ORIGINAL ARTICLE

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Assessment of the impact of a multimedia-based dental education program on oral health knowledge and practices among high school students: A randomised controlled trial

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Abstract

Introduction: Oral health education is essential for adolescents, yet traditional methods face challenges in engaging this demographic. This study evaluates the effectiveness of a multimedia-based dental education program among high school students. This study was carried out to assess the impact of a comprehensive multimedia-based dental education program on oral health knowledge and practices among high school students.

Methods: A total of 228 students were recruited and randomly assigned to experimental (n=114) and control (n=114) groups. The experimental group received a four-week multimedia program, while the control group followed the standard curriculum. Outcome measures included oral health knowledge scores, brushing frequency, flossing habits, dietary choices, and observational assessments. Statistical analysis employed descriptive statistics, paired t-tests, and analysis of covariance (ANCOVA).

Results: The multimedia-based program led to a significant increase in oral health knowledge scores in the experimental group compared to the control group (Mean Change: 14.6, $p < 0.001$). Moreover, the experimental group demonstrated higher brushing frequency ($p < 0.001$), increased flossing habits ($p < 0.001$), and improved dietary choices ($p < 0.05$). Observational assessments showed higher adherence to oral hygiene practices in the experimental group ($p < 0.001$).

Conclusion: The multimedia-based dental education program effectively improved oral health knowledge and practices among high school students. This approach holds promise for scalable and engaging oral health education strategies.

Keywords: *Multimedia-based Education, Oral Health, Adolescents, Dental Education, Health Promotion, Preventive Dentistry*

Practice Highlights

- Integrated multimedia elements enhanced participant engagement, utilising videos, e-learning modules, and pamphlets.
- Positive shifts in oral health practices observed, with increased brushing and flossing frequencies in the experimental group.

I. INTRODUCTION

Oral health education serves as a cornerstone in empowering adolescents with the knowledge and skills necessary to maintain optimal oral hygiene. By educating young individuals about the importance of regular brushing, flossing, and dental check-ups, as well as the impact of dietary choices on oral health, preventive practices can be instilled early on. This not only helps in

preventing common dental problems like cavities and gum disease but also promotes overall health and quality of life (Nakre & Harikiran, 2013).

Furthermore, addressing oral health education during adolescence is strategic as it provides an opportunity to intervene during a critical developmental stage. By targeting adolescents with effective educational interventions, it becomes possible to shape behavior and instill healthy habits that can last a lifetime. This proactive approach not only benefits the individual's oral health but also reduces the burden on healthcare systems by minimising the need for costly and invasive dental treatments later in life (Tadin et al., 2022).

The increasing prevalence of dental problems presents a significant public health challenge, as untreated oral diseases can lead to pain, discomfort, and even serious complications such as tooth loss, systemic infections, and impaired overall health (Texas Dental Association, 2008). Moreover, dental problems impose a substantial economic burden on healthcare systems, with costs associated with treatment, emergency care, and lost productivity. In light of these challenges, effective educational interventions are crucial for curbing the burden of oral diseases (Ghoneim et al., 2022). Oral health education programs aim to raise awareness about the importance of oral hygiene, preventive measures, and regular dental check-ups. By providing individuals with the knowledge and skills necessary to maintain good oral health practices, these interventions can empower them to take proactive steps to prevent dental problems and minimise their impact (Kassebaum et al., 2017). This study addresses this need by investigating the impact of a multimedia-based dental education program on the oral health knowledge and practices of high school students.

Adolescence represents a critical period for establishing lifelong health behaviors, and oral health is no exception (National Institutes of Health, 2021). Unfortunately, global studies indicate a concerning prevalence of dental issues among adolescents, including dental caries, gingivitis, and poor oral hygiene practices (Agbelusi & Jeboda., 2006, Zhang et al., 2021). Such issues not only impact immediate health but can also lead to long-term consequences, emphasising the urgency of effective oral health education.

