliva pH is due to the effect of progesterone on plasma bicarbonate levels

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during pregnancy. In addition, changes in the frequency of more frequent meals, differences in oral hygiene patterns in pregnant women and changes in taste can also be reasons for lower saliva pH during pregnancy. Increased levels of chorionic gonadotropin in pregnant women will result in reduced saliva production during pregnancy. So in this study, it was also found that the rate of unstimmulated saliva flow in pregnant women in the 3rd trimester will be lower than in pregnant women in the 1st trimester.[17]

In the third part of the questionnaire, the researcher asked questions about how to maintain the cleanliness of the oral cavity in infants (ages 0-1 years). Pregnant women who know how to clean the oral cavity are expected to apply their knowledge to their children. During the early period of life, the main role in maintaining the child's cleanliness and mouth is greatly influenced by the participation of parents or caregivers. This is because most of the child's time will be spent by parents/caregivers, especially mothers. [4,18] In this study, 100% of the sample was women and 68.9% of them worked to take care of the household (not working) and accompanying their children. Mothers have significantly higher knowledge than fathers about their children's oral and dental health problems.[19] The dependence of toddlers on parents requires parents to have high knowledge and awareness of conditions that affect oral health, how to maintain the health and cleanliness of the child's oral cavity, healthy eating habits and appropriate behavior to maintain oral health. [4]

In this study, all children who were examined for dental caries risk were under 71 months old. Age selection is related to the overview of the incidence of early dental caries. Dental caries in children specifically, it is known globally as Early Childhood Caries (ECC). Early Childhood Caries (ECC) is defined as the presence of one or more decayed, missing, or filled primary teeth in children aged 71 months (5 years) or younger. Based on the Bangkok Declaration, it is defined as the discovery of one or more caries in the primary tooth, it can be in the form of early stage caries (non-cavitation lesions) or cavities have formed, the primary teeth are lost due to a history of caries and teeth cannot be restored or the surface of the primary teeth is patched in children under the age of six.[20] There have been many studies that show that the occurrence of ECC in pre-school children is related to various types of factors. These factors include age, socioeconomic status, good way to brush your teeth with parental supervision, fluoride exposure, duration of breast milk drinking or use of milk bottles, dietary habits, oral hygiene care at home, previous exposure to caries, active caries, the number of plaques, enamel defects and the composition of microorganisms in saliva/ *s.mutants.*[21]

In the results of the study, a strong relationship was found between the level of parental knowledge during pregnancy and the risk of dental caries in patients aged 3-5 years at RSGM-P Nala Husada, namely the higher the level of parental knowledge during pregnancy related to the lower risk of child caries in the future.

Caries Risk Assessment (CRA) is very important, especially in the 1000 days of a child's life, for the quality of hard tissue in the next life. The caries risk assessment forms that can be used in children are the Caries-Risk Assessment Tool (CAT), Caries Management By Risk Assessment (CAMBRA), American Dental Association (ADA) Caries-Risk Assessment, and Cariogram.[20] Caries risk assesment instrument with CAMBRA has been proven to be valid and reliable as a standard for diagnosing caries risk in children aged 0-5 years in Indonesia based on research by Amalia, et al. in 2018 [22]. Research on children aged 13-14 who have been calculated for caries risk using CAMBRA, proves that CAMBRA is proven to measure caries accurately in terms of sensitivity of 47.62% and specificity of 80%. [23]

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Risk factors for caries are variables that either directly contribute to its development (such as the presence of cariogenic microflora) or have been shown to correlate with its occurrence, for example, persistent poverty or limited health knowledge. Commonly identified risk factors include reduced salivary flow, visible dental plaque, frequent sugar intake, use of intraoral appliances, general health problems, sociodemographic conditions, limited access to dental care, and cariogenic microorganisms. Meanwhile, protective factors in the risk of caries are conditions that can reduce the occurrence of dental caries, for example, children consume fluoride drinking water, brush their teeth daily with fluoride toothpaste, receive topical fluoride application from health professionals regularly and visit the dentist for regular dental care.[24,25] Five disease indicators related to caries risk in early childhood can be assessed using the CAMBRA method. These indicators are dentin-limited caries lesions, restoration in the last three years, plaque count, salivary pH conditions, and the discovery of white lession as an early form of dental caries. [26]

Most pregnant women are not yet aware that poor oral hygiene during pregnancy will have an impact on them, on the baby that is being conceived and on the pregnancy process itself. Pregnant women's knowledge of the process of transmission of pathogens in the mouth, diet during pregnancy, and habits of maintaining oral hygiene are closely related to the etiology of the occurrence of dental caries in children and are the basis for the prevention of oral and dental diseases.[27] In newborns, the baby's oral cavity is in a sterile condition or only has a few bacteria due to the birth process. However, parental behaviors especially between mother and child that allow saliva exchange such as the use of shared cutlery or kissing the child on the mouth will contribute to the development of the oral cavity and oral microbiome during childhood.[28]

Streptococcus mutans is the main bacteria that causes human dental caries that has a fundamental role in the etiology of the disease. The process of transmission of dental caries can occur vertically when it is transferred from mother to child, for example, when sharing household utensils such as spoons and forks, giving a bottle of milk to the baby after it is put in the mother's mouth, or in general whenever there is a transfer of saliva from an adult to the child's mouth.[29] Mothers who have poor oral hygiene and a high number of karyogenic bacteria in the oral cavity will increase the risk of dental caries in their newborns, making children more susceptible to early childhood caries.[30] The oral cavity must be cleaned from birth to prevent bacterial colonization in the oral cavity from an early age and prevent the development of early childhood caries. the incidence of ECC and lower levels of *Streptococcus mutans* are obtained than in infants from mothers who receive oral health care since prenatal.[31]

Health protection for the mother and the unborn baby is an absolute thing during pregnancy, so pregnant women must comply with all rules during pregnancy, During this period, mothers can protect dental and oral health by carrying out preventive care as early as possible so that serious problems in the oral cavity can be prevented.[32] Pregnant women should be aware of dental problems that may arise during pregnancy. Optimal dental and oral health for the developing mother and baby in the womb can be achieved by increasing knowledge and effective preventive measures.[13] Structured education programs to parents regarding oral and dental health can greatly enhance their knowledge and facilitate the development of behaviors in maintaining better oral and dental health among children. Expanding this program to the entire community will have a significant impact on improving children's oral health in the long term.[33]

CONCLUSION

As the results of this study, a strong relationship was found between the level of

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parental knowledge during pregnancy and child's dental caries risk in patients aged 3-5 years at RSGM-P Nala Husada, namely the higher the level of parental knowledge during pregnancy related to the lower risk of child caries in the future. It is hoped that in the future the level of knowledge in pregnant women can be improved by providing education through various media and also direct education from dental health workers. With the increase in knowledge of pregnant women, it is hoped that it can intervene in factors that affect the calculation of the risk of child caries.

ACKNOWLEDGMENT

Many thanks to Hang Tuah University for financing this research. It is hoped that the results of this research will contribute to the community, especially the people of coastal areas and surrounding areas.

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Available at http://journal-denta.hangtuah.ac.id/index.php/jurnal/issue/view/27
DOI: https://doi.org/10.30649/denta.v19i2.7

Accredited No. 79/E/KPT/2023
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