ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2024; 10(3): 30-34

www.oraljournal.com
Received: 12-04-2024
Accepted: 18-05-2024

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The impact of oral health on 3-5 years old children's quality of life in Deli Serdang Regency

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DOI: https://doi.org/10.22271/oral.2024.v10.i3a.1981

Abstract
Dental and oral health are crucial for children, especially those aged 3-5 years, as this period marks the eruption of primary teeth and guides the development of permanent dentition. Poor dental and oral health can lead to functional limitations, discomfort, and pain, negatively impacting children's quality of life and potentially causing physical, psychological, or social issues. This study aimed to determine the impact of dental and oral health on the quality of life of children aged 3-5 years in Deli Serdang, Indonesia. This study was descriptive with cross-sectional design consisting 77 mothers who had children aged 3-5 years, with inclusion criteria were mothers whose children had dental and oral problems over the past three months. The Early Childhood Oral Health Impact Scale (ECOHIS) was used to assess the quality of life and categorized by the criteria of Oral Health Related Quality of Life (OHRQoL) and consist of six domains such as: child's symptoms, dental function, psychological, self-image or social interaction, parent's condition, and family function. The most frequently dental and oral health issue reported was tooth decay 80.5%. Analysis of OHRQoL data revealed that child's symptoms were the most significantly affected domain, with a prevalence of 70.1%. This shows that the impact of tooth, mouth, and jaw pain on children affects their quality of life, highlighting the importance of early intervention and preventive dental care strategies.

Keywords: Dental and oral health, quality of life, ECOHIS

Introduction
The dental and oral health of children is crucial because it can have significant long-term effects on teeth growth and development [1]. Early intervention is crucial as damage to primary teeth during childhood can impact subsequent dental health into adulthood. The ages of 3-5 years mark a golden period characterized by the full eruption of primary teeth, setting the stage for the transition to mixed dentition by age six. Primary teeth are essential to various aspects of facial growth and development, including chewing, speech, aesthetics, facial expression, and the proper eruption of permanent teeth. Compromised primary teeth, whether through damage or infection, can significantly affect facial structure and overall childhood growth and development [2]. Tooth pain, tooth decay, malocclusion, and Traumatic Dental Injury (TDI) are common dental and oral issues among preschool children [3]. According to the World Health Organization (WHO) 2022 report on dental and oral health, these problems affect approximately 3.5 billion people globally, with 3 out of 4 people affected residing in middle-income countries [4]. In Indonesia, data from the 2018 Riset Kesehatan Dasar (RISKESDAS) indicates that 20.9% of the population experiences oral health problems, with dental issues prevalent in 80.4% of 5-year-olds nationwide. In Sumatera Utara province specifically, 79.77% of children aged 5 have dental problems, while 25.1% of children in the same age group face oral health challenges [5, 6].
Globally, approximately 514 million children are affected by tooth decay in primary teeth [4]. According to the RISKESDAS 2018 survey, the prevalence of primary dental caries in Indonesia is 81.5% among children aged 3-4 years and 90.2% among children aged 5 years [7]. Dental caries, a common condition of the oral cavity, significantly impacts children's quality of Life.

It frequently results in severe pain, reduced appetite, difficulty in mastication, weight loss, sleep disturbances, behavioral changes, and disruptions in learning activities [8].

Untreated dental caries can lead to significant pain, adversely affecting a child's quality of life. This condition can disrupt sleep quality, interfere with daily activities, and hinder the maintenance of proper oral hygiene [9].

Dental and oral health have a complex relationship with general health [10]. Pathological changes in the oral cavity can adversely affect systemic health. Dental and oral diseases can lead to functional impairments, discomfort, and pain, resulting in physical, psychological, and social disabilities that significantly impact the sufferer's quality of life [11].

Parents, especially mothers, play a crucial role in teaching children's good habits for dental and oral health. Mothers who often spend more time with their children, particularly if they are at home, can effectively look after their children's dental care. When children have dental problems, mothers are especially concerned because it can affect their daily activities and overall quality of life [1].

Quality of life encompasses subjective health status, functional abilities, and health-related quality of life [12]. One significant measure of quality of life is Oral Health-Related Quality of Life (OHRQoL), widely utilized to assess oral health outcomes across various age groups, including children and adolescents. In children, OHRQoL evaluates how oral diseases affect daily activities for both the child and their family, considering physical, social, psychological, and financial aspects [13].

