

Improving Students' Oral Hygiene Through School Dental Health Program: A Meta-Analysis

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ABSTRACT

Background: Oral health is a vital component of overall well-being. The School Dental Health Program (UKGS) is designed to enhance students' oral hygiene through education and health promotion initiatives. This study conducted a systematic review of the literature to evaluate the effectiveness of the UKGS program in improving oral hygiene among students.

Subjects and Method: The literature search was conducted in November 2024 using the PubMed, Scopus, and Google Scholar databases. The search employed keywords such as "School Dental Health Program," "UKGS," "oral hygiene," "dental health," "students," "school," "intervention," "health education," and "effectiveness." Studies were included if they evaluated the effectiveness of the UKGS program in improving students' oral hygiene, were published in either Indonesian or English, and utilized quantitative or qualitative research designs. Studies were excluded if they did not address the UKGS program, were not relevant to the research question, used non-empirical methods, or were published before 2010. Due to time constraints, a total of 14 articles were selected for analysis. These studies explored various factors affecting the effectiveness of the program, including the frequency and duration of implementation, educational methods used, support from parents and teachers, and students' socioeconomic backgrounds.

Results: The UKGS program has the potential to enhance students' knowledge, attitudes, and practices related to oral hygiene. However, its effectiveness is influenced by several key factors, including the involvement of parents and teachers, the use of engaging and interactive educational methods, and access to dental health services. Based on these findings, the study offers several recommendations to improve the future effectiveness of the UKGS program. These include increasing the frequency and duration of program implementation, incorporating more interactive and engaging educational approaches, and addressing existing gaps in access to dental health services.

Conclusion: The UKGS Program has great potential in improving students' oral hygiene. However, to achieve optimal results, the program needs to be well-designed and consistently implemented by considering various factors that influence its effectiveness. By implementing the recommendations mentioned, it is hoped that the UKGS program can be more successful in improving oral health among students.

Keywords: school dental health program, oral hygiene, teacher support

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BACKGROUND

Oral health is an integral part of overall health (Organization, 2017). Poor oral hygiene can lead to various health problems, such as dental caries, periodontal disease and bad breath. These oral health problems not only affect the quality of life but can also negatively impact general health, including increasing the risk of heart disease, stroke and diabetes (Association, 2023).

In Indonesia, oral health problems are still a major challenge. Basic Health Research (Riskesdas) data in 2018 showed that the prevalence of dental caries in children aged 5-12 years reached 60.6% (Ministry of Health, 2019). This shows that efforts to improve the oral health of children in Indonesia still need to be improved.

One of the efforts made to improve children's oral health is through the School Dental Health Program (UKGS). The UKGS program aims to improve students' knowledge, attitudes, and oral hygiene practices through education and health promotion. This program is expected to help students maintain their oral health early on and prevent oral health problems in the future. (Ministry of Health, 2016)

However, the effectiveness of the UKGS program in improving students' oral hygiene is still debatable. Some studies show that the UKGS program can improve students' knowledge, attitudes, and oral hygiene practices, but some other studies show that this program is not always effective in reducing the incidence of caries. Therefore, this study aims to conduct a symantic review of the literature that discusses the effectiveness of the UKGS program in improving students' oral

hygiene. This review will analyze various factors that influence the effectiveness of the UKGS program, such as program frequency and duration, educational methods, parental and teacher support, and socio-economic factors. The results of this review are expected to provide more effective recommendations for improving the UKGS program in the future.

SUBJECTS AND METHOD

1. Study Design

This study uses a systematic review approach, this review will be conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and meta-analysis using primary data, i.e. data from previous similar studies. A literature search was conducted in November 2024 in several electronic databases, including PubMed, Scopus, Web of Science, Cochrane Library, and Google Scholar. The keywords to be used in the search included various combinations of terms, including (but not limited to): "School Dental Health Program", "UKGS", "oral hygiene", "dental health", "students", "school", "intervention", "health education", "effectiveness".

