

THE EFFECT OF REINFORCED AUDIOVISUAL ORAL HEALTH EDUCATIONAL AID ON THE ORAL HEALTH OF REMOVABLE PARTIAL DENTURES WEARERS: RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Background: Patients with removable partial dentures are always at a greater risk of developing gingivitis, and are more prone to caries. Oral hygiene is a critical factor can be controlled by the patients and affect the dental health of remaining teeth and retention of removable appliances

Aim: To evaluate the effect of reinforced audiovisual oral health educational aid on the oral health among patients with removable partial dentures

Material and Method: Randomized clinical trial was conducted on 40 removable partial denture wearers, who were divided randomly into two intervention groups. The two groups were included in one-time oral health educational program using verbal and audiovisual aid, the two groups instructed to apply oral hygiene instructions at home with use of reinforced audiovisual aid in group II only. Plaque and gingival scores for all remaining teeth were measured at the baseline and after one month follow up.

Results: Group II, (reinforced group) showed significant ($P = 0.000$) lower plaque and gingival scores (1.05 and 1.17 respectively) than their base line scores (2.8 and 2.59 respectively) and that recorded for group I (one-time group) after one month follow up (1.43 and 1.38 respectively)

Conclusion: Reinforced oral health education is effective in improving the practicing regarding oral hygiene measure and reducing the plaque accumulation and in improving the gingival health.

KEY WORDS: Removable partial dentures, oral health education, audiovisual aid, reinforced oral health aid, oral health

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INTRODUCTION

Oral health education is an integral part of oral health promotion and dental health services.^[1] It is a widely accepted approach in the prevention of oral diseases and improvement in oral health related quality of life.^[2] There are different media of delivering oral health knowledge, the most common form is using verbal methods in addition to the use of non-verbal aids which can improve the oral health education process.^[3]

Audiovisual aids are valuable tools in oral health education, they have a long-lasting impression on the target population. Studies utilizing audiovisual aids to improve oral health have found them to be effective in improving oral health knowledge among the target groups.^[4,5] Videos have been used as training and instruction tool for many years; the major advantage being better visualization of practical techniques during groups teaching. Videos instructions have been shown to be more effective than traditional lectures alone, as means of teaching the clinical skills. Videos provide a practical and entertaining audiovisual medium for oral health education that is suitable for both group and individual learning. Videos offer a standardized level of teaching, and information on the video can be repeated according to the viewer's needs.^[6,7]

Oral health of patients with removable partial denture (RPD) and denture after-care begins from the moment the patient is fitted with RPD. Clinical follow-up should include instructing patients for regular oral and RPD hygiene procedures which play a major role in the maintenance of oral health and the long-term success of removable prosthodontic treatment.^[8] RPD treatment is successful, when patients are highly motivated toward the appropriate method of hygiene maintenance procedures. Different researches have shown that different factors such as social status, age, education, systemic diseases, and smoking among elderly people lead to poor oral hygiene specially those who wear removable appliances.^[9]

Previous studies have shown a correlation between RPDs and increased risk of periodontal diseases.^[10,11] Therefore, proper denture uses and care constitutes important component not only for functional and aesthetic reasons, but also for the health of the supporting periodontal tissues and appropriate maintenance of the denture itself for RPD wearers.^[12] **Milward et. al**, concluded that appropriate oral hygiene measure and control of other systemic factors can improve the oral and periodontal health of patients with RPD.^[13]

The objective of this study was to compare the effectiveness of use of reinforced home audiovisual aids compared to one-time verbal instructions assisted with audiovisual aids in improving oral hygiene in RPD patients with moderate to poor oral hygiene.

METHODOLOGY

Randomized control trial was conducted among patients with removable partial dentures (RPD) Kennedy classification class I and II attended to Umm Al Qura University, Faculty of Dental Medicine.

Sample size calculation

Sample size was calculated using G*power software version 3.1.9.6 for Mac, compared mean plaque scores for two independent groups, the effect size was (0.6) based on the anticipated difference in plaque accumulation between the two groups,^[4] the sample power 95% and α error 0.05%. The calculated sample size was (32) which increased to (40) to increase the sample power.

