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THE RELATIONSHIP BETWEEN DENTAL CARIES STATUS AND QUALITY OF LIFE IN STUDENTS OF MUHAMMADIYAH 3 SEMARANG HIGH SCHOOL

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ABSTRACT

Background : Dental caries is a prevalent oral health issue among adolescents, affecting not only their oral health but also their overall quality of life. Investigating the relationship between dental caries and quality of life is crucial because dental caries can impact various aspects of adolescents' lives, including nutrition, sleep, aesthetics, and education, thereby highlighting the need for comprehensive understanding and intervention strategies to improve adolescent health outcomes. **Method:** This analytical observational study utilized a cross-sectional design involving 337 students from SMP Muhammadiyah 3 Semarang, with a sample of 183 selected through stratified random sampling. Inclusion criteria included students aged 12-14 years who provided informed consent, while exclusion criteria involved those absent or incomplete in the questionnaire. Ethical clearance was obtained, and data collection occurred on February 21, 2024, using the DMFT index for dental caries and a validated quality of life questionnaire. Data analysis included the Kolmogorov-Smirnov test for normality and the Spearman Rank test to assess relationships between variables. **Result :** There is a statistically significant relationship between dental caries status and quality of life in students with p value of 0.014 (<0.05). **Conclusion :** The findings of this study indicate a significant relationship between dental caries and the quality of life among adolescents aged 12-14 years. Addressing dental caries is essential for improving overall well-being and quality of life in this population.

Keywords: adolescents health, CPQ11-14, dental caries, quality of life

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INTRODUCTION

World Health Organization (WHO) 2022, said that quality of life is a person's perception of their position in life according to their culture, goals, standard expectations, and priorities. Quality of life is subjective and cannot be observed by others and is based on a person's understanding of various aspects of life, Health is one of the important domains of quality of life ¹. In addition, there are other domains such as work, school, environment which are key domains of quality of life. Therefore, the quality of life of each individual is influenced by their conditional characteristics and social, cultural, and environmental status ^{2,3}.

Health quality of life is multidimensional consisting of five dimensions, namely physical well-being, psychological, parental relationships and independence, social support and peers and school environment. Indonesia's score is relatively low compared to other countries, namely 1.8 on a scale of 10. The lowest indicator is in the health system with a score of 0.1. Health-related quality of life in adolescents can be seen from physical well-being, psychological well-being, mood and emotions, peers and social support, parental relationships and independence, school environment, social acceptance, and financial resources ^{4,5}.

Adolescence is an important stage in human life because it is a transition period from childhood to adulthood. Rapid physical, psychological, mental and psychosocial changes occur that have an impact on various aspects of life, adolescents prefer to socialize more with their peers so that it affects the psychological development of adolescents. During growth and development, various problems are often experienced, one of which is health problems, specifically experiencing tooth decay and even gum disease or having healthy teeth ^{4,6}. Oral Health Organization (WHO) 2013, 60-90% of elementary school children experience caries. As young people get older, this number will continue to increase, adolescent development is fulfilled so as not to cause problems in the future that will interfere with adolescent growth and development ⁷.

Dental caries with a prevalence of 73.4% in Indonesian children aged 10 to 14 years is the most common dental problem ^{8,9}. Untreated dentin caries has a negative impact on the quality of life of children and adolescents. Dental caries in children is characterized by teeth that are sensitive to hot, cold and sweet. Reason Dental caries

is caused by demineralization of enamel and dentin, Causes of oral hygiene caries, dental plaque, tooth structure, cariogenic consumption habits. Caries will occur if there are supporting factors, namely host, microorganisms, substrate and time ¹⁰. In teeth affected by caries, pain can appear spontaneously, even though there is no stimulation. The pain can last for days or even persist if not treated immediately ^{10,11}. Caries can cause pain that has an impact on chewing disorders so that nutritional intake will be reduced affecting the growth and development of children, difficulty sleeping, aesthetic problems and affecting education and will interfere with chewing function and speech function is also disturbed. ^{12,13} Therefore, this study aims to investigate the relationship between dental caries and quality of life among students at Muhammadiyah 3 Middle School in Semarang.

MATERIALS AND METHODS

This study is an analytical observational study. The approach or research design used is *a cross-sectional study*. The population in this study were 337 students of SMP Muhammadiyah 3 Semarang, with a total sample of 183 students. The sampling technique used was *Stratified random sampling*. The inclusion criteria used included being 12-14 years old and students who were willing to be respondents in the study by filling in *informed consent*. The exclusion criteria used were students who were not present when the study was taking place and did not fill out the questionnaire completely. This study was conducted on February 21, 2024.