2. Step of Systematic Review

The steps of the systematic review are as follows:

- 1) Identifying the research question
- 2) Develop a systematic review protocol or research guide
- 3) Create a database of relevant research journal search areas (PubMed, Scopus, and Google Scholar)

- 4) Selection of research journals that are relevant to the research questions and research topics
- 5) Selecting qualified research journals according to the inclusion and exclusion criteria
- 6) Analyzing and synthesizing the results contained in the research journals
- 7) Write up the research results in a research report

3. Inclusion Criteria

The exclusion criteria in this study are as follows: (1) Studies that do not address the UKGS program or are not relevant to the research question; (2) Studies that use non-empirical methods; and (3) Studies published before 2010

4. Exclusion Criteria

The inclusion criteria in this study are as follows: (1) Study evaluating the effectiveness of the UKGS program in improving students' oral hygiene; (2) Studies published in Indonesian or English; and (3) Studies that use quantitative or qualitative research designs

5. Definition Operational of Variable School Dental Health Program (UKGS) was a program conducted in schools to improve students' dental and oral health through education and health promotion, including counselling, demonstration of tooth brushing techniques, and dental check-ups. Data Source: Research articles reviewed in a systematic review. Measurement Method: Direct observation of the UKGS program implementation in schools, content analysis of the educational materials used, and data on the types and frequency of program activities.

Effectiveness of the UKGS Program was the success rate of the UKGS program in increasing students' knowledge, attitudes, and practices (KAP) related to dental and oral health, as well as in reducing the

incidence of dental caries. Data Source: Data from research studies reviewed in a systematic review, such as KAP scores before and after the program, plaque and gingiva scores, and data on the incidence of dental caries. Measurement Method: Analysis of quantitative and qualitative data from reviewed studies, such as KAP scores measured by questionnaires, plaque and gingiva scores using standardized indices, and analysis of data on dental caries incidence.

Factors Influencing the Effectiveness of the UKGS Program

a. Frequency and Duration of the Program was how often the UKGS program is implemented and the duration of the program. Data Source: Information on the frequency and duration of the program from the reviewed studies. Measurement Method: Analysis of data on how many times the program is implemented within a certain period (e.g., weeks, months, years) and the program's duration.

b. Educational Methods was Methods used in the UKGS program, such as counselling, demonstrations, videos, or educational games. Data Source: Information on the educational methods used in the UKGS program from the reviewed studies. Measurement Method: Analysis of data on the types of educational methods used, the content delivered, and the level of interactivity of the methods.

c. Parental and Teacher Support was the level of involvement of parents and teachers in supporting the UKGS program at home and school. Data Source: Information on the roles of parents and teachers in the UKGS program from the reviewed studies. Measurement Method: Qualitative data analysis on the level of participation of parents and teachers,

their contributions to the program, and the support they provide to students.

d. Socioeconomic Factors was the socioeconomic status of students, which can influence their access to dental health services. Data Source: Data on students' socioeconomic status from the reviewed studies. Measurement Method: Analysis of data on parental education level, parental occupation, and family income.

6. Study Selection

The studies will be selected based on title, abstract, and full text. The study selection process will be documented using the PRISMA flowchart

7. Data Extraction

Data is collected from papers that are eligible for inclusion in the research findings. This data includes information such as authors, year of publication, research objectives, data collection instruments, research techniques,

and results. The extracted data was presented descriptively without analysis. Information was obtained from 15 of papers that met the criteria for inclusion.

8. Data Analysis

Articles were selected using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology, which is conducted systematically following the correct research phases or protocols. This systematic review process consists of several steps.

- 1) Gather background information and objectives.
- 2) Research question.
- 3) Literature search.
- 4) Selection criteria.
- 5) Practical screening.
- 6) Quality checklists and procedures.
- 7) Data extraction strategies.
- 8) Data synthesis strategies.