Traditional oral health education methods often face challenges in engaging and effectively conveying information to adolescents. Conventional classroom lectures and textbook-based approaches may struggle to capture the attention of this demographic, potentially limiting the efficacy of such interventions. However, there is evidence to suggest that traditional oral health education has been effective in improving oral health knowledge (Angelopoulou et al., 2015), reducing plaque accumulation, and promoting oral health in adolescents (Gousalya et al., 2022). On the other hand, it is important to note that traditional models of oral health education have been criticised for their didactic delivery and failure to acknowledge the individual context and motivations of the recipients (Ford & Farah., 2012).

As technology becomes increasingly integrated into daily life, leveraging multimedia platforms for health education emerges as a promising strategy to enhance engagement and knowledge retention (George et al., 2014).

The primary objective of this study was to assess the effectiveness of a comprehensive multimedia-based dental education program in improving oral health knowledge and promoting positive oral hygiene practices among high school students. By employing a well-structured intervention and rigorous evaluation, this research aims to contribute valuable insights that can inform the design and implementation of future oral health education initiatives.

The significance of this study lies in its potential to inform evidence-based oral health education strategies for adolescents, especially in regions facing resource constraints. If successful, the multimedia-based approach could serve as a scalable and cost-effective model for widespread implementation in school settings. Ultimately, the outcomes may contribute not only to the improvement of oral health outcomes among adolescents in the study setting but also to the development of best practices with broader implications for global oral health promotion.

II. METHODS

A. Intervention
A comprehensive multimedia-based dental education program was developed by a team of experienced dental educators, multimedia designers, and content developers. The program included visually engaging educational videos covering various aspects of oral health, interactive e-learning modules to reinforce key concepts, and informative pamphlets providing supplementary written material.

Throughout the intervention period, the research team closely monitored the attendance and participation of students in both the experimental and control groups. Attendance records, completion rates of e-learning modules, and participation levels in interactive sessions

were meticulously documented to assess the program's adherence.

1) Program feedback and modification: Continuous feedback sessions were held with both students and educators to evaluate the effectiveness of the multimedia-based dental education program. Adjustments and modifications were made in real-time based on feedback received, ensuring the program remained dynamic and responsive to the specific needs and preferences of the participants.

2) Quality assurance: To maintain consistency and quality across program delivery, educators underwent training sessions, and periodic evaluations were conducted to assess their adherence to the prescribed curriculum and teaching methodologies.

B. Study Design

A randomised controlled trial was conducted involving 228 high school students, aged 14 to 18, recruited from four local high schools in Burhanpur, India, after obtaining permission from the school authorities. Institutional Review Board (IRB) approval with approval number GGSCDS&RC/2022/IEC/168 was obtained prior to the start of this study. Students and their parents/guardians were provided with detailed information about the study, and informed consent was obtained from all participants. The study was conducted between January 2022 and December 2023.

A sample size calculation was conducted prior to the initiation of the study to ensure adequate statistical power. Based on previous literature and anticipated effect sizes, the calculation indicated that a sample size of 228 participants would provide sufficient power to detect significant differences in oral health knowledge and practices between the experimental and control groups. Factors such as an alpha level of 0.05, a power of 0.80, and an effect size estimate derived from similar interventions were taken into consideration during the calculation. This approach ensured that the study was adequately powered to detect meaningful differences in the outcomes of interest.

Random assignment of participants to the experimental and control groups was performed using a computer-generated randomisation sequence. The sequence was generated by an independent researcher not directly involved in the implementation of the study. Participants were assigned to the experimental or control group based on their identification numbers, ensuring an equal chance of allocation to either group. This randomisation process helped minimise selection bias and ensure that any differences observed between the groups could be attributed to the intervention rather than systematic differences in participant characteristics.

Given that participants were recruited from multiple local high schools in Burhanpur, India, cluster randomisation was employed to minimise contamination between groups. High schools were considered as clusters, and randomisation was carried out at the school level to prevent potential contamination of intervention effects between students within the same school. This approach helped maintain the integrity of the study design and reduce the risk of cross-group contamination, thereby enhancing the internal validity of the findings.

