

THE RELATIONSHIP BETWEEN ORAL HEALTH KNOWLEDGE AND OHI-S SCORES AMONG 12-15 YEAR OLD CHILDREN AT AMANATUL UMMAH ISLAMIC BOARDING SCHOOL IN MOJOKERTO

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Abstract

Oral health among teenagers is influenced by knowledge, daily hygiene routines, and environmental factors. In boarding school settings, students often follow structured schedules and controlled dietary patterns, which may positively affect oral hygiene status. A more regulated routine can reduce snacking frequency and improve consistency in toothbrushing, contributing to lower plaque accumulation and better OHI-S scores. Strengthening oral health knowledge may further enhance these outcomes. This study analyzes the correlation between oral health knowledge and oral hygiene status (OHI-S) among 12-15 year-old students at Amanatul Ummah Islamic Boarding School, Mojokerto. This observational analytical study used a cross-sectional design involving 100 students selected through purposive sampling. Oral health knowledge was measured using a structured questionnaire, while oral hygiene status was assessed clinically using the Simplified Oral Hygiene Index (OHI-S). Data were analyzed using the nonparametric Spearman correlation test. Most respondents had moderate levels of oral health knowledge, while a majority demonstrated good oral hygiene status, a condition likely supported by the school's controlled diet and consistent daily routines. Statistical analysis showed a strong and significant negative correlation between knowledge and OHI-S scores ($r = -0.721$; $p < 0.01$). In conclusion, there is a significant correlation between oral health knowledge and oral hygiene status. Higher knowledge levels are associated with better OHI-S scores, further supported by the structured environment of the boarding school, which contributes to maintaining good oral hygiene.

Keywords: Oral health knowledge, OHI-S, Teenagers, Boarding school, Human and Health

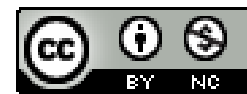
Abstrak

Kesehatan gigi dan mulut pada remaja dipengaruhi oleh tingkat pengetahuan serta kebiasaan pemeliharaan kebersihan gigi. Pada lingkungan pesantren, jadwal harian yang teratur dan pola makan yang terkontrol dapat mendukung kebersihan mulut yang lebih baik melalui penurunan konsumsi makanan kariogenik dan peningkatan konsistensi menyikat gigi. Penelitian ini

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bertujuan menganalisis hubungan antara tingkat pengetahuan kesehatan gigi dan mulut dengan status kebersihan mulut (OHI-S) pada santri usia 12-15 tahun di Pondok Pesantren Amanatul Ummah, Mojokerto. Penelitian ini menggunakan desain cross-sectional dengan 100 responden yang dipilih secara purposive. Pengetahuan diukur menggunakan kuesioner terstruktur, sementara status kebersihan mulut dinilai melalui pemeriksaan OHI-S. Analisis data dilakukan menggunakan uji korelasi Spearman. Hasil: Sebagian besar responden memiliki tingkat pengetahuan kategori sedang dan status kebersihan mulut kategori baik. Terdapat korelasi negatif yang kuat dan signifikan antara tingkat pengetahuan dan skor OHI-S ($r = -0.721$; $p < 0.01$). Kesimpulan penelitian ini adalah terdapat hubungan signifikan antara tingkat pengetahuan kesehatan gigi dan mulut dengan status kebersihan mulut. Pengetahuan yang lebih tinggi berasosiasi dengan skor OHI-S yang lebih rendah, yang menunjukkan kebersihan mulut yang lebih baik.

Kata Kunci: Pengetahuan kesehatan gigi dan mulut, OHI-S, Remaja, Pesantren, Human and Health

INTRODUCTION

Oral and dental health are essential components of overall health, as conditions in the oral cavity may influence systemic well-being and quality of life. Poor oral hygiene is associated with dental caries, gingival inflammation, pain, and functional limitations that interfere with daily activities such as eating, speaking, and learning (Pudentiana et al., 2021; Osadolor & Iwuoha, 2019; Maulanti et al., 2021). Globally, oral diseases affect approximately 3.58 billion people and remain a major public health concern, particularly among children and adolescents, with a growing burden of non-communicable diseases (Hasan et al., 2024).

In Indonesia, oral health problems remain highly prevalent. Data from Basic Health Research (Riskesdas 2018) indicate that 57.6% of the population experiences dental and oral health issues. Dental caries is common across age groups, affecting 41.1% of children aged 3-4 years, 67.3% aged 5-9 years, and 55.6% aged 10-14 years (Hasan et al., 2024; Novita et al., 2024). These conditions are strongly influenced by oral hygiene practices, dietary habits, particularly sugar consumption and limited access to preventive dental care.

