

Dental odyssey: a comprehensive literature review on global strategies, behavioral programs, and creative approaches for ages 6-12 years

Meysa Ayu Cahyani¹, Agus Sudaryanto^{2*}

¹Ners Professional Study Program, Faculty of Health Sciences, University of Muhammadiyah Surakarta, Indonesia

²Department of Community Nursing, Faculty of Health Sciences, University of Muhammadiyah Surakarta, Indonesia

*Correspondent: Agus Sudaryanto, Department of Community Nursing, Faculty of Health Sciences, University of Muhammadiyah Surakarta, Indonesia. email: agus_sudaryanto@ums.ac.id

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ABSTRACT

Introduction: Oral and dental hygiene serves as an indicator of a condition free from diseases, debris, and health issues in the oral cavity, affecting individuals of all age groups. Health education through various global learning systems, behavioral programs, and creative approaches has proven effective in enhancing children's understanding of the importance of maintaining oral and dental cleanliness.

Objective: Objective: This research aims to review relevant journals contributing to the development of insights, behaviors, and understanding regarding children's oral and dental health across crucial age ranges.

Methods: Using a literature review method, we filtered articles from Google Scholar, PubMed, Garuda (Digital Reference Library), and Science Direct published within the last six years. Searches in both Indonesian and English languages yielded ten articles that, after a selection process, provided diverse results regarding the implementation of learning models to enhance children's understanding of their oral and dental hygiene.

Result: From the ten articles, it can be concluded that the application of education on oral and dental hygiene through various learning systems can effectively improve children's knowledge.

Conclusion: the oral hygiene of elementary school children from various countries. Variations in research designs were found, and there is low awareness among children regarding dental health in Indonesia. Educational programs, such as "Brush Day & Night," and collaborations between FDI and Unilever have proven effective in improving children's toothbrushing habits. The use of music and the snake ladder game was also considered appropriate for developing awareness and behaviors related to dental hygiene.

Keywords: child education, global health education, teeth, and mouth.



INTRODUCTION

Children aged 6-12 years experience a transitional phase characterized by the presence of both primary and permanent teeth. Consequently, oral and dental health issues are common among elementary school children if not properly maintained (Aji, Rizkasari, and Anisa, [2023](#)). The prevalence of recommended tooth brushing practices for children is emphasized during their early years (Khasanah, Susanto, and Rahayu, [2019](#)). Dental and oral diseases in children arise from inadequate monitoring and training in maintaining oral hygiene (Aji, Rizkasari, and Anisa, [2023](#)). In reality, children are not yet accustomed to being aware of dental and oral health, leading to suboptimal tooth brushing habits (Ayu Saidah and Khoiriyah Isni, [2022](#)). Based on survey findings, the decline in oral hygiene in children aged 6-12 years is mainly caused by children's lack of knowledge and rarely brushing their teeth, less than twice a day (Muliadi, Isnanto, and Agus Marjianto, [2022](#)). The habits of children aged 6-12 years contribute to the emergence of oral health issues, including a low understanding of the importance of maintaining dental and oral hygiene. Insufficient knowledge of dental health leads to poor dental and oral hygiene, accumulating debris, and calculus (Pudentiana *et al.*, [2021](#)).

Research shows that children's oral and dental hygiene awareness is greatly influenced, especially by education and hygiene skills (Saadah *et al.*, [2021](#)). Parents also play a crucial role in guiding, training, and motivating their children, instilling habits of recognizing oral and dental hygiene for their health (Manbait *et al.*, [2019](#)). The bleeding gums or bad breath can be attributed to frequent consumption of overly sweet foods and beverages that are either too cold or hot (Sayekti *et al.*, [2022](#)). Education has a significant role for children aged 6-12 years, as they undergo substantial growth and development during this period. Supporting the foundation of education for health improvement becomes a primary focus, aiming to ensure a good understanding of health information, adoption of healthy behaviors, and engagement in preventive efforts (Pariati and Lanasari, [2021](#)). People with visual impairment, known as tunanetra, face challenges acquiring knowledge about oral health due to their limited vision. Consequently, they tend to have lower dental and oral hygiene (Istadi, Probosari, and Sulistiyan, [2022](#)).

