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Research Article

The Correlation of Caries Risk Assessment with Oral Hygiene Index and Parent's Education Level in Pesantren Mizanul Ulum Sanrobone

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Abstract

Attention must be given to the boarding school students' oral health status. There is a considerable probability that boarding school students' oral cavities are going to suffer a variety of problems, particularly when they live and stay away from their parent's supervision. Caries risk assessment is used to predict and prevent the development of caries. This study aims to determine the correlation between caries risk assessment with oral hygiene status and parents' education level in Pesantren Mizanul Ulum Sanrobone. Dental examinations and interviews were conducted on 61 students using the Caries Risk Assessment (CRA) form and Oral Hygiene Index Simplified (OHI-S). The correlation between caries risk assessment and oral hygiene status and the education level of students' parents was assessed using the Spearman test. According to the statistical analysis findings, there was a 0.312 correlation coefficient (r) between the CRA and the OHI-S. Meanwhile, the parents of the students have an education level of -0.198. These results showed a correlation between caries risk assessment and oral hygiene status (OHI-S), and no correlation with the education level of students' parents. According to these findings, students are more likely to get cavities if their oral hygiene is poor.

Keywords: correlation; caries risk assessment; oral hygiene; education level of parents; boarding school

INTRODUCTION

Dental caries is a chronic disease that begins to impair a child's dentition in the earliest years of life.[1] Untreated caries can result in significant pain and discomfort, infection, sepsis, and tooth loss if it spreads to the dental pulp. It can even exacerbate or even lead to systemic disorders.[2] According to the Global Burden of Disease (GBD) 2017 report, out of 328 diseases, dental caries in permanent teeth is the most common, affecting around 2.3 billion people globally.[3]

To avoid disease, dental professionals can use a validated assessment strategy, such as the caries risk assessment methodologies, to execute a systematic and evidence-based plan to monitor changes in the caries risk status of patients.[4] Caries prevention strategies must be implemented based on knowledge and comprehension of the anticipated risk. The risk model determines the risk variables that contribute to caries but cannot accurately predict how the disease will progress. The disease process is complicated. Therefore, risk models counting more variables produce better forecasts.[5]

Caries risk assessment is used to motivate patients to take action that will move them from a high or moderate risk of caries category to a low risk of caries category. As a result, risk assessment can help you allocate your time and money for oral health programs more effectively by

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removing a lot of pointless interventions, such as professional topical fluoridation of children at low risk of caries. Additionally, caries risk assessment has the ability to encourage caries prevention at the primary level, that is, prior to the onset of the disease process.[6]

According to the American Academy of Paediatric Dentistry (AAPD), care pathways—also known as caries risk assessment and management protocols—are essential to the current clinical care provided to infants, kids, and teenagers. These procedures can assist medical professionals in making treatment choices based on a child's age, carrier's risk, and level of patient compliance. The Council on Clinical Affairs created the document, which was adopted in 2022 and last updated in 2019.[7]

Numerous factors can affect the development of caries. Typically divided into direct factors (oral hygiene behaviours, history of fluoridation, diet, genetics) and indirect factors (race, parental education, access to dental clinics and health centres, socioeconomic level).[8,9] Oral hygiene and the occurrence of caries are tightly associated, as we already know. According to the oral hygiene theory, biofilms on tooth surfaces are likely to begin producing acids when dietary carbohydrates are present. These acids cause the enamel to demineralize, eventually making it possible for cariogenic bacteria to infect the dentin and pulp. According to this theory, dental caries can be avoided by manually removing the biofilm from tooth surfaces using toothbrushes or other interproximal cleaning tools.[10]

Students who attend boarding schools need additional attention paid to their oral health. Boarding students live away from their parents' daily supervision at home. Without assistance from their family, they must handle all their daily tasks independently. Despite routine follow-up, the prevalence and severity of dental caries at Turkish boarding schools were high.[11] Therefore, this research is deemed necessary to determine the level of caries risk in Islamic boarding school students in Pesantren Mizanul Ulum Sanrobone and assess the relationship between the oral hygiene status and the education level of the student's parents.

