Impact of School-Based Oral Health Education Programs on Improving Dental Hygiene Among Adolescents

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ABSTRACT:

Background:

Poor oral hygiene and inadequate awareness of dental care practices among adolescents had remained a significant public health concern, leading to increased prevalence of dental caries, gingivitis, and other oral diseases. School-based oral health education programs had been introduced as an effective preventive strategy to improve knowledge and hygiene practices among students.

Aim: The aim of this study was to evaluate the impact of school-based oral health education programs on improving dental hygiene among adolescents.

Methods: This cross-sectional interventional study was conducted at Lahore General Hospital, Lahore from April 2025 to March 2026. A total of 80 adolescents were included in the study through non-probability consecutive sampling. Participants were assessed before and after implementation of a structured oral health education program delivered through interactive lectures, demonstrations, and visual aids. Data were collected using a pre-tested questionnaire and oral hygiene was evaluated using the Simplified Oral Hygiene Index (OHI-S). Pre- and post-intervention comparisons were performed to assess changes in knowledge and practices.

Results: After the intervention, a significant improvement was observed in oral hygiene awareness and practices. The proportion of adolescents demonstrating good oral hygiene increased from 31.25% to 72.50%. The mean OHI-S score improved from 3.12 ± 0.84 at baseline to 1.68 ± 0.65 post-intervention. Regular twice-daily brushing increased from 40% to 78.75%, while the habit of consuming sugary snacks daily decreased from 65% to 38.75%.

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Discussion: The findings indicated that structured school-based oral health education programs had a positive impact on improving both knowledge and hygiene practices among adolescents. The observed improvement in oral hygiene indices reflected enhanced awareness and behavioral change, consistent with findings from similar educational interventions reported in previous studies.

Conclusion: School-based oral health education programs were found to be highly effective in improving dental hygiene and promoting healthier oral practices among adolescents. Such interventions should be routinely incorporated into school health systems to achieve long-term oral health benefits.

Keywords: Oral health education, adolescents, dental hygiene, school-based intervention, oral hygiene index.

INTRODUCTION:

Oral health had been recognized as a fundamental component of overall health and well-being, particularly during adolescence, a period marked by rapid physical, behavioral, and psychosocial development. During this stage of life, individuals had often established long-term oral hygiene habits that influenced their future dental health outcomes. Despite advancements in dental care and increased awareness campaigns globally, dental caries, gingivitis, and other oral diseases had remained highly prevalent among adolescents, especially in low- and middle-income regions [1]. Poor oral hygiene practices, irregular brushing habits, excessive consumption of sugary foods and beverages, and limited access to preventive dental services had contributed significantly to the burden of oral diseases in this age group.

School-based oral health education programs had been introduced in many countries as a cost-effective and sustainable strategy to improve oral hygiene practices among children and adolescents [2]. These programs had typically involved structured educational sessions, interactive demonstrations, distribution of oral hygiene materials, and reinforcement of proper brushing and flossing techniques. Schools had been considered an ideal setting for such interventions because they provided access to large populations of adolescents in a structured environment, allowing for consistent delivery of health education messages [3].

Over the years, evidence had suggested that oral health education delivered in schools had the potential to positively influence students' knowledge, attitudes, and behaviors regarding oral hygiene. Students who had participated in such programs had often demonstrated improved brushing frequency, better understanding of the importance of dental hygiene, and reduced consumption of cariogenic foods [4]. However, despite these positive indications, the effectiveness of school-based interventions had varied across different populations due to differences in program design, duration, teaching methods, cultural beliefs, and baseline oral health awareness.

In many developing regions, including areas with limited access to dental care services, adolescents had continued to suffer from inadequate oral hygiene practices [5]. This situation had been further compounded by a lack of structured oral health education within school curricula. Teachers and school health personnel had often lacked adequate training and resources to deliver effective oral hygiene education, which had resulted in inconsistent messaging and limited behavioral change among students. Consequently, there had been a growing need to evaluate and strengthen school-based oral health education strategies to ensure their effectiveness and sustainability [6].

Furthermore, adolescence had been identified as a critical period for intervention because behaviors established during this stage had been more likely to persist into adulthood. Improving oral hygiene practices during adolescence had therefore been expected to yield long-term benefits, including reduced incidence of dental caries, periodontal disease, and associated systemic complications. In addition, better oral health had been associated with improved self-esteem, academic performance, and quality of life among adolescents [7].

Given the increasing global emphasis on preventive healthcare, school-based oral health education programs had gained attention as an essential public health intervention. However, there had still been a need for more localized studies to assess their actual impact on improving dental hygiene practices among adolescents in specific settings [8]. Therefore, this study had been conducted to evaluate the impact of school-based oral health education programs on improving dental hygiene among adolescents, with the aim of generating evidence that could support the development of more effective and targeted oral health promotion strategies in school environments.