Game-based learning also enhances students' intrinsic orientation, confidence in learning, and self-efficacy (Topçu, [2023](#)). In line with the explanation from the background, the researcher is interested in conducting a comprehensive study exploring global strategies, behavioral programs, and creative approaches to enhance awareness of oral hygiene among children aged 6-12 (Napitupulu, [2023](#)). The positive impact of implementing a learning system model that involves small group activities in enhancing oral hygiene awareness among children aged 6-12 can provide profound insights and contribute to understanding how game-based learning effectively influences students' intrinsic orientation (Saragih *et al.*, [2021](#)). It also boosts their confidence in maintaining oral hygiene. In this method, students are grouped into small groups, each consisting of 2 children, to manage the given material collaboratively, effectively creating a change in the classroom atmosphere and discussion (Siregar, [2021](#)). This research will focus on understanding the factors influencing children's lack of oral hygiene and the educational efforts applied through the learning system model.

MATERIALS AND METHODS

This study is a literature review, where previous researchers and practitioners conducted a literature search through online databases. Subsequently, the review process was carried out using the PRISMA diagram to identify relevant journals with titles to be discussed in the literature review, culminating in results that align with the study's objectives. Data for the research were obtained by exploring databases such as Google Scholar, PubMed, Garuda (Digital Reference Library), and Science Direct, utilizing both Indonesian and English languages. The search covered the past six years, from January 2018 to September 2023. The sorting process employed the "boolean searching" method with the addition of the words AND and OR, which

are inserted in keywords such as teeth, mouth, children, oral hygiene, and care to broaden the search scope and facilitate the identification of relevant research journals for the literature review's title :