Adolescents aged 12-15 years represent a critical period for establishing long-term oral health behaviors. The World Health Organization identifies children aged 6-12 years and early adolescence as priority groups for global caries surveillance, emphasizing the importance of reducing caries experience and maintaining functional dentition during this stage (Ferizi et al., 2022). Increased autonomy in food choices, higher consumption of sugar-sweetened foods and beverages, irregular toothbrushing habits, and infrequent dental visits place adolescents at greater risk for oral health problems.

Previous studies have demonstrated a strong association between oral hygiene behavior and oral health status in adolescents. Research conducted in Kosovo among 15-year-old students reported a mean DMFT of 3.21 ± 2.193 and a mean OHI-S of 1.945, with significant correlations between brushing frequency, dental visits, OHI-S, and DMFT ($p < 0.05$) (Ferizi et al., 2022). Similarly, a study among sixth-grade students in Iran found a mean DMFT of 1.83 and OHI-S of 1.40, with significantly better oral hygiene among girls compared to boys ($p < 0.001$) (Jafari et al., 2022). These findings highlight the importance of oral hygiene practices in shaping adolescents' oral health outcomes.

Oral health knowledge plays a fundamental role in influencing health-related behavior. Adequate knowledge enables individuals to recognize risk factors, adopt preventive practices, and maintain effective oral hygiene routines. Previous research has demonstrated a significant relationship between oral health knowledge and oral hygiene status, as measured by the Simplified Oral Hygiene Index (OHI-S), indicating that higher levels of knowledge are associated with better oral hygiene conditions (Pudentiana et al., 2021). Knowledge influences dietary behavior, toothbrushing frequency, awareness of cariogenic foods, and utilization of dental services (Ganesh et al., 2019). Therefore, assessing oral health knowledge alongside objective clinical indices such as OHI-S is essential for understanding adolescents' oral health status.

Islamic boarding schools (pesantren) represent a unique environment that may influence adolescents' oral health behaviors. Amanatul Ummah Islamic Boarding School in Mojokerto, one of the largest pesantren in East Java, accommodates more than 10,000 students from diverse backgrounds (Hasanah, 2021). Students live with limited parental supervision, and their daily routines including dietary patterns and oral hygiene practices are shaped by institutional regulations (Bramantoro et al., 2020). Previous evidence suggests that boarding-school students may face higher oral health risks due to irregular toothbrushing schedules, limited access to dental services, and frequent consumption of cariogenic snacks (Hamid et al., 2025). However, the structured environment of pesantren also provides an opportunity to promote healthy habits through targeted health programs.

Despite several oral health education initiatives, evidence examining the relationship between oral health knowledge and oral hygiene status among adolescents aged 12-15 years in Amanatul Ummah Islamic Boarding School remains limited. To date, no study has specifically assessed whether students' oral health knowledge aligns with their actual oral hygiene condition using standardized indices such as the OHI-S. This gap highlights the need for empirical data to support the development of effective oral health promotion and preventive strategies within the boarding-school setting.

Therefore, this study aims to analyze the relationship between oral health knowledge and oral hygiene status, as measured by the Simplified Oral Hygiene Index (OHI-S), among adolescents aged 12-15 years at Amanatul Ummah Islamic Boarding School, Mojokerto. The findings are expected to provide baseline data for designing targeted oral health education and preventive programs tailored to the unique environment of Islamic boarding schools.

METHODS

This study employed a quantitative analytical design with an observational approach using a cross-sectional method. The research aimed to determine the relationship between the level of dental and oral health knowledge and oral hygiene status, measured using the Simplified Oral Hygiene Index (OHI-S), among adolescents aged 12-15 years. All data were collected simultaneously without any intervention to observe the association between the studied variables.

The study population consisted of students aged 12-15 years who lived and studied at Amanatul Ummah Islamic Boarding School, Mojokerto, East Java. Participants were selected using a purposive sampling technique based on predefined inclusion criteria: adolescents aged 12-15 years, free from active dental caries at the time of examination, willing to participate in the study, and having obtained informed consent from parents or guardians. Students undergoing active dental treatment or experiencing severe systemic disorders were excluded to minimize potential confounding factors related to oral hygiene status. The sample size was determined using the Slovin formula according to the total population.

Dental and oral health knowledge was assessed using a structured, closed-ended questionnaire developed based on relevant literature. The questionnaire evaluated respondents' understanding of dental anatomy, oral hygiene practices, cariogenic and non-cariogenic foods, and the causes and prevention of dental and oral diseases. Knowledge scores

were classified using the Modified Bloom's Taxonomy into low, moderate, and high categories. The questionnaire also incorporated a know-do practice component to evaluate the alignment between knowledge and daily oral health behavior.

