Related Factors of Early Childhood Caries (ECC): A Literature Review

Ratna Dwi Handayani[1], Ulfah Utami[2]*

[1,2]Department of Dental Health Poltekkes Kemenkes Bandung

E-mail: ratnadwihandayani@gmail.com

Abstract **Background**: Childhood caries is a common global problem, affecting 50% of children under 12 years old. Early childhood caries is a condition where the tooth structure is damaged, impacting children's health and quality of life.
Objectives: The present study systematically reviewed a journal on factors affecting childhood caries (ECC) with bacteria, feeding bottle, diet, and frequency of toothbrushing.
Method : This study is a narrative literature review that analyses 15 study articles from various countries using a thematic approach. The selected articles include quantitative, qualitative, mixed-methods, and litelatur review studies published between 2016 and 2025. The analysis was conducted through thematic classification and narrative synthesis.
Results: The review identified four key themes contributing to the related factors of Early Childhood Caries (ECC) (1) microbiological; (2) diet and eating habits; (3) oral hygiene; and (4) socioeconomic and environmental.
Conclusion : These findings highlight interventions regarding the incidence Early Childhood Caries (ECC).

Keywords: Early Childhood Caries (ECC), microbiological factors, dietary and eating habits, oral hygiene, socioeconomic and environmental factors.

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BACKGROUND

As an important global public health issue, Early Childhood Caries (ECC) refers to a condition in which children up to 71 months of age have at least one decayed, missing, or filled tooth. The distribution of ECC is highly uneven across the world; its prevalence is much higher in vulnerable groups and low-income communities, highlighting a striking health disparity.[1]

The prevalence of Early Childhood Caries (ECC) in developing and developed countries reaches 70%. In Riyadh, Saudi Arabia, the prevalence of Early Childhood Caries (ECC) is 76% in children aged 36 to 71 months, and in Southeast Iran, the prevalence of Early Childhood Caries (ECC) is 56.6%. Countries in Southeast Asia report a prevalence of Early Childhood Caries (ECC) ranging from 25% to 95% among children aged 5–6 years.[3]

Differences in the prevalence of Early Childhood Caries (ECC) can be caused by several factors and do not stand alone independently, but are influenced by other factors such as socio-cultural and economic factors. Prevention strategies can be tailored regionally and take into account social determinants of health to achieve optimal effectiveness.3 Bacteria in the oral cavity, such as Streptococcus mutans, have the ability to ferment carbohydrates and produce acid, leading to enamel demineralization. Children who consume excessive amounts of sugar, particularly sucrose, will accelerate the process of enamel demineralization. [4]

Interventions must target several factors simultaneously, ranging from promoting good oral hygiene and changing dietary habits to improving access to early dental care and empowering parents. Ignoring the complex interrelationships between these factors and the underlying social determinants will only render prevention efforts less than optimal and perpetuate dental health inequalities among children.[5]

Based on the above, this research aims to identify and analyse the multidimensional factors that contribute to Early Childhood Caries (ECC) . The study integrates findings from various countries with factor clinicians and non clinis. The research problem is formulated as follows: “What are the factors Early Childhood Caries (ECC)?”

METHODS

This study is a literature review that aims to identify the multidimensional factors influencing positive childbirth experiences. The research design employed is a narrative literature review with a thematic approach, which enables the researcher to explore and synthesize findings from various relevant primary sources. Data for this study were obtained from journal articles previously selected by the author, comprising 21 articles that include the results of quantitative, qualitative, mixed-methods research, and literature review.

Data collection was conducted systematically by thoroughly reading each article, identifying the main variables, and assessing the methodological quality and relevance to the study’s objectives. Subsequently, the researcher extracted and categorized the data based on key themes such as Early Childhood Caries (ECC) and frekuensi feeding Bottle toddler.

The data were analysed using manual thematic analysis, which involved iterative reading of all study results, categorizing factors based on their recurrence in the literature, and comparing similarities and differences across studies. During the synthesis process, the findings were organized narratively to establish a logical flow that addresses the main research question: *What factors* Early Childhood Caries (ECC)*?* This method was selected because it

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allows for the integration of heterogeneous types of studies, thereby producing a more comprehensive understanding of the phenomenon under investigation

RESULTS

This study identified five major themes that shaped the positive experience of maternity mothers based on the results of the synthesis of 15 study articles analyzed, namely: (1) microbiological; (2) diet and eating habits; (3) oral hygiene; and (4) socioeconomic and environmental

1. Microbiological

Microorganisms that cause caries are crucial in the initiation and progression of Early Childhood Caries (ECC). Streptococcus mutans and Streptococcus sobrinus are the most common bacteria associated with Early Childhood Caries (ECC). 6 In addition to the main bacteria that cause caries, Lactobacilli also play a role in exacerbating tooth decay, although they are not the initial trigger of this disease. Certain non-mutans Streptococcus species with acidogenic and aciduric properties also influence the caries development process. [7]