MATERIALS AND METHODS

This observational research was conducted in Pesantren Mizanul Ulum Sanrobone, Takalar Regency, South Sulawesi Province. The research sample was taken using a total sample technique from all the students of Madrasah Tsanawiyah and Madrasah Aliyah of Pesantren Mizanul Ulum Sanrobone. In this study, we obtained a total sample of 61 students. This study was conducted after the approval of the Health Research Ethic Commission Faculty of Dentistry and Hasanuddin Dental Hospital (UH17120904). Written informed concern was obtained from each of the participants prior to their participation in this study. The authors declare that they have no competing interests.

We collected students' data regarding their age (years), gender (male/female), parents' employment, and education level (elementary school, junior high school, high school, or university). In addition, we did a dental examination and interviewed each student to receive information about Caries Risk Assessment (CRA) and to assess the Oral Hygiene Index (OHI-S). The OHI-S score for an individual comprises two components: the debris index-simplified and the calculus index-simplified. These two components are each independently calculated and added. The OHI-S scores range from good (0–1.2), fair (1.3–3.0), and bad (3.1–6.0).[12] We utilized the Indonesian CRA form based on the American Academy of Pediatric Dentistry (AAPD). This form contains 13 questions, divided into three group factors: biological factors, protective factors, and clinical findings. Each student was categorized into low, moderate, and high caries risk.

Descriptive statistics were used to analyze the participant characteristics with percentages according to the variables and the distribution. The Shapiro-Wilk test was used to determine the normality to confirm data distribution. Spearman's rank correlation coefficients were used to evaluate the correlation between variables. Correlation coefficient interpretations were between 0.00 and 0.10 = negligible correlation; between 0.10 and 0.39 = weak correlation; between 0.40 and 0.69 = moderate correlation; between 0.70 and 0.89 = strong correlation; between 0.90 and 1.00 = very strong correlation. SPSS (version 27; SPSS Japan Inc., Tokyo, Japan) was used for the statistical analysis.

RESULT

A description of the characteristics of all students who were respondents in this study is presented in Table 1. This table shows that the number of male students dominates, namely 49 students (80.3%) compared to female students who are 12 (19.7%). In the age category, there is a different age range between 12 and 18 years, where the largest number of students aged 16 is 21 people (34.4%). Meanwhile, there were only 2 students aged 12 and 18 (3.3%). In Table 1, it is shown that the education level of students' parents varies from elementary school to university. A total of 6 parents of students only completed elementary school (9.8%), and as many as 14 people completed junior high school (23%). High school is the highest level of education held by parents of students, namely 32 people (52.5%), while only 9 parents of students have completed the university level (14.8%).

Furthermore, Table 2 describes the Caries Risk Assessment, which is divided into three categories: low, moderate, and high. Students with a high risk of caries reached 70.5% of the total number of students in this study (43 students), while students with a low risk of caries were 18 students (29.5%). The Oral Hygiene Index was divided into three categories: Good, Average, and Poor. Meanwhile, each category has a total of 29 (47.5%), 20 (32.8%), and 12 students (19.7%), respectively. This assessment used the debris index (DI) and also the calculus index (CI). The Oral Health Index-Simplified (OHIS) score was the sum of the DI and CI scores.

Table 1. Description of age, gender, and parent's education level (n= 61)

	Number of students	Percentage (%)
Gender		
Male	49	80.3
Female	12	19.7
Age (years)		
12	2	3.3
13	10	16.4
14	12	19.7
15	10	16.4
16	21	34.4
17	4	6.6
18	2	3.3
Parents' Education Level		
Elementary school	6	9.8
Junior High school	14	23
High school	32	52.5
University	9	14.8

Table 3 shows the correlation between CRA and the OHI-S and the parents' education level of Pesantren Mizanul Ulum Sanrobone students. The table above shows a significant relationship between CRA and OHI-S with a significant difference value of 0.014 ($p<0.05$) with a correlation coefficient of 0.312. Different results were shown between CRA and the education level of students' parents. Based on the table above, it can be seen that there is no relationship between these two variables, with no significant difference value of 0.126 ($p>0.05$) and a correlation coefficient value of -0.198.