To address potential biases related to academic performance, we collected demographic information from all participants, including indicators of academic achievement. This information allowed us to assess any confounding variables during data analysis. Additionally, randomisation was employed to ensure that participants with varying academic backgrounds were equally distributed between the experimental and control groups, minimising the impact of academic performance on study outcomes.

1) Experimental group (n=114): Prior to the intervention, informed consent was obtained from both students and their parents/guardians. The multimedia-based dental education program was delivered to the experimental group during regular school hours. The intervention spanned four weeks, with carefully structured sessions designed to cover topics such as oral anatomy, proper brushing and flossing techniques, the impact of diet on oral health, and the importance of regular dental check-ups. Each week, students participated in interactive discussions, watched educational videos, completed e-learning modules, and received informational pamphlets to reinforce the acquired knowledge. To ensure engagement and understanding, the program incorporated quizzes, group activities, and open discussions facilitated by trained dental educators.

2) Control group (n=114): The control group received the standard oral health education provided as part of the existing school curriculum. The standard curriculum included traditional classroom lectures, textbook readings, and basic demonstrations of oral hygiene practices. No additional multimedia resources were introduced to the control group to maintain a clear distinction from the experimental group.

C. Development of Survey Instrument

The survey instrument utilised for baseline assessment underwent a rigorous validation process to ensure its reliability and validity in measuring participants' oral health knowledge. The validation process included several key steps aimed at enhancing the quality and accuracy of the survey instrument.

The survey items were delved based on an extensive review of existing literature on oral health knowledge among adolescents. Content experts in the fields of dentistry, public health, and education were consulted to ensure that the survey items adequately covered essential concepts related to oral health.

Prior to the commencement of the main study, a pilot test of the survey instrument was conducted with a small group of high school students similar to the study population. Feedback from the pilot test participants was carefully analysed, and adjustments were made to the wording and clarity of the survey items based on their input.

The survey instrument underwent thorough review by a panel of experts comprising professionals from diverse backgrounds, including dentistry, education, and survey design. The expert panel assessed the relevance, comprehensibility, and appropriateness of the survey items for the target population, providing valuable feedback for further refinement.

D. Outcome Measurements and Analysis

In this study, a comprehensive set of outcome measures was employed to assess the impact of the intervention on participants' oral health knowledge and practices. The study commenced with a baseline assessment, during which demographic data, oral health history, and participants' knowledge of oral health practices were collected. Throughout the four-week intervention period, participants' oral health practices were evaluated weekly through self-reports and observations, ensuring continuous monitoring of their adherence and engagement with the program. Following the intervention, a post-intervention assessment was conducted, and participants' oral health practices were monitored for an additional two weeks to assess the sustainability of behavior changes beyond the intervention period.

1) Pre-intervention assessment: Before the initiation of the intervention, a thorough baseline assessment of participants' oral health knowledge was conducted using validated surveys (Appendix A). These surveys covered a wide spectrum of oral health concepts, including the anatomy of teeth and gums, the significance of fluoride, and common dental diseases. Individual knowledge scores were calculated, establishing a baseline measure for each participant, with the maximum score for the knowledge assessment set at 100 (Appendix B).

2) Post-intervention assessment: Following the four-week intervention period, participants from both the experimental and control groups underwent a post-intervention survey (Appendix C). This survey mirrored the pre-intervention assessment and allowed for a direct comparison of changes in knowledge. Individual knowledge scores were recalculated, and the difference between pre- and post-intervention scores was used to quantify the impact of the educational program.

3) Brushing frequency: Participants' brushing habits were assessed through a combination of self-reporting and observation. Each participant maintained a detailed log, recording the frequency and duration of their toothbrushing activities. Trained researchers also conducted periodic observations to validate self-reported data, enhancing the reliability of the findings.

4) Flossing habits: Similar to brushing, participants self-reported their flossing habits, detailing the frequency and thoroughness of their flossing routine. Periodic checks were conducted to corroborate self-reported data, ensuring the accuracy of the information gathered.

5) Dietary choices: The study assessed participants' dietary habits related to oral health, including the consumption of sugary snacks and beverages. Dietary logs and self-reporting were used, and nutritional assessments were conducted to evaluate participants' awareness of the relationship between diet and oral health.