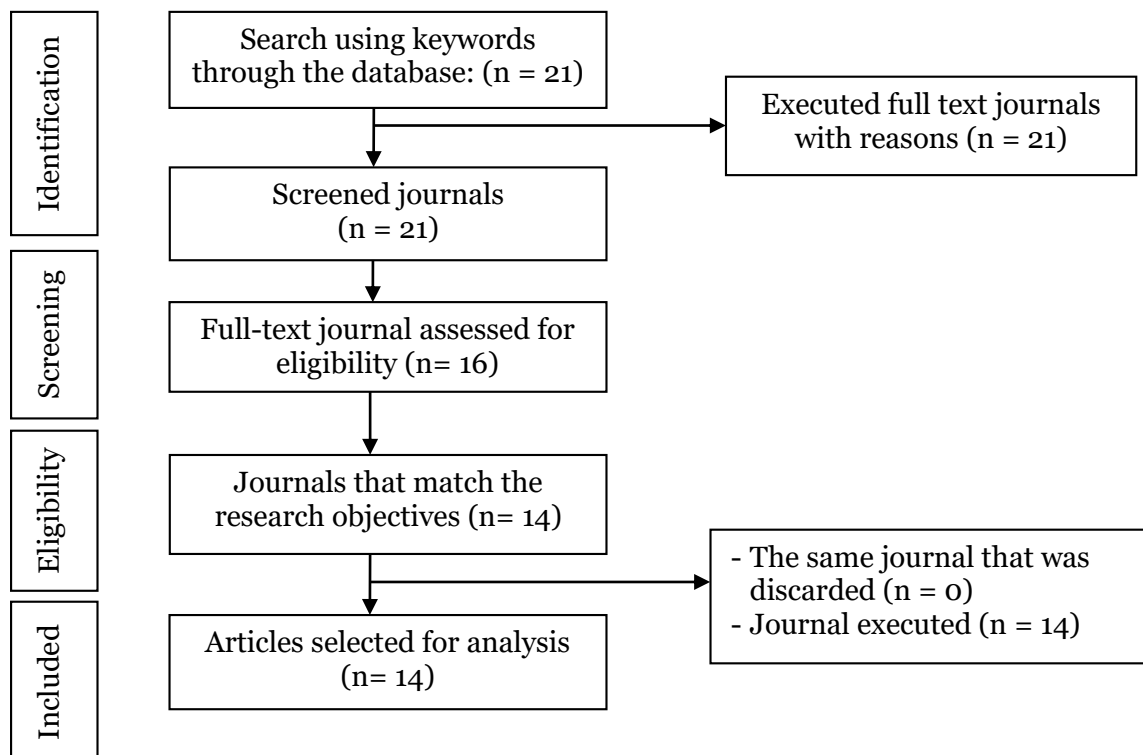


Figure 1. Diagram PRISMA flow diagram of Improving Students' Oral Hygiene Through School Dental Health Program

RESULTS

Based on the search results using pre-determined keywords and inclusion criteria as well as time constraints, this systematic review found a total of 21 articles relevant to the research topic. After the screening process, 4 articles were excluded because they did not meet the inclusion criteria, leaving 16 articles. Further screening regarding relevant research objectives, based on this screening 2 articles did not have objectives relevant to this study, leaving 15 articles to be used and reviewed in this study.

After obtaining 14 articles for review, a summary of the 14 articles discussing the effectiveness of the School Dental Health Program (UKGS) in improving students' oral hygiene is presented. These studies come from various countries such as Indonesia, Nepal, Sudan, India, and Brazil, employing diverse research methods including randomized controlled trials, quasi-experimental designs, and meta-analyses.

Generally, these studies indicate that the UKGS Program has the potential to improve students' oral hygiene knowledge, attitudes, and practices. However, the program's effectiveness is not always consistent and is influenced by various factors

such as the educational methods used, program duration, parental and teacher involvement, and the students' socio-economic status.

For example, a study by Subedi et al. (2021) in Nepal showed that a three-month dental health education program successfully enhanced students' oral hygiene knowledge, attitudes, and practices while reducing plaque and gingiva scores. Another study by Kashyap et al. (2022) in India demonstrated that game-based educational methods were more effective in enhancing students' oral hygiene performance compared to conventional methods.

It is important to note that some studies show that the UKGS Program is not always effective in reducing the incidence of caries. This may be due to other factors such as diet and access to adequate dental care.

Thus, these studies provide a comprehensive overview of the effectiveness of the UKGS Program but also highlight the importance of designing and implementing the program in a structured manner, considering the factors that influence its effectiveness. For more details about the research results of the 14 articles (Table 1).

Table 1. Summary of burden of Improving Students' Oral Hygiene Through School Dental Health Program

Author (Year)	Region	Objective	Sample Size	Method	Result
Subedi et al. (2021)	Dharan city, Nepal	The aim of this study was to assess the effectiveness of an dental health education (OHE) intervention on dental health knowledge, attitudes and practices (KAP), plaque control and gum health among school children aged 12-15 years in	The sample size was 120 school children, with 120 children in the intervention group and 120 children in the control group.	The method used was a randomized controlled trial.	There was 54.58% improvement in overall oral hygiene KAP in experimental group ($p = 0.001$) whereas no improvement was seen in control group at the end of the study. The mean plaque score was improved by 57.67% ($p = 0.001$) in experimental group in comparison to 4.56% in control group. Gingival index was improved by 49.90% ($p = 0.001$) in experimental group in