Oral hygiene status was assessed through a direct clinical examination using the Simplified Oral Hygiene Index (OHI-S) according to the criteria established by Greene and Vermillion. The examination measured debris and calculus accumulation on six index teeth (16, 11, 26, 36, 31, and 46). OHI-S scores were categorized as good, fair, or poor to reflect the respondents' oral hygiene condition.

Data collection involved administering the questionnaire followed by an OHI-S examination conducted by trained clinical dental students using standardized examination tools. All collected data were recorded, coded, and entered into a database for analysis. Statistical analysis was performed using SPSS software. Univariate analysis was conducted to describe respondent characteristics, knowledge levels, and OHI-S categories, while bivariate analysis was carried out using Pearson or Spearman correlation tests depending on data normality, assessed by the Kolmogorov-Smirnov or Shapiro-Wilk tests. A p-value of less than 0.05 was considered statistically significant.

RESULTS

This study involved 100 adolescents aged 12-15 years from Amanatul Ummah Islamic Boarding School, Mojokerto. The collected data comprised respondents' demographic characteristics, levels of dental and oral health knowledge, and oral hygiene status measured using the Simplified Oral Hygiene Index (OHI-S). Descriptive and inferential statistical analyses were performed to examine the distribution of variables and the relationship between oral health knowledge and oral hygiene status.

The age distribution of respondents was relatively balanced across the study range. Participants aged 15 years constituted the largest proportion (30%), followed by those aged 13 years (25%), 12 years (24%), and 14 years (21%). Based on gender, male respondents accounted for 59% of the sample, while females comprised 41%.

Table 1. Characteristics of Respondents Based on Age

Age	Amount	Percentage
12 Years Old	24	24%
13 Years Old	25	25%
14 Years Old	21	21%
15 Years Old	30	30%

Regarding dental and oral health knowledge, most respondents demonstrated a moderate level of knowledge (90%), while 10% were classified as having a high level of knowledge. No respondents fell into the low knowledge category. These findings indicate that although the majority of adolescents possess adequate oral health knowledge, only a small proportion have advanced understanding.

Table 2. Level of Dental and Oral Health Knowledge Based On Bloom (1956)

Variable: Level of Dental and Oral Health Knowledge	Number of Respondents	Percentage
High	10	10%

Moderate	90	90%
Low	0	0%

Assessment of oral hygiene status using the OHI-S index revealed that 86% of respondents had good oral hygiene, 13% were categorized as fair, and 1% had poor oral hygiene. Overall, the results suggest that most students maintain satisfactory oral hygiene practices, although a minority may require additional oral health guidance.

Table 3.Oral Hygiene Index Simplified (OHI-S) Based On Greene & Vermillion (1964)

Variable: Oral Hygiene Index Simplified (OHI-S)	Number of Respondents	Percentage
Good	86	86%
Fair	13	13%
Poor	1	1%

Normality testing using the Kolmogorov-Smirnov test showed that the dental and oral health knowledge variable was normally distributed ($p = 0.065$), while the OHI-S variable was not normally distributed ($p = 0.000$). Consequently, a non-parametric Spearman rank correlation test was applied to analyze the relationship between the two variables.

The Spearman correlation analysis demonstrated a strong and statistically significant negative correlation between the level of dental and oral health knowledge and OHI-S scores ($r = -0.721$, $p < 0.01$). This finding indicates that higher levels of oral health knowledge are associated with lower OHI-S scores, reflecting better oral hygiene status among the respondents. The scatterplot analysis further supported this relationship, showing a clear linear trend without extreme outliers, indicating that the data met the assumptions required for valid correlation analysis.

DISCUSSION

This chapter discusses the research findings that examined the link between oral health knowledge and oral hygiene status (OHI-S) in adolescents aged 12 to 15. The study took place at the Amanatul Ummah Islamic Boarding School in Pacet, Mojokerto, and included 100 respondents. The main finding—a strong negative correlation ($r = -0.721$; $p < 0.01$)—supports the idea that more knowledge leads to better oral hygiene.

The discussion analyzes this relationship in the context of the respondents and their organized living environment. It connects the results to relevant theories and recent literature published between 2021 and 2025. Selecting 100 teenagers aged 12 to 15 is methodologically important. This age group is crucial for cognitive development and establishing health behaviors (Ferizi et al., 2022). The balanced distribution across these early-to-mid adolescent years ensures that the sample reflects the readiness needed for effective health interventions. Physiologically, these respondents have the fine motor skills to perform complex hygiene techniques, such as angling the toothbrush correctly and controlling brushing movements (Hassan & Miller, 2022). Thus, the OHI-S results primarily showcase behavioral compliance, motivation, and skill rather than physical ability.