Trained researchers conducted periodic observations to assess participants' oral health practices in a naturalistic setting. This included direct observations of toothbrushing and flossing routines, as well as an assessment of participants' adherence to recommended oral hygiene practices.

Throughout the study, continuous monitoring and quality checks were implemented to ensure the accuracy and reliability of the outcome measures. Any deviations or unexpected trends in the data were promptly investigated, and corrective actions were taken as needed. This approach ensured the robustness of the study's outcome assessments.

Descriptive statistics were employed for demographic data. Paired t-tests were used to compare pre- and post-intervention knowledge scores. Analysis of covariance (ANCOVA) was conducted to assess the impact of the intervention on oral health practices, controlling for baseline differences. IBM SPSS Statistics software (version 22.0) was utilised for data analysis, with a predetermined significance level set at $p < 0.05$.

III. RESULTS

The demographic characteristics table illustrates a well-balanced study population, with both the experimental and control groups having similar age distributions (16.2 ± 1.0 vs. 16.1 ± 0.9) and gender representation (Male/Female: 56/58 vs. 55/59). Baseline knowledge scores align closely, with mean scores of 45.2 (experimental) and 44.8 (control) and standard deviations of 8.3 and 8.1, respectively (Table 1).

Group	Experimental (n=114)	Control (n=114)	Total (N=228)
Age (Mean ± SD)	16.2 ± 1.0	16.1 ± 0.9	16.15 ± 0.95
Gender (Male/Female)	56/58	55/59	111/117
Mean Knowledge Score (Pre-Intervention)	45.2	44.8	
SD (Pre-Intervention)	8.3	8.1	

Table 1. Demographic characteristics and baseline knowledge scores

The post-intervention knowledge scores show a substantial improvement in the experimental group (59.8 ± 7.5) compared to the control group (46.2 ± 8.5). The mean change in knowledge scores is notably higher in the experimental group (14.6) compared to the control group (1.4), demonstrating the statistically significant impact of the multimedia-based dental education program ($p < 0.001$) (Table 2).

Group	Experimental	Control
Mean Knowledge Score (Post-Intervention)	59.8	46.2
SD (Post-Intervention)	7.5	8.5
Mean Change in Knowledge Score	14.6	1.4
p-value (Paired t-test)	<0.001	0.205

Table 2. Primary outcome - Oral health knowledge scores

The secondary outcomes highlight positive changes in oral health practices within the experimental group. Participants in this group demonstrated higher mean brushing frequency (14.3 vs. 12.7 times/week) and flossing frequency (3.2 vs. 1.5 times/week). Furthermore, there was a substantial reduction in sugary snacks (25% vs. 5%) and an increase in healthy dietary choices (20% vs. 7%) within the experimental group, supported by a significant p-value ($p < 0.05$) (Table 3).

Group	Experimental	Control
Mean Brushing Frequency (times/week)	14.3	12.7
SD (Brushing Frequency)	2.1	2.5
Mean Flossing Frequency (times/week)	3.2	1.5
SD (Flossing Frequency)	1.8	1.2
% Reduction in Sugary Snacks	25%	5%
% Increase in Healthy Dietary Choices	20%	7%
p-value (Chi-square test)	<0.05	--

Table 3. Secondary outcomes - Oral health practices

Observational assessments reveal a higher percentage of high adherence in the experimental group (75%) compared to the control group (40%). Program adherence monitoring further supports these findings, with the experimental group showing higher average attendance (3.8 vs. 3.5), completion rates of e-learning modules (95% vs. 80%), and participation in interactive sessions (90% vs. 75%) (Table 4).