Author (Year)	Region	Objective	Sample Size	Method	Result
		Dharan city, Nepal.			comparison to 0.7% in control group. Caries experience was increased in both groups but no significant difference was seen
Abdullah et al. (2024)	Makassar Regional Government	To find out about the UKGS program on the level of oral hygiene of children at SD Inpres Unggulan BTN, Makassar Regional Government	The sample in this study was 85 children from SD Inpres Unggulan BTN Pemda Makassar	The method used is a quantitative method, with a cross-sectional design. Data from the OHI-S examination results and interview results will be analyzed using SPSS 23	The application of UKGS at the Unggulan BTN Primary School, Pemda, in this research shows that there is no relationship between UKGS and dental and oral hygiene in students, however there are still several other factors that support the dental and oral hygiene of students at the Unggulan BTN Primary School, Makassar Pemda, such as children's behavior, mother's knowledge, the student's surrounding environment and economic factors.
Jaime et al. (2015)	Monte Sião, Brazil	This 3-year retrospective controlled clinical trial assessed the effect of a school-based oral health education program on the incidence of caries in children.	A total of 240 students, aged 5 to 7 years, from two public schools in Monte Sião, Brazil, were included in the study	The method used in this research is a retrospective controlled clinical trial.	More students from the experimental group stated knowing what was dental caries and declared that they use dental floss daily, but no significant differences in caries incidence was observed between the experimental and control groups
Kurniawati et al. (2023)	Kartasura, Central Java	The aim of this study was to determine the effectiveness of school dental health education programs on the knowledge, attitudes, practices, and oral hygiene status of elementary school students	The research was conducted on 310 elementary school students in Kartasura, Central Java.	This research is a quasi-experiment with pre and post tests without control group design.	The results showed an increase of knowledge (p-value=0.00), attitude and practice (p-value = 0.02); and a decrease in the mean of PHP-M (p-value = 0.01) after the intervention. In conclusion, school dental health education programs are effective in increasing the knowledge, attitudes, practice and oral hygiene status of elementary school children.
Heriyanto et al. (2018)	Bandung City, Indonesia	The purpose of this study was to determine the effect of school dental health education programs through interactive videos	The sample was taken by purposive sampling, as many as 30 people	The type of research conducted was quasi-experimental with a pre-post two group experimental design	The Statistical Test uses Mann Whitney Test Analysis at 95% confidence level. The results showed that dental health education programs through interactive videos and calendars had a statistical effect on changes

Author (Year)	Region	Objective	Sample Size	Method	Result
		and calendars on changes in tooth brushing behavior in elementary school age children at SDN ArcamanikEndah and SDN Mekarjaya and their families			in tooth brushing behavior in elementary school-aged children and their families in Bandung's SDN ArcamanikEndah (p <0.001)
Kosasih et al. (2021)	Bandung Regency, Indonesia	This research was conducted to assess the effect of little doctor training on the knowledge, attitudes and skills of little doctors, as well as on teeth brushing skills and patterns in Bandung Regency, Indonesia	A total of 12 little doctors and 291 school children in grades 4-6 of elementary school from four state schools were included in this study. Evaluation of tooth brushing patterns at school is carried out every month for 3 months.	This research uses a quasi-experimental design with pretest and posttest. The instrument consists of a knowledge and attitude questionnaire, observation sheet, and checklist sheet.	School-based dental and oral health education methods involving small doctors are effective in improving dental and oral hygiene in elementary school children.
Moin et al. (2021)	Karachi, Pakistan	This study is aimed at using different interventions to evaluate the improvement of oral hygiene in hearing impaired children.	Twelve schools for disabled children in Karachi city. Out of these twelve, three schools IDAREU, Deaf Reach, and JS Academy for deaf agreed to participate	This research used a randomized controlled trial method	Maintaining oral health requires the compliance of individuals to perform different methods of preventive dentistry, such as tooth brushing and use of dental floss. The use of different oral hygiene educational interventions such as pictorial and video methods have been proven and useful for hearing impaired children in improving oral health.
Shenoy and Sequei (2010)	Mangalore City, Karnataka State, India.	To determine the effectiveness of school DHE, conducted at repeated and differing intervals, in improving oral health knowledge, practices, oral hygiene status, and the gingival health of schoolchildren belonging to two socioeconomic	This 36-week duration study assessed the effectiveness of school DHE conducted every three weeks against every six weeks on oral health knowledge, practices, oral hygiene status and gingival health of 415, 12- to 13-year-old	This research used a randomized controlled trial method	Plaque and Gingival score reductions were highly significant in intervention schools, and were not influenced by the socioeconomic status. When oral health knowledge was evaluated, highly significant changes were seen in intervention schools; more significantly in schools receiving more frequent interventions. The socioeconomic status influenced the oral hygiene aids used and the frequency of change of toothbrush.

