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Comparative Interventional Study On Effectiveness Of Audio-Visual Aids And Pamphlets In Plaque Reduction Among Youths

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Abstract
Background: *Oral hygiene education plays a vital role in preventing plaque accumulation and maintaining periodontal health. Different educational approaches are used to improve oral hygiene practices, but their relative effectiveness among youth requires evaluation.*
Aim: *To compare the effectiveness of audio-visual aid and pamphlet-based education in reducing plaque accumulation among youth aged 18–25 years.*
Methods: *A comparative interventional study was conducted among 60 participants aged 18–25 years, who were randomly allocated into two groups. Baseline plaque scores were recorded using a Loe & Sillness plaque index before intervention. Group A received oral hygiene education through audio-visual demonstration, while Group B received the same educational content through pamphlet-based instruction. Plaque scores were reassessed after 21 days to determine the effectiveness of both interventions.*
Results: *Both educational interventions resulted in a reduction in plaque scores after 21 days. However, the audio-visual instruction group demonstrated greater improvement compared with the pamphlet-based education group, indicating superior effectiveness in reinforcing oral hygiene practices.*
Conclusion: *Both audio-visual and pamphlet-based oral hygiene education methods were effective in improving oral hygiene status, but audio-visual instruction showed greater impact in reducing plaque among young adults. Audio-visual demonstration may therefore be considered a more effective educational tool for promoting oral hygiene practices.*
Keywords: *Oral hygiene education, plaque, audio-visual aids, pamphlet, youth.*
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I. Introduction

Oral health is a fundamental component of overall health and well-being. It enables individuals to perform essential daily functions such as eating, speaking, and social interaction without pain, discomfort, or embarrassment. Poor oral health can significantly affect quality of life by causing pain, infection, tooth loss, and impaired function. Dental diseases such as dental caries and periodontal diseases are among the most prevalent chronic conditions worldwide. These conditions are largely preventable, yet they continue to impose a substantial burden on individuals and healthcare systems. Oral health is closely linked to systemic health. Poor oral hygiene and untreated oral diseases have been associated with systemic conditions such as cardiovascular diseases, diabetes mellitus, respiratory infections, and adverse pregnancy outcomes. Additionally, maintaining good oral health contributes to better nutrition, as healthy teeth and gums allow proper chewing and digestion of food. It also plays a crucial role in psychological well-being, self-esteem, and social confidence.[1]

Effective oral hygiene remains one of the most important preventive measures in reducing dental plaque accumulation and maintaining periodontal health. Dental plaque serves as the primary etiological factor in gingival inflammation and periodontal destruction when not adequately removed through regular mechanical cleaning.[2]

Toothbrushing technique plays a critical role in plaque removal. Among available brushing methods, the Modified Bass technique is widely recommended because it enables effective cleaning at the gingival margin and interproximal areas.[3] However, successful use of this technique depends on adequate patient education and demonstration.

Young adults often show irregular oral hygiene behavior due to limited reinforcement of oral hygiene practices. Educational strategies that improve motivation and practical understanding can significantly influence plaque control.[4]

Audio-visual teaching methods have become increasingly popular because they combine visual demonstration with auditory explanation, improving retention of procedural steps. Printed pamphlets remain useful because they are inexpensive, easy to distribute, and can be reviewed repeatedly.[5] Comparative evaluation of these methods is necessary to identify the most effective educational approach for plaque control among youth populations. Keeping this in mind the study was planned.

II. Methodology

This study was designed as a comparative interventional study with a pre-test and post-test design to evaluate plaque reduction following oral hygiene instruction delivered through two different educational methods. The study population consisted of 60 participants within the age group of 18–25 years selected from a school, college, or community setting. Convenience sampling was used to recruit participants who met the eligibility criteria.

Inclusion Criteria

Participants aged between 18–25 years with fair to poor oral hygiene, presence of natural teeth, and willingness to participate in the study were included.

Exclusion Criteria

Participants undergoing orthodontic treatment, having systemic diseases affecting oral health, or who had undergone recent professional oral prophylaxis within one month were excluded from the study.

Sample size

The sample size for the present comparative interventional study was calculated using the formula for comparison of two means:

$$n = \frac{2\sigma^2 (Z_{\alpha/2} + Z_{\beta})^2}{d^2}$$

Where n = sample size per group, σ = standard deviation obtained from previous similar studies, d = expected mean difference between groups, $Z_{\alpha/2} = 1.96$ at 95% confidence interval, and $Z_{\beta} = 0.84$ at 80% power.