Group	Experimental	Control
High Adherence (%)	75%	40%
Moderate Adherence (%)	20%	50%
Low Adherence (%)	5%	10%
p-value (Chi-square test)	<0.001	--
Average Attendance (out of 4 weeks)	3.8	3.5
Completion Rate of E-learning Modules	95%	80%
Participation in Interactive Sessions	90%	75%

Table 4. Observational assessments and program adherence monitoring

Participants in the experimental group expressed higher overall satisfaction (8.9 vs. 6.5) and perceived educational value (9.2 vs. 5.8) compared to the control group. Moreover, 95% of participants in the experimental group expressed willingness to recommend the program, while only 45% in the control group were inclined to do so. These feedback indicators affirm the positive reception of the educational intervention (Table 5).

Group	Experimental	Control
Overall Satisfaction (Scale 1-10)	8.9	6.5
Perceived Educational Value (Scale 1-10)	9.2	5.8
Willingness to Recommend Program	95%	45%

Table 5. Program feedback

IV. DISCUSSION

Oral health education is a crucial component of overall health promotion, particularly among adolescents who are at a critical stage in developing lifelong habits. The present study aimed to evaluate the effectiveness of a multimedia-based dental education program on oral health knowledge and practices among high school students in India.

The primary outcome of the study revealed a substantial improvement in oral health knowledge among participants who underwent the multimedia-based dental education program. The mean change in knowledge scores for the experimental group was 14.6, indicating a significant positive impact ($p < 0.001$). This aligns with existing literature emphasising the efficacy of multimedia approaches in enhancing health education outcomes (Smith et al., 2020). Interactive and visually engaging materials, such as videos and e-learning modules, have been shown to effectively convey health information, promoting better retention and understanding (George et al., 2014).

The significant increase in post-intervention knowledge scores supports the notion that multimedia interventions can effectively bridge gaps in oral health literacy (Sharma et al., 2022). These findings are consistent with studies that highlight the advantages of incorporating technology-based educational tools in oral health promotion programs (Ardekani et al., 2022; Scheerman et al., 2018).

Beyond knowledge enhancement, the study demonstrated positive changes in oral health practices among participants in the experimental group. The increased mean brushing frequency (14.3 times/week) and flossing frequency (3.2 times/week) in the experimental group compared to the control group ($p < 0.001$) underscores the program's impact on promoting healthier oral hygiene habits.

Research has consistently shown that knowledge alone may not necessarily translate into behavioral change (Prochaska & Velicer., 1997). However, the multifaceted approach of the multimedia-based program, incorporating educational videos, interactive modules, and pamphlets, appears to have effectively influenced participants' behaviors. This is in line with the Health Belief Model, which posits that enhancing knowledge, perceived susceptibility, and perceived benefits can contribute to behavior change (Rosenstock et al., 1998).

The study's examination of dietary choices adds a valuable dimension to the outcomes, revealing a reduction in sugary snack consumption and an increase in healthy dietary choices among participants in the experimental group ($p < 0.05$). This is consistent with broader public health efforts that emphasise the role of diet in oral health (Scardina & Messina, 2012, Tungare & Paranjpe, 2023). The observed positive changes in dietary habits align with the socio-ecological model, which underscores the impact of individual, interpersonal, and environmental factors on health behavior (McLeroy et al., 1988).

The multimedia approach likely played a crucial role in conveying the link between diet and oral health. Interactive elements and visual aids may have heightened participants' awareness, contributing to better-informed dietary choices (Pouriayevali et al., 2023).

Program adherence monitoring revealed high levels of engagement among participants in the experimental group. The average attendance, completion rates of e-learning modules, and participation in interactive sessions were consistently higher compared to the control group. This robust program adherence is indicative of the acceptability and perceived value of the multimedia-based dental education program among the participants.

Participant feedback further substantiates the program's success. High levels of overall satisfaction (8.9 out of 10) and perceived educational value (9.2 out of 10) reinforce the positive reception of the program. Moreover, the overwhelmingly high willingness to recommend the program (95%) underscores the potential for scalability and sustained impact.

The choice of Burhanpur, a town in central part of India, as the study setting is particularly relevant. India grapples with a significant oral health burden, with a high prevalence of dental diseases among its population (Gambhir et al., 2013). Adolescents in semi-urban and rural areas often face challenges in accessing adequate oral health education, necessitating innovative approaches to bridge this gap. Burhanpur town, as a representative setting, allows for insights that can be extrapolated to similar regions, contributing to the broader discourse on effective oral health interventions.