Study subjects:

The study patients aged from 35–55 years, wearing removable partial dentures from one to three years, their gingival and plaque scores more than one were selected. Patients who are smoking or with systemic diseases or taken antibiotic for one month ago were excluded from the study. All the participants signed informed consents before starting the study.

Oral health education program

Three animated videos of teeth brushing technique were selected from the internet, which was of two minutes duration demonstrating the tooth brushing technique and oral hygiene maintenance instructions for patients wearing RPD. Out of three videos, one video was selected by one prosthodontist and other periodontologist. All the selected patients were educated and trained through verbal instructions and audiovisual aid (using the selected video). After the instruction session, the participants assigned randomly into two intervention groups according to the type of RPD and the gender, by stratified randomization technique using computer random program software: **Group I (one time):** was instructed to keep home oral hygiene measures (twice daily tooth brushing for two minute each). **Group II (reinforced):** was supplied with the video used during oral health education session and instructed to keep home twice daily tooth brushing during watching the educational video.

Data collection

The demographic data including the age, gender, methods and frequency of oral hygiene measures usage and duration of RPD wearing was collected using questionnaire. Clinical examination was done for all patients to record the RPD class, followed by recording the plaque and gingival scores for all the remaining teeth using plaque and gingival indices^[14] at the baseline and after one month follow up.

Validity and reliability of the data

One examiner who was blind to the allocation of the participants in the two groups conducted all the measurements including the oral health educational session. The examiner was trained and calibrated to the criteria of dental plaque and gingival indices. The intra examiner consistency was tested on ten patients examined twice on one week apart and the difference was statistically evaluated by kappa test it was (94%).

Statistical analysis

Statistical analysis was made using Statistical Package for Social Science (SPSS) version 27. Testing the difference between parametric numeric data was analyzed using t test and one way ANOVA test with pairwise comparison using Tukey post hoc test. P value of level <0.05 were considered significant.

RESULTS

The present study was conducted on (40) patients, 23 (57.5%) males and 17(42.5%) females and (45%) of them were class I and (55%) class II Kennedy classification of RPD. Regarding the age, 21 (52.5%) was aged 35 – 45 years and 19 (47.5%) was aged 45 – 55 years with mean age 47 years. The stratified randomization of the two groups was done to ensure equal distribution of the participants in the both groups regarding the age, gender and type of RPD. (**Figure 1**)

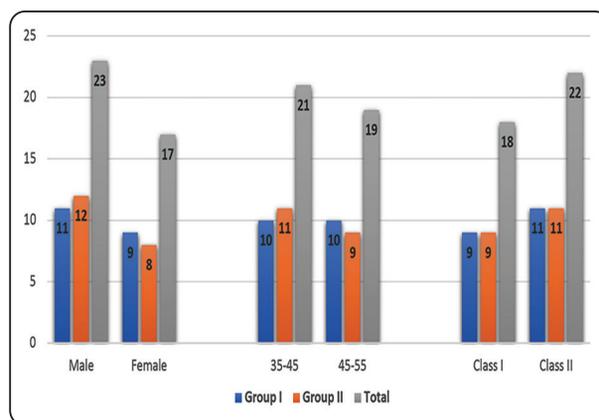


Fig. (1) Sample distribution in group I and II according to gender, age and type of RPD

Regarding the mean plaque score, group I (one time) and group II (reinforced) showing lower significant mean plaque scores for both male and female participants after one month. The lowest mean plaque score was recorded among female participants in reinforced group (0.98) followed by male participants in the same group (1.12). Comparing the mean plaque scores of the two groups

after one month showing significance difference between the two groups for males and females ($p = 0.000$ and $p = 0.000$) respectively. According to the Kennedy classification, lower mean plaque score (0.88) recorded for the reinforced group class II followed by class I RPD wearers (1.23) in the same group. After one month, Pair wise comparison showed significance difference ($p = 0.000$) between group I (one time) & II (reinforced) for both class I and for class II RPD wearers ($p = 0.000$). (**Table 1**).