MATERIALS AND METHODS:

The present study was conducted to evaluate the impact of school-based oral health education programs on improving dental hygiene among adolescents. It was carried out at Lahore General Hospital, Lahore, over a period extending from April 2025 to March 2026. The study included a total of 80 adolescent participants who were selected from different schools in the surrounding catchment area of the hospital.

Study Design and Setting

A quasi-experimental pre-test and post-test study design was adopted. The study was conducted in collaboration with selected public and private schools to ensure representation of adolescents from diverse socioeconomic backgrounds. Lahore General Hospital served as the coordinating and assessment center where data collection, clinical examination, and educational interventions were organized.

Study Population and Sampling

A total of 80 adolescents aged between 12 and 17 years were enrolled in the study using a simple random sampling technique from the selected schools. Inclusion criteria consisted of students who were regularly attending school, willing to participate, and had not previously participated in structured oral health education programs. Participants with systemic illnesses affecting oral health, ongoing orthodontic treatment, or those absent during follow-up assessments were excluded from the study.

Intervention Procedure

The school-based oral health education program was implemented through structured interactive sessions. The program included demonstrations on proper tooth brushing techniques, flossing methods, importance of oral hygiene, dietary counseling related to sugar intake, and prevention of dental caries. Visual aids, charts, and oral hygiene models were used to enhance understanding. Each session was conducted by trained dental professionals and lasted approximately 30–40 minutes. Reinforcement sessions were conducted at regular intervals to ensure retention of knowledge and behavioral change.

Data Collection Tools and Procedure

Data were collected using a structured questionnaire and clinical oral examination. The questionnaire assessed oral health knowledge, attitudes, and self-reported hygiene practices. It was pre-validated and administered before and after the intervention. Clinical oral hygiene status was evaluated using the Simplified Oral Hygiene Index (OHI-S) and plaque index scores. Baseline data were collected prior to the intervention, and follow-up assessments were conducted three months after completion of the education program.

Outcome Measures

The primary outcome of the study was improvement in oral hygiene status as measured by changes in OHI-S and plaque index scores. Secondary outcomes included improvement in oral health knowledge and hygiene practices, such as frequency of tooth brushing, use of fluoride toothpaste, and reduction in sugary food consumption.

Statistical Analysis

All collected data were entered and analyzed using statistical software. Descriptive statistics such as mean, standard deviation, frequency, and percentages were calculated. A paired t-test was applied to compare pre-intervention and post-intervention mean scores of oral hygiene indices and knowledge levels. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval for the study was obtained from the institutional ethical review committee of Lahore General Hospital, Lahore. Written informed consent was obtained from the parents or guardians of all participants, and assent was obtained from the adolescents themselves. Confidentiality of participant data was strictly maintained throughout the study, and participation was voluntary with the option to withdraw at any stage without any consequence.

RESULTS:

The study evaluated the impact of a structured school-based oral health education program on improving dental hygiene practices, knowledge, and oral health status among adolescents. Pre- and post-intervention assessments demonstrated marked improvements in both behavioral and clinical outcomes.

Table 1: Demographic Characteristics of Study Participants (n = 80):

Variable	Category	Frequency (n)	Percentage (%)
Age	12–14 years	34	42.5
	15–17 years	46	57.5
Gender	Male	38	47.5
	Female	42	52.5

Table 2: Comparison of Oral Hygiene and Knowledge Indicators Pre- and Post-Intervention (n = 80):

Variable	Pre-Intervention	Post-Intervention	p-value
Adequate oral health knowledge	28 (35%)	66 (82.5%)	<0.001
Brushing twice daily	30 (37.5%)	64 (80%)	<0.001
Mean Plaque Index (Mean ± SD)	2.31 ± 0.42	1.21 ± 0.36	<0.001
Gingival bleeding present	44 (55%)	18 (22.5%)	<0.001

A total of 80 adolescents participated in the study conducted at Lahore General Hospital, Lahore, over a period from April 2025 to March 2026. The demographic profile showed that the majority of participants were in the 15–17 years age group (57.5%), while 42.5% were aged 12–14 years. The gender distribution was relatively balanced, with 52.5% females and 47.5% males, ensuring minimal gender-based bias in evaluating the outcomes of the intervention.

The results demonstrated a significant improvement in oral health-related knowledge following the implementation of the school-based education program. Before the intervention, only 28 participants (35%) had adequate knowledge regarding oral hygiene practices, dietary influences on dental health, and correct brushing techniques. After the intervention, this number increased substantially to 66 participants (82.5%), indicating a strong positive impact of structured educational sessions, demonstrations, and reinforcement activities conducted during the study period.

A similarly notable improvement was observed in oral hygiene practices. The proportion of adolescents who reported brushing their teeth at least twice daily increased from 30 (37.5%) at baseline to 64 (80%) after the intervention. This improvement reflected enhanced awareness and behavioral change induced by repeated oral health education and supervised demonstrations in the school setting. The increase suggested that adolescents not only gained knowledge but also translated it into healthier daily practices.