While the standard curriculum included live demonstrations of oral hygiene practices, it's important to recognise that traditional pedagogical methods may not always effectively engage students, particularly in high school settings where attention spans can be limited. Live demonstrations, while valuable, may not always fully capture the interest and participation of students, especially when presented in isolation from interactive and immersive learning experiences. Despite the inclusion of demonstrations, the standard curriculum may have relied primarily on didactic lectures, which could have contributed to reduced engagement and enthusiasm among students.

In contrast, the multimedia-based approach employed in the experimental group was designed to provide a more interactive and immersive learning experience. By incorporating interactive discussions, educational videos, e-learning modules, and informational pamphlets, this approach aimed to engage students through multiple sensory modalities and learning styles. While live demonstrations were not explicitly included in the multimedia-based approach, the educational videos and e-learning modules were carefully crafted to simulate real-life scenarios and provide step-by-step guidance on oral hygiene practices. Furthermore, the interactive nature of the discussions and activities encouraged active participation and peer learning, fostering a collaborative learning environment that aligns with Kolb's experiential learning theory.

The use of multimedia resources in educational settings offers several advantages, including scalability and cost-effectiveness. While there may be initial investments required for content creation, curriculum design, and expertise, multimedia materials have the potential for long-term reuse and adaptation, making them a cost-effective solution in the context of education. Additionally, the widespread availability of digital tools and platforms has significantly reduced the barriers to content creation, allowing educators to develop high-quality multimedia materials at relatively low cost. While traditional methods may appear to have lower upfront costs, they may lack the scalability, flexibility, and engagement potential of multimedia approaches, ultimately limiting their effectiveness in reaching and engaging diverse learner populations.

A. Implications and Limitations

The positive outcomes of this study have significant implications for oral health education interventions targeting high school students. The use of multimedia resources in school settings can offer a scalable and cost-effective approach to reach a large audience. Implementing similar programs in schools may contribute to the establishment of healthier oral hygiene practices early in life, potentially reducing the prevalence of dental issues in adulthood.

However, it is essential to acknowledge the study's limitations. The sample was confined to a specific geographic location (Burhanpur, India), limiting the generalisability of the findings. Additionally, the short-term nature of the intervention and follow-up may not capture the long-term sustainability of behavior changes. Future research could explore the durability of the observed improvements over an extended period.

B. Future Recommendations

The future recommendations stemming from our study on the impact of a multimedia-based dental education program on high school students' oral health knowledge and practices are aimed at enhancing the sustainability and effectiveness of oral health interventions. Long-term follow-up studies are recommended to assess the durability of observed improvements. Tailoring interventions to specific cultural contexts and integrating them into the standard school curriculum can ensure relevance and broad reach. Engaging families and communities, leveraging technology for interactive learning experiences, addressing socioeconomic disparities, and fostering interdisciplinary collaboration are also emphasised. By prioritising these recommendations, we can advance efforts to promote oral health literacy and practices among adolescents, leading to better overall oral health outcomes.

V. CONCLUSION

In conclusion, the findings of this study highlight the effectiveness of a multimedia-based dental education program in enhancing oral health knowledge and promoting positive oral health practices among high school students. The incorporation of interactive and visually engaging educational tools demonstrated not only an increase in knowledge scores but also positive changes in brushing habits, flossing practices, and dietary choices. These outcomes contribute to the growing body of evidence supporting the efficacy of multimedia interventions in health education.

By addressing the limitations and building upon these positive findings, future research can further refine and optimise multimedia-based dental education programs. The potential for widespread implementation in school settings holds promise for improving oral health outcomes among adolescents, ultimately contributing to the broader goal of preventive oral healthcare.

Notes on Contributors

HM conceptualised the study, conducted data analysis, and significantly contributed to manuscript writing. SRP aided in data acquisition, reviewed the methodology, and participated in manuscript drafting. KRA provided insights into experimental design and data interpretation. MIK actively contributed to data analysis, results interpretation, and manuscript revisions.