OHRQoL in children is assessed using specialized instruments such as the Early Childhood Oral Health Impact Scale (ECOHIS). Developed for children aged 3-5 years, ECOHIS comprises six domains: child's symptoms, dental function, psychological impacts, self-image and social interactions, parents' condition, and family function [14]. These domains are evaluated through questionnaires completed by parents or guardians, reflecting the impact of oral health on preschoolers' quality of life [15]. Child developmental psychology literature stated that children under 5 years often have difficulty accurately recalling daily or unique events beyond a 24-hour timeframe [14]. Dental and oral issues typically manifest within a 3-month period, corresponding with standard dental examination intervals of 3-6 months [17]. ECOHIS effectively identifies the adverse effects of oral health problems on a child's quality of life [18].

Research conducted by Elfarisi *et al*. found that dental and oral health significantly impacts the quality of life of 4-5-year-old children in Cilayung Village, with 34.03% reporting a significant impact on child symptoms [10].

Based on the information given, dental and oral health greatly affect children's quality of life. This study aims to explore how dental and oral health influence the quality of life of children at Andreas and Ummul Mu'in kindergartens in Deli Serdang, using the ECOHIS domains according to OHRQoL criteria.

Methods

This study was a descriptive study with a cross-sectional design. The study population consisted of mothers with children enrolled in two private kindergartens: Andreas and Ummul Mu'in, located in Deli Serdang Regency, Province of Sumatera Utara. According to school profile data, there were 50 children enrolled in the Andreas kindergarten and 82 children enrolled in the Ummul Mu'in kindergarten.

A sample of 77 people was obtained using the non-probability sampling method purposive sampling based on the inclusion criteria of a mother whose child has had dental and oral problems in the last three months.

This study utilized the Early Childhood Oral Health Impact Scale (ECOHIS), which has been tested for validity and reliability in assessing the impact of dental and oral health on the quality of life of children aged 3-5 years. The ECOHIS questionnaire consists of 13 closed questions structured into two parts: child's impact and family's impact. The child's impact section has four domains: child's symptoms, dental function, psychological well-being, and self-image/social interaction. The family's impact section includes two domains: parent's condition and family function. Responses to ECOHIS questions are categorized into two options: 'very rarely' and 'never,' which receive a score of 0, while 'occasionally,' 'often,' and 'very often' receive a score of 1 [14].

The final score of ECOHIS is obtained from $\frac{\text{sum of scores ever}}{\text{total respondents}} \times 100\%$. Final scores are categorized based on Oral Health-Related Quality of Life (OHRQoL) criteria: less impactful (0-33.3%), quite impactful (33.4-66.6%), and very impactful (66.7-100%) [10].

Data analysis was performed using IBM SPSS software. Univariate data presentation includes frequency distributions of dental and oral problems, associations between oral health frequencies and children's quality of life using ECOHIS, and scores indicating the impact of dental and oral health on child quality of life across ECOHIS domains according to OHRQoL criteria.

Results

A study conducted on 77 respondents revealed that the majority of mothers were aged 31-35 years (35.1%), most were housewives (59.7%), and 27.3% were college graduates, as shown in Table 1.

Table 1: The distribution of respondent characteristics (N=77)

Respondents characteristic	Frequency	Percentage
Mother's age		
≤ 25 years old	1	1.3
26-30 years old	20	26
31-35 years old	27	35.1
36-40 years old	21	27.3
41-45 years old	6	7.8
46-50 years old	2	2.6
Mother's occupation		
Housewife	46	59.7
Private sector employee	7	9.1
BUMN employees	1	1.3
Self-employed	12	15.6
Teacher/lecturer	5	6.5
Midwife/nurse/doctor	5	6.5
Pastor/religious expert	1	1.3
Mother's last education		
Elementary School	2	2.6
Junior High School	7	9.1
Senior High School	47	61
College	21	27.3

The most common dental problem in children is cavities (cavity in one or more teeth with a dark brown or black color) affecting 80.5% as shown in Table 2.

Table 2: Distribution of children's dental and oral problems

Children's dental and oral problems	Frequency	Percentage
Toothache (Pain originating from the teeth)	49	63.6
Cavities (There are holes in one or more teeth with a blackish brown color)	62	80.5
Gum problems (Swollen gums or bleeding gums)	14	18.2
Loosening of milk teeth due to impact or other accidents	8	10.4
Problems with tooth position (Misaligned tooth position)	9	11.7

Table 3 illustrates the distribution of dental and oral health frequencies as assessed by ECOHIS questionnaires against children's quality of life. Within the child's symptom domain, 70.1% of children reported experiencing tooth, mouth, or jaw pain. In the child's dental function domain, 51.9% encountered difficulties eating certain foods. Regarding psychological aspects, 40.3% of children experienced trouble sleeping. In terms of self-image and social interactions, 29.9% of children refrained from smiling or laughing in front of others. Within the parent's domain, 44.2% expressed feelings of guilt, while in the family function domain, 20.8% indicated financial impacts due to their child's dental issues or treatment.