Table 2. Description of Caries Risk Assessment (CRA) and Oral Hygiene Index-Simplified (OHI-S) (n= 61)

	Number of students	Percentage (%)
CRA		
Low	18	29.5
Moderate	0	0
High	43	70.5
OHI-S		
Good	29	47.5
Average	20	32.8
Poor	12	19.7

Table 3. Spearman's rank correlation between Caries Risk Assessment (CRA) with Oral Hygiene Index-Simplified (OHI-S) and Parent's Education Level

Variables	Caries Risk Assessment						r	p-value
	Low		Moderate		High			
	n	%	n	%	n	%		
OHI-S								
Good	12	66.7	0	0	17	39.5	0.312	0.014
Average	6	33.3	0	0	14	32.6		
Poor	0	0	0	0	12	27.9		
Parents' Education Level								
Elementary school	0	0	0	0	6	13.9		
Junior high school	4	22.2	0	0	10	23.3	-0.198	0.126
High school	10	55.6	0	0	22	51.2		
University	4	22.2	0	0	5	11.6		

DISCUSSION

Based on the result of this study, male students dominated the total number of participants compared to female students. Female students' participation in formal education was much lower than male students. The number of female students is generally only half or a third of the number of male students.[13] When referring to the data released by the Ministry of Religion of Indonesia in 2012, it can be seen that the number of male students (50.19%) was greater than that of female students (49.81%) although this result was almost equal.[14] This is possibly caused by the students' parents not allowing their daughters to live in boarding schools and away from parental supervision, in contrast to male students who were considered better able to look after themselves when living far from their parents. Another classic reason is that women are considered inappropriate to be outside the home. More than half of the student's parents have at least a high school education. Considering that, the Indonesian government mandates that all citizens complete 12 years of compulsory schooling.[15]

Based on the results of an evaluation conducted with the CRA form, most students were found to be at high risk of dental caries. Due to low health literacy, most students cannot receive daily oral and dental health information. According to a study, children in Pakistan who have poor oral health literacy also have poor oral health status.[16] The teenagers aged 15 to 19 with poor oral health literacy had more cavitated carious lesions on their teeth than those with appropriate oral health literacy.[17] Patients' self-management abilities, adherence to medical instructions, and overall treatment outcomes may all be improved by raising their level of oral health literacy.[18] In addition, most students also stated they had the habit of consuming foods and drinks containing sugar three times a day. Sugar is one of the factors that influences the high incidence of caries in the oral cavity. According to a study conducted in Padang City, the risk of dental

caries was 5.67 times higher in participants who had more sugary snacks than in those who consumed less of them.[19] Numerous clinical symptoms, such as caries/white spot lesions on various tooth surfaces, including the interproximal teeth, were also discovered due to the dental examination. Additionally, saliva flow was measured during clinical assessments when it was discovered that most students had poor saliva flow. Saliva greatly affects the oral cavity, particularly the cleanliness of the tooth surface. Low saliva flow suggests that saliva's viscosity is high, making it challenging to remove food particles or debris from the surface of the teeth. Low resting pH, low flow rate, and watery saliva with low viscosity were shown to be the elements that contributed to an increase in the prevalence of dental caries, according to a study, but the findings varied depending on the age group.[20] Good results were obtained in the OHI-S assessment, where almost half of the students had good oral hygiene. Students may have done this because they brushed their teeth prior to arriving at school and having their teeth and mouth checked.

A Spearman rank correlation described the monotonic relationship between two variables. This correlation coefficient can be used for ordinal and nonnormally distributed continuous data and is relatively resilient to outliers. Additionally, a Spearman coefficient has a -1 to +1 range. It can describe anything from no association (r = 0) to a perfect monotonic relationship (r = -1 or +1). Correlation coefficients describe the strength and direction of a relationship between variables.[21] This study assessed the correlation between CRA with OHI-S and parents' education level. The result showed a correlation between caries risk assessment and the OHI-S with a correlation coefficient of 0.312. It demonstrated that pupils at the Pesantren Mizanul Ulum Sanrobone had a higher risk of developing caries when their OHI-S (poor oral hygiene) was higher. This result aligns with the research conducted in several orphanages in Semarang City, where there was also a significant relationship between OHI-S and caries incidence.[22] Meanwhile, based on the results of the Spearman test, there was no correlation between the assessment of caries risk and the education level of the student's parents, with a correlation coefficient of -0.198. It demonstrated that the risk of caries faced by students at the Pesantren Mizanul Ulum Sanrobone was unrelated to the educational level of the parents of the students. A study conducted at schools in Palembang City showed similar results, where there was no relationship between the incidence of caries and the level of parental education.[23]

CONCLUSION

The caries risk assessment and dental hygiene status were revealed in Pesantren Mizanul Ulum Sanrobone. However, there was no connection between the two variables and the parents' educational attainment.

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