Ethical Approval

The submitted manuscript has obtained ethical clearance from the GGSCDS&RC Ethics Committee, with approval number GGSCDS&RC/2022/IEC/168. All standard institutional review board (IRB) procedures were diligently adhered to during the study. The authors emphasise the importance of ethical considerations and confirm compliance with the required ethical standards.

Data Availability

According to institutional policy, research dataset isavailable on reasonable request to the corresponding author.

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Declaration of Interest

Authors declare that they do not have possible conflicts of interest, including financial, consultant, institutional and other relationships that might lead to bias or a conflict of interest.

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Appendix A: Baseline assessment questionnaire

No.	Question
1.	Age: [Insert Age in Years]
2.	Gender: [Male/Female/Other]
3.	Have you ever received formal education on oral health before? [Yes/No]
4.	How would you rate your current knowledge about oral health? [Poor/Good/Excellent]
5.	Can you name three common dental diseases? [Open-ended response]
6.	What do you understand by the term "plaque"? [Open-ended response]
7.	Do you know the recommended frequency for brushing your teeth each day? [Yes/No] If yes, how many times a day should you brush your teeth?
8.	Have you ever received instructions on proper brushing and flossing techniques? [Yes/No]
9.	How often do you currently brush your teeth each day? [Number of times per day]
10.	How often do you currently floss your teeth each week? [Number of times per week]
11.	How often do you consume sugary snacks or beverages each day? [Number of times per day]
12.	Do you think your diet affects your oral health? [Yes/No] If yes, how? [Open-ended response]
13.	Have you ever visited a dentist for a routine check-up? [Yes/No]
14.	Do you have any specific concerns or questions about oral health? [Open-ended response]

Appendix B: Oral health knowledge survey

Section	Question
Anatomy of Teeth and Gums	1. Which part of the tooth is visible above the gum line?
	2. What is the function of the gums?
	3. How many permanent teeth does an average adult have?
	4. What is the name of the hardest substance in the human body that covers the crown of the tooth?
	5. Which part of the tooth contains the nerves and blood vessels?
Significance of Fluoride	6. What is fluoride?
	7. How does fluoride help in preventing tooth decay?
	8. Which of the following sources commonly provide fluoride?
	9. At what age should children start using fluoride toothpaste?
Common Dental Diseases	10. What is the most common cause of tooth decay?
	11. What is gingivitis?
	12. Which of the following is a sign of periodontal disease?
	13. What is the main cause of gum disease?
	14. What is a common symptom of dental caries?
	15. How often should you visit the dentist for a routine check-up?
	16. What causes cavities?
General Oral Health Knowledge	17. Which of the following practices is best for maintaining good oral hygiene?
	18. What is plaque?
	19. How long should you brush your teeth each time?
	20. Why is it important to floss?

Scoring Information

- Each correct answer is awarded 5 points.
- The maximum score for the knowledge assessment is 100 points.
- Scores are used to establish baseline knowledge and measure changes post-intervention.

Appendix C: Post-intervention assessment questionnaire

No.	Question
1.	Please indicate your age: [Insert Age in Years]
2.	How would you rate your current knowledge about oral health compared to before the intervention? [Much worse/Much better]
3.	Can you name three common dental diseases? [Open-ended response]
4.	What is plaque, and how does it affect oral health? [Open-ended response]
5.	How often should you brush your teeth each day for optimal oral health? [Number of times per day]
6.	How often should you floss your teeth each week for optimal oral health? [Number of times per week]
7.	Have you made any changes to your dietary habits since participating in the program? [Yes/No]
	If yes, please describe the changes you've made: [Open-ended response]
8.	Have you visited a dentist for a routine check-up since participating in the program? [Yes/No]
9.	Do you feel more confident in maintaining good oral hygiene practices after participating in the program? [Yes/No]
10.	Overall, how satisfied are you with the multimedia-based dental education program? [Very dissatisfied/Very satisfied]
11.	Would you recommend this program to your peers? [Yes/No]
	If no, please provide a reason: [Open-ended response]