Author (Year)	Region	Objective	Sample Size	Method	Result
		classes	schoolchildren belonging to social classes I and V		Controls showed no significant changes throughout
Kashyap et al. (2022)	Lucknow City, India	The aim of this study was to compare the effectiveness of conventional and game-based oral health education on oral hygiene performance of 12-year-old private school children of Lucknow city	The study population aged 12 years comprised 160 participants.	This research used a randomized controlled trial method	As the knowledge scores of children increased and debris score and plaque score decreased considerably, thereby the implementation of game-based oral health education program is an easy and effective method in improving the oral health and preventing oral diseases
Albani et al. (2024)	Sudan	The aim of this research was to determine the state of oral hygiene in dental students before and after the interventional health education program.	The research sample consisted of 119 students of dentistry in their first and fourth years of study.	This research uses a longitudinal cross-sectional study method.	There was a statistically significant difference in the examined population between the beginning of the study and after the health education intervention program. Although a significant improvement in oral hygiene and oral health was noticed after the health education intervention program, the state of oral hygiene was still not at a satisfactory level among the dental students, contrary to our expectations.
Angelopoulos et al. (2014)	Yunani	This study aimed to evaluate the effects of school-based oral health education program on oral health in school children in Sudan	423 school children were randomly allocated into the control (n = 211) and study (n = 212) groups.	A quasi-experimental study was conducted at four governmental schools in Khartoum, Sudan, between August 2018, and March 2022.	The study concluded that education program on oral health improved students' oral health knowledge and practices. Imposing theoretical and practical lessons on oral and dental health in school curricula can motivate students to maintain oral health care, and this improves oral health status.
Kumar et al. (2013)	Andhra Pradesh, India.	The aim of this project was to compare the effectiveness of experiential learning (EL) and traditional lecturing (TL) school-based oral health education on the oral health knowledge, attitude, habits,	Eighty-seven children for the EL group and 80 for the TL group were selected from two areas of Greece.	This study used a prospective clinical trial method with two groups, namely the experiential learning (EL) group and the traditional lecturing (TL) group.	School-based oral health EL for adolescents was found to be more effective than TL in improving oral health attitude and behaviour at 6 months, in improving oral hygiene and gingival health at both 6 and 18 months and in reducing caries incidence 18 months post-intervention

Author (Year)	Region	Objective	Sample Size	Method	Result
Subedi et al. (2021)	Dharan sub-metropolitan city, Nepal	oral hygiene, gingival health and caries incidence of 13-year-old Greek children. Evaluating the effectiveness of a Dental Health Education program with and without involving Self Maintainable Oral hygiene skills among the institutionalized visually impaired children in Chittoor and Nellore Districts of Andhra Pradesh, India.	The study involved 159 children aged 5-17 years of age from two separate institutes in Chittoor and Nellore districts of Andhra Pradesh, India.	A single blind, controlled, repeated measure trial to study the effects of health education program involving with and without self-maintainable oral hygiene skills among visually impaired children of two different visually impaired institutes was designed.	Results showed that health education is beneficial in improving oral hygiene of the visually impaired children and are able to perform self-maintainable skills taught to them with relative ease
Sanaeinasab et al. (2022)	Tehran, Iran	The objective of this study was to assess the effectiveness of an oral health education (OHE) intervention on oral hygiene knowledge, attitude and practices (KAP), plaque control and gingival health among 12–15 years old school children	The sample size was 240 children, with 120 children in the intervention group and 120 children in the control group.	The research method used was a randomized controlled trial with two groups, namely an intervention group and a control group.	The study concluded that oral health education was effective in improving oral hygiene KAP, plaque control and gingival health.
Subedi et al. (2021)	Dharan city, Nepal	The aim of current study was to examine the effects of an educational program based on a Health Belief Model (HBM) to improve oral health behaviors of elementary school children.	112 children ages 6–12 years old accompanied by one of their parents were randomly assigned to intervention/test and control groups.	The method used in this research is a randomized controlled trial. This study compared two groups, namely the intervention group and the control group.	An education program based on HBM may be more effective than current methods used to educate children and their parents on optimal oral health behaviors. Administration of interventions of this type along with other school-based programs to prevent dental caries may be helpful in grade-school children.