Method of Data Collection

Baseline plaque assessment was recorded using a standard Loe and Sillness plaque index prior to intervention. Groups were divided based on lottery method of simple random sampling into group A and group B. Group A received oral hygiene instructions through audio-visual aids, while Group B received pamphlet-based instructions. Both groups were instructed using the Modified Bass toothbrushing technique. Plaque scores were reassessed after 21 days.

Intervention

The intervention in the present study was delivered through two different modes of oral hygiene instruction: audio-visual aid and pamphlet-based education. Participants in Group A received oral hygiene instructions through an audio-visual demonstration video illustrating the proper tooth-brushing technique. The video demonstrated key steps including holding the toothbrush at a 45-degree angle to the gum line, using gentle circular motions, cleaning outer and inner tooth surfaces, vertical strokes for anterior teeth, and short back-and-forth strokes for occlusal surfaces. The video also emphasized brushing twice daily, using a soft-bristled toothbrush, and replacing the toothbrush every three months. Participants were allowed to watch the video in a controlled setting to ensure uniform delivery of instructions.

Participants in Group B received oral hygiene instructions through a pamphlet containing illustrated step-by-step brushing technique guidelines. The pamphlet included the same instructions demonstrated in the audio-visual aid, such as the correct angulation of the brush, circular brushing technique, cleaning of inner tooth surfaces, vertical strokes for anterior teeth, and brushing of chewing surfaces. The pamphlet also included additional oral hygiene recommendations such as brushing twice daily, using fluoridated toothpaste, and replacing the toothbrush periodically. Participants were instructed to read and follow the pamphlet instructions for daily oral hygiene practice.

Both groups were instructed to follow the demonstrated Modified Bass tooth-brushing technique for a period of 21 days, after which plaque scores were reassessed to evaluate the effectiveness of the two educational interventions.

Statistical Analysis

Data obtained were entered into Microsoft Excel and analyzed using statistical software. Paired t-test was used to compare pre- and post-intervention plaque scores within groups, while unpaired t-test was used to compare plaque reduction between groups. The level of significance was set at $p < 0.05$.

III. Results

Out of the total population of 60 participants, 50 males and 10 females between the age group of 18-25 years participated in the study.

In the audio-visual group, mean plaque score reduced from 2.14 ± 0.40 at baseline to 1.38 ± 0.33 after intervention. In the pamphlet group, plaque score decreased from 2.29 ± 0.38 to 1.69 ± 0.37 after 21 days. Within-group analysis demonstrated statistically significant reduction in plaque scores in both groups ($p < 0.001$).

When mean reduction was compared, the audio-visual group demonstrated greater plaque reduction than the pamphlet group, and the difference was statistically significant ($p = 0.006$).

Table 1 Mean Distribution of the Plaque Score at before and after time interval in AV Mode and Pamphlet Mode

Plaque Score		N	Minimum	Maximum	Mean	Std. Deviation
(AV Mode)	Before	30	1.5	2.9	2.1467	0.4083
	After	30	0.8	2	1.3833	0.3333
(Pamphlet Mode)	Before	30	1.8	2.8	2.29	0.38088
	After	30	1.1	2.4	1.69	0.37541

Table 1 showing the Mean Plaque Score at before and after time interval in AV Mode was 2.1467 ± 0.40 and 1.3833 ± 0.33 and in Pamphlet mode the Mean Plaque score was 2.29 ± 0.38 and 1.69 ± 0.37 respectively. It was observed that between both groups the plaque score decreased