Table 3: Frequency distribution of dental and oral problems on children's quality of life using the ECOHIS questionnaire

ECOHIS Domains	Never		Once	
	Frequency	Percentage	Frequency	Percentage
Child's Symptoms				
Pain in the teeth, mouth and jaw	23	29.9	54	70.1
Child's Dental Function				
Difficulty in drinking hot or cold drinks due to dental and oral problems or after receiving dental treatment	48	62.3	29	37.7
Difficulty in eating certain types of food due to dental and oral problems or after receiving dental treatment	37	48.1	40	51.9
Difficulty in speaking due to dental and oral problems or after receiving dental treatment	62	80.5	15	19.5
Missing school because of dental and oral problems or after receiving dental treatment	55	71.4	22	28.6
Child's Psychology				
Difficulty in sleeping due to dental and oral problems or after receiving dental treatment	46	59.7	31	40.3
Irritability or frustration due to dental and oral problems or after receiving dental treatment	60	77.9	17	22.1
Child's Self-Image and Social Interaction				
Refusing to smile or laugh in front of other children because of dental and oral problems or after receiving dental treatment	54	70.1	23	29.9
Refusing to talk to other children because of dental and oral problems or after receiving dental treatment	55	71.4	22	28.6
Parent's Condition				
Feeling annoyed because of child's dental and oral problems or after the child has received dental treatment	54	70.1	23	29.9
Feeling guilty because of child's dental and oral problems or after the child has received dental treatment	43	55.8	34	44.2
Family Functions				
Have you ever taken time off from work because of your child's dental and oral problem or after your child received dental treatment?	67	87	10	13
Dental problems or children's dental treatment have an impact on the family's financial situation	61	79.2	16	20.8

In Table 4, 71.4% of respondents who reported toothache occasionally experienced symptoms of pain in the teeth, mouth, and jaw, while 59.7% of those with cavities reported similar symptoms.

Table 4: Frequency distribution of dental and oral problems on child's quality of life using the ECOHIS questionnaire

Dental and Oral Problems	n	ECOHIS domains of child's symptoms (Pain in the teeth, mouth and jaw)									
		Never				Ever					
		Never		Very rarely		Occasionally		Often		Very often	
		n	%	n	%	n	%	n	%	n	%
Toothache	49	0	0	5	10.2	35	71.4	9	18.4	0	0
Cavity	62	7	11.3	7	11.3	37	59.7	11	17.7	0	0
Gum problems	14	2	14.3	3	21.4	6	42.9	3	21.4	0	0
Loose teeth	8	3	37.5	1	12.5	2	25	2	25	0	0
Tooth position abnormalities	9	1	11.1	1	11.1	5	55.6	2	22.2	0	0

According to OHRQoL criteria, the child's symptoms domain significantly impacts the child's quality of life, accounting for 70.1%. The child's dental function domain and the parent's condition domain are considered to have a moderate impact, while the remaining three domains have a lesser impact on children's quality of life, as indicated in Table 5.

Table 5: The impact score of dental and oral health on children's quality of life across ECOHIS domains, based on OHRQoL criteria.

ECOHIS Domains	Score	Percentage	Category Impact on Children's Dental and Oral Health
Child's symptoms	54	70.1	Very impactful
Child's dental function	106	34.4	Quite impactful
Child's psychology	48	31.2	Less impactful
Child's self-image and social interaction	45	29,22	Less impactful
Parent's condition	57	37.01	Quite impactful
Family functions	26	16.89	Less impactful

Discussions

Cavities are the most prevalent dental issue among children, affecting 80.5%, followed by toothache at 63.6% (Table 2). These findings align with Elfarisi *et al.*'s study in Cilayung Village, where 84% of children had cavities and 78% experienced toothache. This correlation likely stems from the study's focus on preschool children who are particularly susceptible to cavities. If left untreated, cavities can worsen over time, impacting the child's quality of life due to associated pain and discomfort. The primary contributing factor to poor oral hygiene is inadequate dental care and maintenance [17, 18]

According to the child's symptoms domain (Table 3), 70.1% of children reported experiencing tooth, mouth, and jaw pain. This percentage is higher compared to Mendoza's study on preschool children aged 3-5 years, which found that 47.5% suffered from dental, oral, and jaw diseases [18]. Toothache caused by deep cavities can lead to discomfort in the teeth, mouth, and jaw, significantly affecting the child's quality of life [10]. These findings are consistent with the frequency distribution of dental and oral problems observed over the past three months, with cavities affecting 80.5% and toothache affecting 63.6% of children (Table 2).