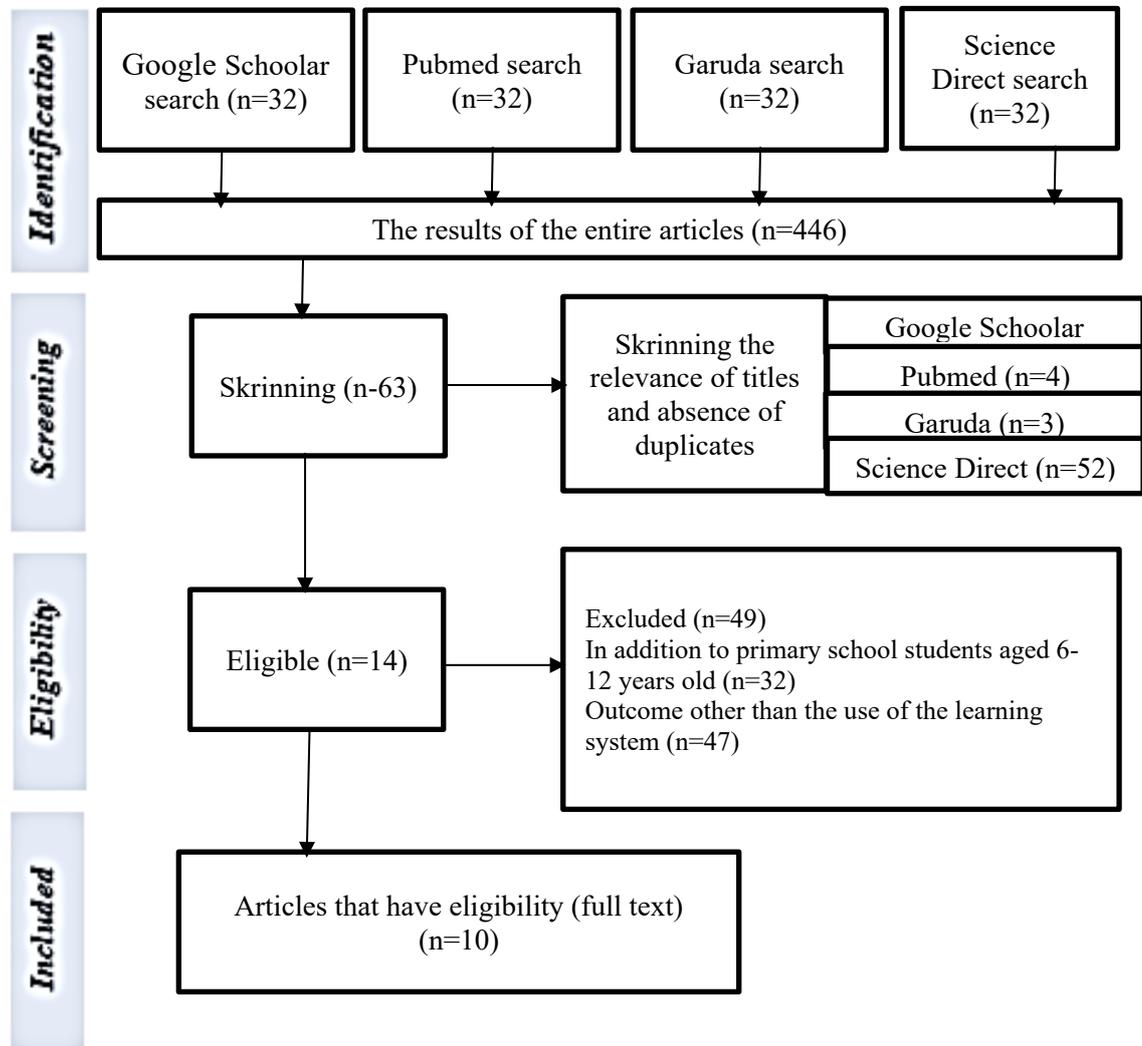


Figure 1. PRISMA Flow Diagram

Based on the prism flow diagram table above, the following are the steps to conduct a review by identifying the theme of oral health as the focus in the selected research, aligning with credible sources from journals and research articles obtained from Google Scholar, PubMed, Garuda, and Science Direct. This involves analyzing the main findings, methodologies, and conclusions to enhance the current understanding of the oral health topic in children (6-12 years old). Articles addressing oral health outside this age range will be excluded from this study. From the conducted search, a total of 446 journals were found in the Google Scholar database (326 articles), PubMed (27 articles), Garuda (6 articles), and Science Direct (87 articles) discussing knowledge about oral and dental hygiene through learning systems for elementary school children. These journals have been grouped for further analysis. Subsequently, screening was conducted to check for possible journal plagiarism. As a result, 63 articles were identified that successfully passed the screening process and were aligned with the literature review theme. A summary of the selected journals meeting the criteria can be explained by creating a flowchart called the PRISMA flow diagram.

RESULT

Based on the 10 articles that meet the inclusion criteria related to the theme of the literature review, most of the studies utilized observational design (6 articles), quasi-experiment (2 articles), and pre-experimental design (2 articles). All articles involved varying sample sizes, ranging from the largest to the smallest, with around 40 respondents. The criteria for respondents included elementary school students aged 6-12 years. The standards or quality of the studies are relatively high or substantial. The research locations encompassed various countries, such as Iran, Germany, Nigeria, and India, as well as several regions in Indonesia, such as Jakarta, Pontianak, and Jambi.