The demographic breakdown, with 59% male and 41% female, is relevant. Research indicates that gender can affect oral hygiene, with females typically showing better adherence (Yildiz & Ozden, 2021). The higher number of male students, reflecting the school's population, means that any health promotion strategy must effectively engage this dominant group.

Additionally, the environment, known as the Pesantren, is key. The structured life defined by routines and peer influences supports stable behavior (Bramantoro et al., 2020). This environment likely affects the positive OHI-S results, requiring a closer look at how individual knowledge operates under such supervision. The setting allows the study to explore how personal knowledge interacts with external discipline.

The finding that 90% of respondents exhibited moderate knowledge, with none in the low category, indicates effective baseline health education, whether before or during the boarding school experience. This widespread moderate understanding shows a successful transfer of basic oral health information. However, the predominance of moderate knowledge suggests a significant barrier. Intermediate knowledge is often insufficient for consistent and high-quality preventive behavior (Lestari et al., 2023). According to the Health Belief Model, this moderate knowledge may indicate low perceived risk or low confidence in performing proper plaque removal techniques (Glanz et al., 2021). Knowing one should brush is not the same as understanding how to angle the brush for cleaning between teeth or why lowering sugar intake is important for managing plaque.

Research shows that moving knowledge from moderate to high requires practical skill demonstrations, professional feedback, and behavioral coaching, going beyond basic recollection (Olanrewaju et al., 2022; Fernandez et al., 2023). The 90% rate of moderate knowledge represents significant untapped potential. Targeted, intensive programs in the controlled setting of the Pesantren can help transform this basic understanding into superior oral hygiene practices (Matthews & Silva, 2024).

The OHI-S results reveal that 86% of adolescents achieved good oral hygiene status. This finding is very positive and significantly exceeds regional levels reported in non-institutionalized adolescent groups (Ferizi et al., 2022). It suggests that a regulated residential environment fosters disciplined daily habits (Rahmani & Syafitri, 2023). The daily routines, monitored schedules, and strong social norms within the boarding school likely promote regular brushing. This routine plays a significant role in the low debris and calculus scores (Singh et al., 2021).

However, the 14% of respondents classified with fair or poor OHI-S raises a concern. This gap shows that following a structure does not guarantee effective practices. These individuals may follow the required brushing schedule but may not brush for the right amount of time or use the correct technique to remove plaque effectively (Alharbi et al., 2022). This distinction highlights the difference between following a routine and practicing skilled hygiene. For this 14%, the moderate knowledge level did not equip them with the skills or motivation needed to perform the routine correctly. Addressing this group requires careful monitoring and personalized feedback rather than broad health promotion.

The most important finding is the strong negative correlation ($r = -0.721$; $p < 0.01$) between increased knowledge and improved OHI-S scores. This relationship shows that knowledge is not just an addition; it is a key driver of effective preventive behavior among these adolescents. It aligns with recent international findings (Rashid & Shafie, 2022; Moraes et al., 2024) and fits well with Behavioral Theory (Ajzen, 2022).

The strength of this correlation, even in a setting that encourages routine (evidenced by the high percentage of good OHI-S scores), indicates that better oral health comes from combining routine with understanding. Students with higher knowledge can recognize early signs of plaque buildup, understand the seriousness of untreated conditions (Tanaka et al., 2023), and effectively apply complex skills such as proper brushing techniques and interdental cleaning (Li & Huang, 2022). This relationship matters: knowledge maximizes the benefits of the structured environment of the boarding school. The study supports focusing future resources on enhancing knowledge. It concludes that interventions should include both behavioral reinforcement and skill acquisition to elevate the existing moderate knowledge to high knowledge and sustained performance. This effort is essential to help the remaining 14%

reach optimal oral health (Al-Qahtani & Ahmed, 2024). The finding confirms that a multi-level approach, combining the school's structure with the students' potential, is the best way to achieve lasting improvements in oral health.

CONCLUSION

This study revealed a strong and significant correlation between dental and oral health knowledge scores and OHI-S scores among teenagers at Amanatul Ummah Islamic Boarding School. Higher knowledge scores were associated with lower OHI-S scores, indicating better oral hygiene status. These findings show that improved knowledge positively influences oral health behavior. This study revealed a strong and significant correlation between dental and oral health knowledge scores and OHI-S scores among teenagers at Amanatul Ummah Islamic Boarding School. Higher knowledge scores were associated with lower OHI-S scores, indicating better oral hygiene status. These findings show that improved knowledge positively influences oral health behavior.

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