Sugar metabolism and acid production in the oral cavity are influenced by Streptococcus mutans bacteria, which metabolize sugars contained in breast milk or formula. Through this fermentation process, bacteria produce acids and trigger enamel demineralization. Bacteria can be transmitted from mothers or caregivers to infants through the sharing of spoons or cups.[8]

2. Diet and Eating Habits

Diet and eating habits are one of the factors contributing to Early Childhood Caries (ECC). Children who snack more than three times a day are 135 times more likely to develop Early Childhood Caries (ECC).9 Inappropriate evening meals also contribute to a 40.05-fold increase in Early Childhood Caries (ECC). The duration of breastfeeding or bottle-feeding during the first two years of life also shows a significant association with the occurrence of Early Childhood Caries (ECC).[3] The frequency of tooth exposure to sugar increases the risk of Early Childhood Caries (ECC). Every time sugar enters the oral cavity, it breaks down into acid and requires time to neutralize the pH. [10] The more frequent the pH drop, the greater the demineralization of the enamel.[6]

3. Oral Hygiene

Poor oral hygiene is the main cause of ECC. Conversely, a proper toothbrushing routine is very important. Children who brush their teeth at least once or twice a day have a 96.7% lower risk of developing ECC compared to those who never brush their teeth. In fact, brushing teeth at night has proven to be highly effective, reducing the risk of ECC by up to 97.2% compared to not brushing at all.[11,12]

In addition, the role of those responsible for children's oral hygiene is very significant. Children who brush their teeth without assistance are 22.9 times more likely to suffer from ECC than children whose teeth are brushed entirely by their mothers. This underscores the importance of active involvement by caregivers and parents in children's oral hygiene, especially during the early years. Given that children have not yet developed the fine motor skills and understanding necessary to brush their teeth independently, parental involvement is a determining factor. Therefore, educating and empowering parents about effective oral hygiene practices is the most transformative intervention.[7,13]

4. Socioeconomic and Environmental

Access to dental services and the age of a child's first dental visit play a crucial role in the risk of ECC. Delays or lack of a first visit to the dentist significantly increase the likelihood of a child developing ECC.1 Conversely, an early first dental visit is highly effective in reducing the risk

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of ECC, with a decrease of up to 95.8%. This early visit is not only aimed at detecting caries at an early stage, but more importantly, it serves as an educational tool for parents regarding proper oral health guidelines. This is a crucial moment for implementing effective primary prevention interventions.[14]

DISCUSSION AND IMPLICATIONS

Early Childhood Caries (ECC) is a disease caused by many interacting factors that trigger and exacerbate the condition. This means that risk factors do not work independently, but rather reinforce each other and create a combined effect that worsens the risk of caries.[15]

A high-sugar diet (dietary factor) provides ample food for *Streptococcus mutans* bacteria (microbiological factor) to produce acid. This situation is exacerbated by poor oral hygiene (oral hygiene factor), which allows plaque buildup, compounded by reduced saliva production at night (environmental/physiological factor), which hinders acid clearance and tooth remineralization processes [16]

Socioeconomic factors, such as low parental education levels or poverty, often underlie problems that exacerbate all other categories of risk factors. Low socioeconomic status can limit families' access to accurate health information, affordable dental care, and healthy food choices. Families with financial constraints may more often choose inexpensive, high-sugar processed foods and may have difficulty purchasing fluoride toothpaste or visiting the dentist regularly [15,17]

The synergistic effect between these risk factors shows that addressing only one factor will not be effective in preventing ECC. The most successful prevention strategies must be comprehensive, targeting several factors simultaneously, and recognizing that socioeconomic factors are often the root cause that exacerbates other factors. Approaches that ignore the interrelationships between these factors are likely to result in suboptimal prevention efforts.[5]

CONCLUSION

This study identified that a factor Early Childhood Caries (ECC), the factor that includes (1) microbiological; (2) diet and eating habits; (3) oral hygiene; and (4) socioeconomic and environmental. All these factors are associated with the occurrence of Early Childhood Caries (ECC). Early Childhood Caries (ECC) is a highly complex, multifactorial disease with prevalence rates that vary extremely between regions and population groups. These differences indicate that ECC risk factors do not operate in isolation but are closely interrelated and significantly influenced by the local socio-cultural and economic context. The effectiveness of ECC prevention cannot be achieved by addressing a single factor alone but requires a comprehensive and integrated approach.

COMPETING INTERESTS

All authors had none to declare

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AUTHOR'S CONTRIBUTION

Ratna Dwi Handayani conceived of the presented idea, data collection and analysis, and wrote the manuscript; Ulfah Utami oversaw the presented idea and analysis; and drafted the manuscript. All authors contributed to the final manuscript.

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