Table 1. Selected Literature Review Results

| No | Author, Title | Objective | Method | Result |
|----|---|--|--------------------------------|---|
| 1 | Deng et al. (2023), Belt and Road countries, a 12-year-old child | Reporting the oral health conditions of 12-year-old children in Belt and Road Initiative (BRI) countries and determining differences in oral health based on geographical regions (BRI routes) and national income levels. | Observational Study | The prevalence of dental caries in 12-year-old children is documented in the WHO database for most BRI countries and is not entirely up-to-date. The findings have implications for situational analysis, which provides an understanding of oral health. |
| 2 | Melo et al. (2021a), Indonesia and Nigeria, a 7-9-year-old child | Evaluating the improvement in understanding and actions regarding oral hygiene among students participating in the Clean Breath Program (BDN) and understanding the sustainability of the resulting improvement. | Observational Study | The program results indicate greater effectiveness in the 7-9 age group. The BDN intervention successfully increased the frequency of tooth brushing in children during the first intervention, and positive outcomes could be sustained for 6-12 months in enhancing children's knowledge and oral health behaviors. |
| 3 | Melo et al., (2021b) Indonesia and Nigeria, a 6-12-year-old | Motivating positive oral health actions and improving oral well-being and quality of life. | Randomized Cluster Superiority | The results showed that children demonstrated a 45% increased likelihood of avoiding further dental damage, loss, or additional treatments. In Nigeria, children had a 71% higher chance of feeling confident, and the percentage of children with oral hygiene increased twofold, from 40% to 80%, within 24 weeks. |
| 4 | Melo et al. (2018), Children in 10 countries | We are assessing the effects of the '21 Day' program on nearly 8,000 children in 10 countries. | Observational Study | The evaluation measurements will be expanded to include indicators of the quality of life-related to oral health, as well as monitoring the knowledge of parents or caregivers about oral health. |
| 5 | Hanifan Aulia et al., (2023), SD Islam Terpadu Alamy, A 3rd-grade elementary school student | We are using videos to understand the difference in children's knowledge levels related to dental and oral health before and after | Pre-Experiment | The average scores of children's dental and oral health knowledge before and after consecutive treatments were 40.0 and 42.1, |

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|----|---|--|---------------------------------|---|
| | | implementing Dental Health Education (DHE). | | respectively. This indicates a significant impact on children's learning. |
| 6 | Kayaaltı-Yüksek & Yıldırım, (2022), Turkey, 60 children aged 8–12-year-old | We are assessing the effectiveness of Mozart's music in assisting the learning of toothbrushing behavior in children with high and low levels of dental anxiety. | Controlled Observational Study | There was a decrease in the plaque index (PI) and gingival index (GI) scores observed at all follow-up visits ($p < 0.050$) for all groups. A significant reduction was observed in the PI values between the group given and not given music in the high dental anxiety level (HDAL) group ($p < 0.001$). However, no statistically significant difference was detected in low dental anxiety level (LDAL) ($p = 0.07$). |
| 7 | Ghea et al., (2019), SD Muhammadiyah 2 Pontianak, 40 fourth-grade elementary school students | We are assessing the success of education using the snake and ladder game as a medium to enhance knowledge about dental and oral hygiene in elementary school students at SD Muhammadiyah 2 Pontianak. | A Quasi-Experimental | The students' knowledge scores in the experimental group before the intervention were 52.25, increasing to 89.25 with a P value of 0.000, while the control group's pretest scores were 52.25, rising to 55.25 with a P value of 0.137. |
| 8 | Rusmiati & Marlia (2019), Indonesia, 80 individuals among 5th-grade students in elementary school | We are identifying the effectiveness of developing booklets and videos in dental health education to enhance dental and oral hygiene among 5th-grade students in elementary school. | A Quasi-Experimental | The results of this study indicate that using booklets and videos as dental health education media is efficacious in improving the level of dental and oral hygiene in 5th-grade elementary school students, as evidenced by the significance value of 0.000 ($p < 0.05$). |
| 9 | Ibiyemi et al., (2022), Nigeria, dental community | Describe the process of developing traditional regional songs about oral hygiene education in various languages. | Kualitatif | Developing a new and effective oral hygiene education tool involves various processes, steps, and diverse sources, which become tasks to receive relevant attention in developing oral health. |
| 10 | Hashemi et al. (2021), Iran, students aged 6–12-year-old | We are assessing the impact of animation and games to enhance confidence and self-care behavior related to oral health in students aged 6-12 years. | Randomized Controlled Trial/RCT | The results show that after five months of the intervention, there was a significant increase in the average scores of self-efficacy and behavior of self-care, from 3.8 to 4.8, 36.8 to 48.9, and 17.07 to 18.29, respectively ($p < 0.05$). However, no significant changes were reported in the control group. |