This study was conducted after obtaining permission (*ethical clearance*) from the ethics committee of the Faculty of Nursing with the number 076/KE/01/2024. Then ask for permission to conduct research from the principal of SMP Muhammadiyah 3 Semarang. Provide *informed consent* to parents regarding the research to be conducted at SMP Muhammadiyah 3 Semarang 1 day before the research was conducted. The data collection instruments used were the DMFT (*Decayed, Missing, and Filled Teeth*) index. In this study, a structured questionnaire was utilized to assess the quality of life of adolescents, specifically focusing on the impact of dental caries. The questionnaire was adapted from a previous study titled "Description of Dental Malocclusion on the Quality of Life of Adolescents Aged 12-14 Years at SMP Negeri 29 Semarang" by Kusumandari et al. (2022). This adaptation ensured that the instrument was relevant to the context of our research while maintaining the integrity of the original tool. The questionnaire underwent a validation process where it was reviewed by experts in the fields of dentistry and public health. Their feedback was incorporated to refine the questions, ensuring that they accurately measured the intended constructs related to dental health and quality of life. The internal consistency of the questionnaire was assessed using Cronbach's alpha, which yielded a coefficient of 0.85, indicating good reliability.

All students who have met the inclusion and exclusion criteria are gathered in each class and then given an explanation of the research procedure and how to fill out the questionnaire, distribution of questionnaires and dental caries examination sheets. After completing the quality of life questionnaire, the students are then examined for dental caries using the index DMFT (*Decayed, Missing, and Filled Teeth*) . The collected data was then analyzed. The *Kolmogorov-Smirnov test* was used to test normality and obtained abnormal dental caries variables. So to determine the relationship between the independent variable and the dependent variable using the Spearman Rank test .

RESULTS

In this study, the total sample used was 183 students.

Table 1. Distribution of Respondent Characteristics at SMP Muhammadiyah 3 Semarang on February 21 (n = 183)

Respondent Distribution	Frequency	Percentage (%)
Class		
Grade 7	51	27.9%
Grade 8	51	27.9%
Grade 9	81	44.3%
Gender		
Man	103	56.3%
Woman	80	43.7%
Age		
12 years old	11	6.0%
13 years old	61	33.3%
14 years	111	60.7%
Total	183	100%

Based on table 1, it is known that the most respondents were in class 9 with a total of 81 people (44.3%), while the most respondents were male with a total of 103 people (56.3%) and the most respondents were 14 years old with a total of 111 people (60.7%).

Table 2. Distribution of Caries Incidence Rate at Muhammadiyah 3 Junior High School Semarang on February 21 (n = 183)

Caries Occurrence	Frequency	Percentage (%)
Very Low	79	43.2
Low	29	15.8
Currently	38	20.8
Tall	37	20.2
Total	183	100

Based on Table 2, it is known that the highest incidence of caries was very low, amounting to 79 people (43.2%).

Table 3. Distribution of DMFT at SMP Muhammadiyah 3 Semarang on February 21 (n = 183)

No	DMFT	Frequency	Percentage (%)
Decay			
1.	0	47	25.7%
2.	1	33	18.0%
3.	2	33	18.0%
4.	3	15	8.2%
5.	4	20	10.9%
6.	5	12	6.6%
7.	6	7	3.8%
8.	7	8	4.4%
9.	8	7	3.8%
10.	9	1	0.5%
Missing			
1.	0	177	96.7%
2.	1	6	3.3%
Filled			
1.	0	175	95.6%
2.	1	8	4.4%
Total		183	100%

Based on Table 3, it is known that there were 47 respondents (25.7%) who had 0 *decay*, while there were 177 people (96.7%) who had 0 *missing teeth* and 177 respondents (95.6%) who had 0 *filled teeth*.

Table 4. Distribution of Quality of Life at Muhammadiyah 3 Middle School Semarang on February 21 (n = 183)

Quality of Life	Frequency	Percentage (%)
Good quality of life	121	66.1%
Quality of life is moderate	61	33.3%
Poor quality of life	1	5%
Total	183	100%

Based on Table 4.4, it is known that the majority of respondents have a good quality of life, namely 121 people (66.1%). There is a statistically significant relationship between dental caries status and quality of life in students of Muhammadiyah 3 Middle School, Semarang with a *p value* of 0.014 (<0.05).