In the child's dental function domain (Table 3), 51.9% of children encountered difficulties eating certain types of food, while 37.7% experienced challenges drinking hot or cold beverages due to dental issues or following dental treatment. These difficulties are commonly observed in 3-5-year-old children with deep and extensive carious lesions, which can cause pain triggered by stimuli like sweet foods or hard textures. Sensitivity to hot and cold drinks may result from stimulation of C-fiber nociceptors, with hot stimuli causing persistent dull pain and cold stimuli causing brief sharp pain. Children with cavities or dentin hypersensitivity may experience heightened pain intensity, exacerbating their discomfort [19, 20].

According to the child's dental function domain (Table 3), 28.6% of children missed school due to dental issues or after dental treatment. This absence is often due to the pain caused by dental problems, which can disrupt learning and affect school attendance [19].

Additionally, 19.5% of children in the same domain experienced difficulty speaking because of dental issues or after dental treatment (Table 3). This difficulty may result from cavities, which can lead to tooth loss affecting the clarity of speech, especially certain sounds or letters. [19] Swollen gums can also contribute to speaking difficulties, consistent with the findings showing 18.2% of children experiencing gum problems (Table 2).

In the child's psychological domain (Table 3), 40.3% of children had trouble sleeping due to dental issues or after dental treatment. This discomfort is often caused by pressure on infected teeth, which worsens when lying down [19]. Additionally, within the same psychological domain, 22.1% of children reported feelings of anger or frustration stemming from dental problems or following dental interventions (Table 3). Such emotional responses may result from intense pain episodes that trigger sudden changes in mood, manifesting as anger or frustration [21].

In the child's self-image and social interaction domain (Table 3), 29.9% of children refrained from smiling or laughing in front of peers due to dental concerns or after dental procedures. This behavior may reflect developmental challenges in preschool-aged children, impacting their social interactions by affecting their willingness to engage socially through smiling or laughing [22]. Moreover, 28.6% of children in this domain avoided talking to other children due to dental problems or after dental treatment. This could be because young children prioritize playing and communicating with friends over concerns about how they look [23].

In the parent's condition domain (Table 3), 44.2% of mothers or other family members felt guilty because of their child's dental problems or after their child received dental treatment. This guilt may arise due to the high prevalence of cavities and toothaches reported in this study, placing responsibility on parents despite their feelings of guilt [24].

Similarly, in the parent's condition domain (Table 3), 29.9% of mothers or other family members experienced anxiety due to their child's dental issues or after dental treatment. This anxiety could be attributed to the frequent occurrence of tooth pain, reported at 63.6% (Table 2), and the significant number of children experiencing pain in their teeth, mouth, and jaw (70.1% in the child's symptoms domain, Table 3). Toothaches often lead children to express discomfort, causing psychological stress and concern for parents [18].

In the family function domain (Table 3), 20.8% of families reported that their child's dental and oral problems had impacted their financial situation. This could be attributed to the parents' decision not to seek dental treatment immediately, possibly because the children's activities were not significantly affected. Financial impacts typically arise from the costs associated with dental treatments [25].

Similarly, within the family function domain (Table 3), 13% of mothers or family members took time off from work due to their child's dental issues or post-dental treatment. This percentage may reflect the study's demographic composition, where many respondents were housewives who did not need to take leave from work due to dental or oral problems (Table 1). According to the study, 71.4% of children experiencing toothaches sometimes exhibit symptoms of pain in their teeth, mouth, and jaw, while 59.7% of those with cavities also report similar symptoms (Table 4). This is often a result of untreated cavities, which cause tooth pain in children, especially when the cavities progress to the point of affecting the tooth pulp [17].

According to OHRQoL, the child's symptoms are categorized as severely affecting the quality of life of children, with a percentage of 70.1% (Table 5). This finding aligns with the frequency distribution of dental and oral problems reported by parents, where cavities and toothaches were prevalent in the last three months (Table 2). The presence of tooth, mouth, and jaw pain can hinder daily activities, thereby reducing a child's

quality of life.[17] Toothache symptoms typically result from untreated severe caries lesions, impacting daily activities and consequently reducing children's quality of life [10].

Conclusion

Children aged 3-5 years in Deli Serdang Regency who have experienced pain in their teeth, mouth, and jaw are impacted in their quality of life.

Conflict of Interest: Not available

Financial Support: Not available

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How to Cite This Article
Natassa SE, Yanti GN, Moganadass K, Friska CM, Silaban FY, Hutajulu NA. The impact of oral health on 3-5 years old children's quality of life in Deli Serdang Regency. International Journal of Applied Dental Sciences 2024;10(3):30-34.