DISCUSSION

The research findings indicate that the selected articles offer diverse approaches to enhance awareness and dental health practices among children aged 6-12. These studies effectively explore creative strategies, including the use of engaging media such as music influence, utilization of snakes and ladders games, and the development of learning through traditional songs. All of these contribute to a comprehensive and varied insight, aiming to improve children's understanding of the importance of maintaining oral hygiene. Oral and dental hygiene can be explained as a condition with no plaque, tartar, or other stains on the tooth surfaces, including food particles, and without any odor in the mouth (Hermanto, Mahirawatie, and Edi, [2021](#)). Previous research has revealed that attitudes can change after undergoing an educational approach through storytelling interactions. Although not entirely manifested, negative attitude categories can be transformed into positive attitudes (Herminastiti, Mapappoleonro, and Jatiningsih, [2019](#)). When students begin to show interest in understanding science, attitude changes occur, and their behavior can metamorphose from negative to positive (Hafizhah, Syafiq, and Fikawati, [2020](#)). Health education approaches are not limited to promotion but also encompass preventive efforts, handling both direct and indirect care, and recovery efforts (Hasfya, Nababan and Erawati, [2021](#)). Various strategies and educational techniques can be applied to enhance knowledge through training and information delivery using relevant media or non-media in line with children's education.

The first article (Deng, McGrath, and Jiang, [2023](#)) explains the dental health conditions of 12-year-old children in countries affiliated with the Belt and Road Initiative (BRI). This explanation further includes identifying dental health variations associated with geographical regions and the countries' income levels. BRI countries are categorized based on WHO regions, including Africa, the Americas, Southeast Asia, Europe, the Eastern Mediterranean, and the Western Pacific. The statistical tests revealed significant variations in dental caries experiences among 12-year-old children in BRI countries, particularly regarding dental caries experiences. Statistical analysis indicates that the Sub-Saharan African region has a lower median DMFT score than BRI countries in Europe, Southeast Asia, East Asia, and the Western Pacific.

Additionally, East Asian, and Pacific countries show lower median DMFT scores than Europe, the Americas, the Caribbean, and Southeast Asia. The second article (Melo *et al.*, [2021a](#)) explains the Brush Day & Night program's role in developing understanding and actions related to dental health in children, evaluated through a controlled trial in Indonesia and Nigeria to assess the program's effectiveness. The program was implemented over 21 days in schools, utilizing various media, including posters, videos, and interactive activities. Measurements included questions about dental health knowledge and behaviors, such as brushing frequency, fluoride toothpaste usage, understanding the importance of dental care, and dental condition examinations. Statistical results were presented through odds ratios (OR) with a 95% confidence interval (CI), using a conditional logistic approach for three evaluation times: T0 + 3W (T0+21), T0 + 8W (T1), and T0 + 24W (T2). Although there were no differences in the program's effectiveness between the two countries, the initial conditions only influenced specific aspects, such as brushing frequency and fluoride toothpaste usage.

Furthermore, in the third article (Melo *et al.*, [2021b](#)), the Brush Day & Night program, particularly its impact on children's well-being and oral health, is explained. The primary results from the cluster-randomized trial conducted in Indonesia and Nigeria indicate that the program can enhance the well-being and dental hygiene of children in Nigeria while reducing the risk of worsening dental conditions among children in Indonesia. There is a 45% increased probability of preventing worsening conditions of cavities, loss, or filled teeth. Additionally, in Nigeria, children have a 71% higher likelihood of developing confidence with improved dental hygiene, doubling from 40% to 80% over the 24 weeks. Overall, the program is effective in promoting the improvement of dental and oral health in children and preventing dental caries. However, research results are inconsistent across the entire child population, and further studies are needed

collaboratively to identify influencing factors. The fourth article (Melo *et al.*, 2018) discusses phases III and IV of the partnership between Brush Day The fourth article (Melo *et al.*, 2018) discusses Phase III and Phase IV of the Brush Day & Night partnership between the FDI (Federation Dentaire Internationale) and Unilever. This partnership aims to ensure that good dental health habits can be sustained, particularly in dental education and prevention for children aged 7-9. The primary results from Phase III through the partnership include evaluating the '21 Day' program conducted on nearly 8,000 school children in 10 countries. The evaluation describes the program's effectiveness in educating children to brush their teeth twice daily. It is proven that there is a 25% increase in school children brushing their teeth after the first '21 Day' intervention, which generally continues for 6-12 months.