FIGURE 1

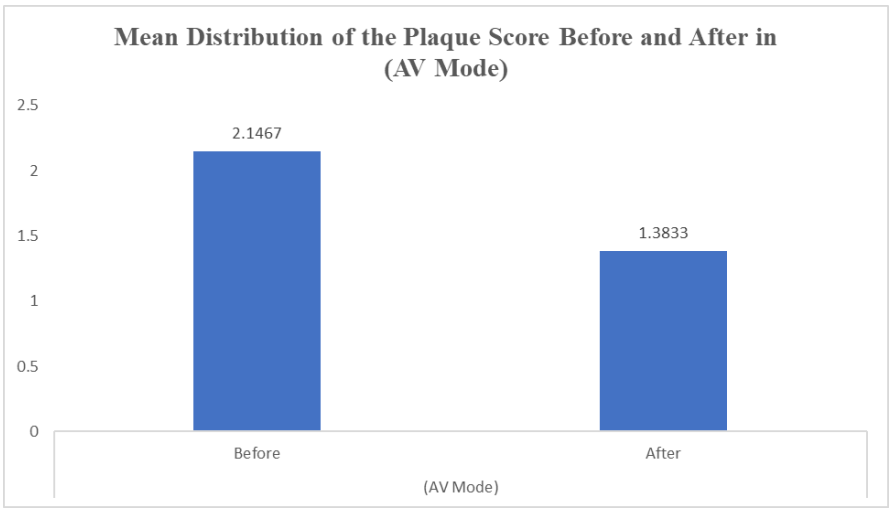


FIGURE 2

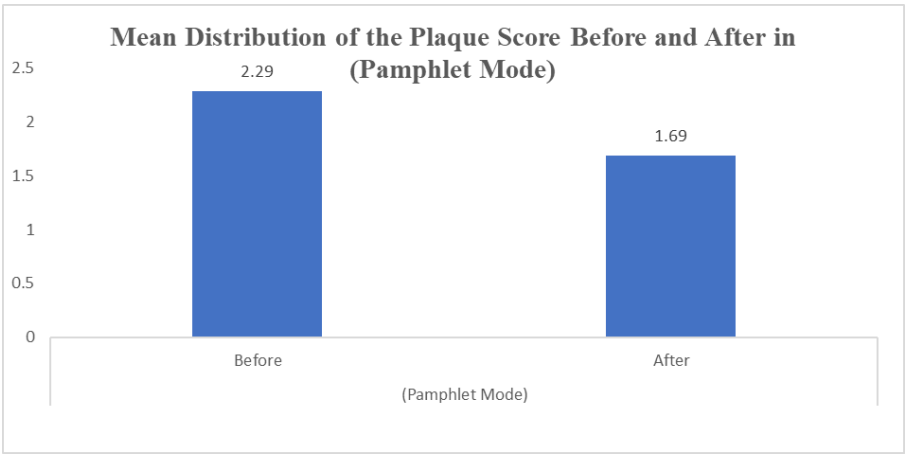


TABLE 2 within Group comparison of the Plaque score in AV Mode and Pamphlet Mode

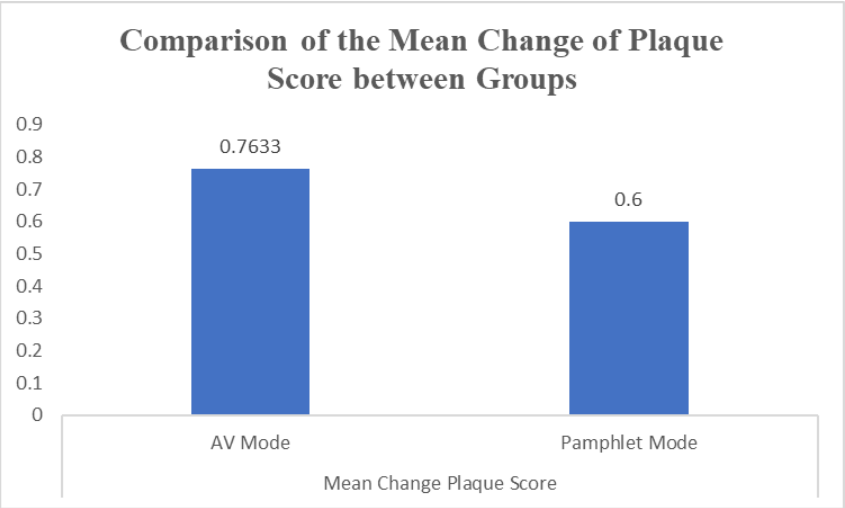
		Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	T	p Value
(AV Mode)	Before	2.1467	30	0.4083	0.07455	0.76333	15.501	<0.001*
	After	1.3833	30	0.3333	0.06085			
(Pamphlet Mode)	Before	2.29	30	0.38088	0.06954	0.600	21.153	<0.001*
	After	1.69	30	0.37541	0.06854			