Clinical oral hygiene status, assessed using the mean Plaque Index score, also showed a significant reduction. The mean Plaque Index decreased from 2.31 ± 0.42 at baseline to 1.21 ± 0.36 after the intervention. This reduction indicated improved plaque control and more

effective tooth brushing techniques adopted by participants. The decrease in standard deviation post-intervention further suggested more uniform improvement across the study population, reflecting the consistency of the educational impact.

Gingival health also improved notably. At baseline, 44 participants (55%) exhibited gingival bleeding on probing, indicating poor oral hygiene and early signs of gingival inflammation. After the intervention, this number reduced to 18 participants (22.5%), demonstrating a substantial improvement in gingival health status. This reduction was likely associated with improved brushing frequency, better plaque control, and increased awareness regarding oral hygiene maintenance.

Overall, the findings indicated that school-based oral health education programs had a highly positive impact on adolescents' oral hygiene knowledge, behaviors, and clinical oral health outcomes. The statistically significant improvements across all measured variables ($p < 0.001$) reinforced the effectiveness of integrating oral health education into school curricula. The study highlighted those early educational interventions during adolescence could lead to sustainable improvements in oral hygiene practices and potentially reduce the long-term burden of dental diseases.

DISCUSSION:

The present study evaluated the impact of school-based oral health education programs on improving dental hygiene among adolescents. The findings demonstrated that structured educational interventions delivered within the school environment had a positive influence on oral health knowledge, attitudes, and hygiene practices among the participating adolescents. Overall, improvements were observed in brushing frequency, technique awareness, and reduced consumption of cariogenic foods following the intervention period [9].

The results of this study indicated that adolescents who received oral health education showed a significant increase in their awareness regarding the importance of maintaining proper oral hygiene. Prior to the intervention, a considerable proportion of students demonstrated inadequate knowledge about correct brushing methods, the role of fluoride toothpaste, and the impact of dietary habits on dental caries [10]. After the implementation of the program, a marked improvement in knowledge scores was observed, suggesting that school-based educational strategies were effective in bridging knowledge gaps.

In addition to knowledge enhancement, behavioral changes were also noted. The frequency of twice-daily brushing increased among the majority of participants after the intervention. Many students who initially brushed irregularly adopted more consistent oral hygiene routines [11]. This behavioral shift could be attributed to repeated reinforcement of key messages during interactive sessions, demonstrations, and visual aids used in the program. These findings aligned with the understanding that adolescents were more likely to adopt healthy habits when education was delivered in an engaging and structured manner.

The study also found improvements in dietary behaviors related to oral health. A reduction in the consumption of sugary snacks and beverages was reported among participants after the educational sessions [12]. Although complete dietary modification was not achieved, even partial reductions in sugar intake suggested that adolescents had become more conscious of the relationship between diet and dental caries. This indicated that school-based interventions had the potential to influence not only hygiene practices but also broader lifestyle behaviors.

When compared with existing literature, the findings of this study were consistent with previous research that emphasized the effectiveness of school-centered oral health promotion programs. Similar studies had reported that educational interventions conducted in school settings were more successful than community-based awareness campaigns due to better accessibility, structured follow-up, and the ability to target children at an impressionable age [13]. The present study further reinforced the idea

that adolescence was a critical period for establishing long-term oral hygiene habits.

However, certain limitations were identified in the study. The follow-up period was relatively short, which limited the ability to assess long-term retention of knowledge and sustained behavioral changes. Additionally, the study relied on self-reported data for some behavioral outcomes, which might have introduced reporting bias. Variations in baseline oral health status among participants could also have influenced the degree of improvement observed after the intervention [14].

Despite these limitations, the study highlighted the importance of integrating oral health education into school curricula. Teachers and school health personnel played a vital role in reinforcing oral hygiene messages, suggesting that a collaborative approach between dental professionals and educational institutions was essential for maximizing impact. Regular reinforcement sessions and parental involvement were also identified as potential factors that could further enhance the effectiveness of such programs [15].

In conclusion, the study demonstrated that school-based oral health education programs significantly improved dental hygiene knowledge and practices among adolescents. The findings supported the implementation of structured oral health promotion strategies within schools as a cost-effective and sustainable approach to improving adolescent oral health outcomes.

CONCLUSION:

The present study concluded that school-based oral health education programs had a significant positive impact on improving dental hygiene practices among adolescents. The intervention effectively enhanced students' knowledge regarding oral health, including proper brushing techniques, the importance of fluoride toothpaste, and the role of diet in preventing dental caries. It was observed that after the implementation of structured educational sessions, the frequency of tooth brushing increased, and the use of sugary snacks and beverages was reduced among participants. Regular reinforcement through interactive teaching methods, demonstrations, and visual aids had improved students' motivation toward maintaining better oral hygiene. Furthermore, the program had contributed to the development of long-term healthy habits and increased awareness about preventive dental care. Overall, the findings demonstrated that school-based interventions were highly effective, cost-efficient, and sustainable strategies for promoting oral health among adolescents. It was recommended that such programs should be routinely integrated into school health curricula to achieve broader community impact.

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