DISCUSSION

1. Effectiveness of the UKGS Program

a. Improvement in Knowledge, Attitudes, and Oral Hygiene Practices

The UKGS program has been proven effective in increasing students' knowledge, attitudes, and practices regarding oral hygiene. Research shows that children experienced a significant increase in KAP scores (knowledge, attitudes, practices) after participating in the program, indicating that students not only understand the importance of maintaining oral hygiene but also strive to apply good practices in their daily lives. This is demonstrated by the research findings, such as the study by Subedi et al. (2021), which showed that a three-month dental health education program successfully improved students' knowledge, attitudes, and practices.

b. Decrease in Plaque and Gingival Scores

Besides increasing knowledge, the UKGS program is also effective in reducing plaque and gingiva scores, indicating that students are more aware and active in maintaining their dental cleanliness, positively impacting overall oral health. This is demonstrated by studies, such as the one by Subedi et al. (2021), which found that the three-month dental health education program significantly reduced plaque and gingiva scores.

Based on these findings, a study conducted by Kashyap et al. (2022) also showed that game-based educational methods were more effective in improving students' oral hygiene performance compared to conventional methods. This shows that the use of interesting and interactive educational methods in the UKGS program can increase student motivation and understanding of the material presented. Kurniawati et al. (2023) also found that dental health education programs in schools were effective in improving the knowledge, attitudes, and

practices, as well as the oral hygiene status of elementary school students.

Nevertheless, it is important to note that some studies indicate that the UKGS program is not always effective in reducing the incidence of dental caries. This may be due to other factors influencing dental health, such as diet and access to adequate dental care services.

2. Factors Affecting the Effectiveness of the UKGS Program

a. Frequency and Duration of the Program

The frequency and duration of the UKGS program are important factors influencing the effectiveness of the program. The study by Shenoy and Sequeira (2010) showed that regularly repeated dental health education programs are more effective in improving students' knowledge, practices, oral hygiene status, and gingival health. These findings indicate that more frequent and sustained UKGS programs have a greater impact on students' knowledge and practices.

b. Educational Methods

The educational methods used in the UKGS program also significantly impact the program's effectiveness. Kashyap et al. (2022) found that game-based educational methods are more effective in improving students' oral hygiene performance compared to conventional methods. This indicates that using engaging and interactive educational methods, such as games, can enhance students' motivation and understanding of the delivered content.

c. Parent and Teacher Support

The involvement of parents and teachers is crucial for the success of the UKGS program. The study by Subedi et al. (2021) showed that parental and teacher involvement can provide moral support and motivation for students to practice good oral hygiene habits. Support from parents at home and guidance from teachers at school can create

a conducive environment for students to apply good oral hygiene practices.

d. Socioeconomic Factors

The socioeconomic status of students can influence their access to dental health services, including the UKGS program. The study by Shenoy and Sequeira (2010) showed that students from lower socioeconomic backgrounds might face more barriers in accessing dental health services.

3. Recommendations

To achieve optimal results, the UKGS program should be conducted regularly and with a longer duration, allowing students to receive more in-depth and continuous teaching on oral hygiene. The use of engaging and interactive educational methods, such as integrating technology like educational videos, games, and live demonstrations, is highly recommended to make learning more interesting for students. Furthermore, it is important to involve parents and teachers in the UKGS program as their involvement not only provides moral support but also motivation for children to apply the good habits they have learned. Additionally, the program should be designed to address gaps in access to dental health services, particularly for children from underprivileged families by providing more affordable and accessible services in communities in need.

Overall, the UKGS Program has great potential in improving students' oral hygiene. However, to achieve optimal results, the program needs to be well-designed and consistently implemented by considering various factors that influence its effectiveness. By implementing the recommendations mentioned, it is hoped that the UKGS program can be more successful in improving oral health among students.

AUTHOR CONTRIBUTION

All researchers have contributed to the

writing of the manuscript and approved the final version of the manuscript for publication

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CONFLICT OF INTEREST

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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