The fifth article (Hanifan Aulia, Sri Ratna Laksmiastuti, and Dhyani Widhianingsih, 2023) conducted an experimental analysis using a cross-sectional study design to examine the differences in the level of understanding among children regarding oral health before and after implementing Dental Health Education (DHE) through educational videos. The study was conducted at SD Islam Terpadu Lamy Subang, showing a significant impact of DHE implementation on children's insights into the importance of oral health through educational videos. The overall average scores of children's understanding of oral health before and after the intervention were 40.0 and 42.1, respectively. The study demonstrated a significant improvement in children's awareness of oral health through the educational video. The sixth article (Kayaalti-Yüksek and Yıldırım, 2022) discusses the influence of Mozart music on the reduction of Plaque Index (PI) and Gingival Index (GI) in children with higher and lower levels of dental anxiety. The research also evaluates the effectiveness of Mozart's music in teaching toothbrushing behavior to children. The results show a statistically significant decrease in Plaque Index (PI) and Gingival Index (GI) scores in all groups during follow-up visits ($p < 0.05$). Listening to Mozart's music before tooth brushing training has a significant impact on plaque removal in high-anxiety children, while Mozart's music does not have a positive effect on children with low anxiety. Next, (Ghea, Ridha, and Selviana, 2019) explain using engaging media, such as a Snakes and Ladders game, to enhance the effectiveness of oral health education for elementary school students. The implications of these findings can be applied in curriculum planning to strengthen interactive educational approaches involving media usage. The study results show that the experimental group improved knowledge from 52.25 to 89.25 ($p = 0.000$), while the control group experienced a lower increase, from 52.25 to 55.25 ($p = 0.137$).

The eighth article (Marlia and Rusmiati, 2019) explains the need for preventive efforts against dental and oral diseases, especially in the Pondok Meja region, which experiences a high incidence of dental diseases. Low educational levels lead to a lack of awareness of the importance of dental health, particularly among children. Therefore, an expansion of booklets and learning videos related to dental health was carried out to develop an understanding of dental and oral hygiene for 80 fifth-grade students. The study design employed the quasi-experiment method, indicating the effectiveness of booklets and learning videos in understanding children's dental and oral hygiene. The statistical analysis yielded a significance level of 0.000 ($p < 0.005$), indicating the effectiveness of this program.

The ninth article (Ibiyemi *et al.*, 2022) describes the development of a local traditional song as an alternative tool for oral hygiene education in Southwest Nigeria. The development process took place over six months, involving the creation of lyrics, selection of song type, melody, and song production. The result was the creation of a 90-second song in English. The production required a detailed process and sufficient resources. The tenth article (Hashemi *et al.*, 2021) investigates the influence of animation and games as strategies to enhance self-efficacy and self-care behavior in oral health among students aged 6-12. The study involved 82 children as samples, divided into 38 children in the case group and 44 in the control group. The research results show that both groups had similar distributions for gender, parental education, and the number of family members. The statistical tests produced indicate no significant differences in the average scores

for self-care, knowledge, attitude, behavior, and self-efficacy before the intervention in the research group ($p < 0.05$). After the intervention, the case group showed a significant increase in the average behavior scores before and after the intervention. The results of the tenth article above describing the implementation of innovative educational learning strategies for enhancing children's understanding of oral hygiene yielded accurate outcomes. This is due to the facilitation of information delivery through various variations of global strategies, behavioral programs, and creative approaches tailored for elementary school children aged 6-12.

CONCLUSIONS

This literature review discusses ten studies on the oral hygiene of elementary school children from various countries. Variations in research designs were found, and there is low awareness among children regarding dental health in Indonesia. Educational programs like "Brush Day & Night" and collaborations between FDI and Unilever have improved children's toothbrushing habits. Music and the snake ladder game were also considered appropriate for developing awareness and behaviors related to dental hygiene. Overall, innovative educational learning plays a crucial role in developing the understanding and practices of oral hygiene in elementary school children.

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