Table 2 showing within group comparison of the Plaque score in AV Mode and Pamphlet Mode depicted that there was a statistically significant decrease in the Mean Plaque score in AV Mode (MD=0.763, p<0.05) and in Pamphlet Mode (MD=0.600, p<0.05)

TABLE 3 Comparison of the Mean Change of the Plaque Score

	Groups	N	Mean	Std. Deviation	Std. Error Mean	Mean Difference	T	p Value
Mean Change Plaque Score	AV Mode	30	0.7633	0.26972	0.04924	0.16333	2.874	0.006*
	Pamphlet Mode	30	0.6	0.15536	0.02837			

Table 3 showing it was observed that the AV Mode depicted a significant higher decrease in the plaque score when compared to the Mean change in plaque score of Pamphlet Mode. (P<0.05)



IV. Discussion

The present comparative interventional study demonstrated a statistically significant reduction in plaque scores in both the audio-visual and pamphlet groups after 21 days, with a greater reduction observed in the audio-visual group. This indicates that structured oral health education plays a crucial role in improving oral hygiene practices among young adults. These findings are consistent with previous studies emphasizing the importance of educational interventions in reducing plaque accumulation and promoting periodontal health[2].

Dental plaque is the primary etiological factor for gingival and periodontal diseases, and its control is essential for maintaining oral health. The significant reduction in plaque scores observed in the present study highlights the effectiveness of educational strategies in modifying oral hygiene behavior. A study published in the South Eastern European Journal of Public Health also reported that oral health education significantly improves plaque control, reinforcing the importance of preventive education in young populations[2].

The greater effectiveness of audio-visual instruction observed in this study is supported by research conducted by Yohana et al., which demonstrated that demonstration-based techniques such as the Modified Bass method significantly improve plaque removal due to better understanding and execution of brushing techniques[2]. Visual learning enhances comprehension of brushing angles, strokes, and sequencing, which are difficult to interpret through text alone.

Similarly, a study from the International Journal of Scientific Research reported that audiovisual aids were more effective than traditional methods in improving oral hygiene knowledge and practices. The authors concluded that video-based education enhances retention and understanding, leading to better clinical outcomes, which is in agreement with the present findings[4].

The effectiveness of audiovisual aids is further supported by studies assessing knowledge gain through multimedia tools. Research conducted in Greater Noida showed that patients exposed to audiovisual education demonstrated significantly higher knowledge retention and improved oral hygiene practices compared to those receiving conventional instructions[7].

Pamphlet-based education in the present study also resulted in a statistically significant reduction in plaque scores, indicating that printed materials remain a useful tool for oral health promotion. However, their effectiveness is limited by factors such as literacy level, motivation, and correct interpretation of instructions. A study evaluating oral hygiene instructions through printed material also found improvements in plaque scores, although the magnitude of change was less compared to interactive teaching methods[7].

Furthermore, research available on ScienceDirect highlights that behavioral interventions combined with visual aids are more effective than passive information delivery in achieving long-term improvements in oral hygiene practices[10]. This supports the concept that active learning methods lead to better behavioral outcomes.

Another study published in the European Journal of Pharmaceutical and Medical Research emphasized that audiovisual education improves both awareness and practice of oral hygiene measures more effectively than traditional approaches, particularly among younger populations who are more receptive to digital learning formats[12].

The superior performance of audiovisual instruction can be explained by the multimedia learning theory, which states that information presented through both visual and auditory channels enhances understanding and retention. Young adults, in particular, are more accustomed to digital and video-based learning, making audiovisual methods more effective and engaging compared to static written materials.

Despite the positive outcomes, the present study has certain limitations. The short duration of follow-up (21 days) does not allow assessment of long-term sustainability of improved oral hygiene behavior. Additionally, the sample size was relatively small and limited to a specific age group, which may affect the generalizability of the findings. Future studies should include larger populations, longer follow-up periods, and repeated interventions to evaluate long-term effectiveness.

Overall, the present study confirms that both educational methods are effective in improving oral hygiene status, but audio-visual instruction is superior due to its ability to enhance understanding, retention, and practical application of oral hygiene techniques.

V. Conclusion

Both audio-visual and pamphlet-based oral hygiene education significantly improved plaque control among participants after 21 days. However, audio-visual instruction demonstrated greater effectiveness and may therefore be considered a more effective educational tool for oral hygiene promotion in young adults.

Future studies involving larger sample size and longer follow-up are recommended to assess long-term behavioral change.

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