DISCUSSION

This study has an age range of 11-14 years, shown in table 1 shows that the sample is mostly 14 years old. Adolescence is important for the formation of positive oral hygiene habits that will be emulated in adulthood. This is also the time when children begin to show defiant behavior towards parents and teachers. Dental caries is an age-related disease that involves about 60-90% of school children¹⁴.

Caries is the result of several interrelated factors such as cultural, social, and political factors, which in turn influence individual behavior and commitment to taking preventive oral hygiene measures. Dental caries is a multifactorial disease that has a high prevalence, especially for children. Caries itself is assessed by conducting dental and oral examinations using the caries index.¹⁷ Dental caries research has increased attention to critical life stages such as adolescence because caries development increases at this stage. In addition, during adolescence good oral hygiene, proper diet and regular dental check-up behavior should be enforced¹⁵.

The results of the examination in this study showed that the incidence of caries at SMP Muhammadiyah 3 Semarang had a very low caries incidence, as much as 43.2%. Based on the confession of the principal of SMP Muhammadiyah 3 Semarang, he said that there was a visit every 6 months for routine examinations related to dental and oral health by the health center. This is in line with research conducted by Su *et al.*, 2024, which stated that the oral health of adolescents aged 12 to 15 years in China showed a very low prevalence of oral diseases/conditions, such as probe bleeding, dental calculus and dental caries. Increasing age, diet, maternal

educational background lower than university, rarely brushing teeth, not having a habit of using dental floss, and high frequency of sugar consumption are factors that significantly increase the risk of dental and oral diseases/problems¹⁵.

Untreated cavities, especially those associated with pain, can affect a child's physical and psychological development, as well as their performance in school and everyday life. The FDI *World Dental Federation* states that oral health has many aspects and includes the ability to speak, smile, smell, taste, touch, chew, swallow, and express emotions through facial expressions with confidence and without pain, discomfort, and craniofacial disease. A definition that describes physiological, social, and psychological characteristics that are important for quality of life. Oral disorders have a negative impact on the functional, social, and psychological well-being of children and their families¹⁷.

The CPQ₁₁₋₁₄ score indicates well-being related to oral, functional, emotional and social problems that can evaluate the quality of life related to dental and oral health. Based on this study according to table 4, the quality of life status (CPQ₁₁₋₁₄) in 183 students shows that the largest category of quality of life is good quality of life. The results of this study are in line with research conducted by Amran, Lisfrizal & Ningrum, 2023 which was conducted on 97 patients showing that the quality of life value is included in the low quality of life category. The difference in the results of this quality of life study depends on the prospects and experiences of the subjects, which differ according to socioeconomic, social, demographic, psychological and other cultural factors. Individuals with poor dental and oral health and low levels of expectation are known to not consider themselves to have a low level of quality of life and declare themselves satisfied. However, on the contrary, individuals who have good dental and oral health and high expectations may have a high level of quality of life, even with minor oral problems that indicate dissatisfaction. Maintaining dental and oral health is very important because dental and oral health are integral parts of body health that are interrelated with general health in our bodies²¹. According to Piaget, adolescent cognitive development into the formal operational stage is when thinking becomes more rational. At this stage, adolescents begin to develop abstract thinking, hypotheses and are able to see various possibilities in solving problems faced and begin to think about other people's views of themselves¹⁹.

This study resulted in a relationship between dental caries and quality of life with a significance value of 0.014, which means the *p-value* <0.05. This is in line with research conducted by Nurwati, Setijanto and Budi, 2019, which showed that the lower the dental caries index, the higher the quality of life of school children. Research by Pakkhesal *et al.* in 2021 stated that the dental and oral health status of Gorgan preschool children affected the quality of life of them and their parents. The quality of life score increased along with the increase in the dmft index in children, indicating a significant relationship between dmft and the quality of life score. Dental caries is a multifactorial chronic condition that takes time to develop and be detected clinically. Dental caries is one of the most common diseases in children and adults which is a serious public health problem²¹. This caries problem is also influenced by community behavior and requires appropriate promotion methods in order to increase the quality of life.^{17,26}

In conclusion, this study highlights the significant relationship between dental caries and the quality of life among adolescents at SMP Muhammadiyah 3 Semarang and emphasizes the importance of effective oral health initiatives. The findings suggest that a majority of respondents exhibited very low caries incidence and reported a good quality of life, which underscores the need for continued health education and regular dental check-ups to maintain and improve oral health outcomes. Overall, this research contributes to a deeper understanding of the impact of dental health on adolescent well-being and provides a foundation for future studies aimed at enhancing preventive measures and promoting better quality of life in this population.

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