Table 2, showing the mean gingival scores before and after one month in the two intervention groups. Regarding the gender, females in both groups (I and II) showing lower mean gingival scores (1.31 and 1.11) respectively after one month with significance difference between them ($p = 0.000$). According to Kennedy classification of RPD, the mean gingival

score in class II for both groups I and II were (1.24 and 0.99) respectively with significance difference between them ($p = 0.000$). The mean gingival score among class I RPD wearers after one month was similar to that among class II RPD wearers (1.24) with no significance difference between them ($p = 0.975$).

The total mean plaque scores before health education were (2.74 and 2.8) for the two intervention groups, with no significance difference (0.649). After one month the mean plaque score for group II (reinforced) was (1.05) which is significantly lower than that among group I (one time) (1.34). Similarly, the mean gingival scores were (2.66 and 2.59) for the two groups respectively, which decreased to reach (1.38 and 1.17) with significant difference between them ($p = 0.000$). **Figure (2)**

TABLE (1) Total mean plaque values for the two examined groups regarding the gender and type of RPD

	Group I		Group II		F (p value)
	Before Mean \pm SD	After Mean \pm SD	Before Mean \pm SD	After Mean \pm SD	
According to gender					
Male	2.81 \pm 0.073 ^a	1.53 \pm 0.052 ^{ab}	2.76 \pm 0.061 ^a	1.12 \pm 0.066 ^{ab}	32.643 (0.000)*
Female	2.67 \pm 0.065 ^a	1.33 \pm 0.045 ^{ab}	2.83 \pm 0.057 ^a	0.98 \pm 0.049 ^{ab}	38.814 (0.000)*
Unpaired t (p value)	2.688 (0.396)	9.832 (0.000)*	3.721 (0.583)	8.032 (0.000)*	
According to RPD type					
Class I	2.85 \pm 0.067 ^a	1.61 \pm 0.052 ^{ab}	2.79 \pm 0.092 ^a	1.23 \pm 0.061 ^{ab}	28.547 (0.000)*
Class II	2.63 \pm 0.099 ^a	1.25 \pm 0.045 ^{ab}	2.80 \pm 0.078 ^a	0.88 \pm 0.066 ^{ab}	44.051 (0.000)*
Unpaired t (p value)	3.026 (0.457)	9.281 (0.000)*	2.841 (0.892)	10.949 (0.000)*	
Total	2.74 \pm 0.069	1.43 \pm 0.059	2.80 \pm 0.063	1.05 \pm 0.054	40.352 (0.000)*

a: significant difference between before and after mean scores in the same group

b: significant difference between the mean scores of the two groups after one month

** significance difference at p value less than 0.05*

TABLE (2) Total mean gingival values for the two examined groups regarding the gender and type of RPD

	Group I		Group II		F (p value)
	Before Mean±SD	After Mean±SD	Before Mean±SD	After Mean±SD	
According to gender					
Male	2.69±0.081 ^a	1.44±0.062 ^{ab}	2.66±0.053 ^a	1.22±0.046 ^{ab}	41.061 (0.000)*
Female	2.62±0.075 ^a	1.31±0.055	2.53±0.049 ^a	1.11±0.045 ^{ab}	48.723 (0.000)*
Unpaired t (p value)	1.688 (0.996)	9.803 (0.000)*	2.921 (0.551)	12.991 (0.000)*	
According to RPD type					
Class I	2.68±0.069 ^a	1.51±0.072 ^{ab}	2.69±0.077 ^a	1.24±0.049 ^{ab}	28.547 (0.000)*
Class II	2.63±0.074 ^a	1.24±0.049 ^{ab}	2.50±0.069 ^a	0.99±0.038 ^{ab}	44.051 (0.000)*
Unpaired t (p value)	2.026 (0.857)	10.661 (0.000)*	4.841 (0.092)	11.732 (0.000)*	
Total	2.66±0.073	1.38±0.066	2.59±0.071	1.17±0.044	45.464 (0.000)*

a: significant difference between before and after mean scores in the same group
b: significant difference between the mean scores of the two groups after one month
** significance difference at p value less than 0.05*

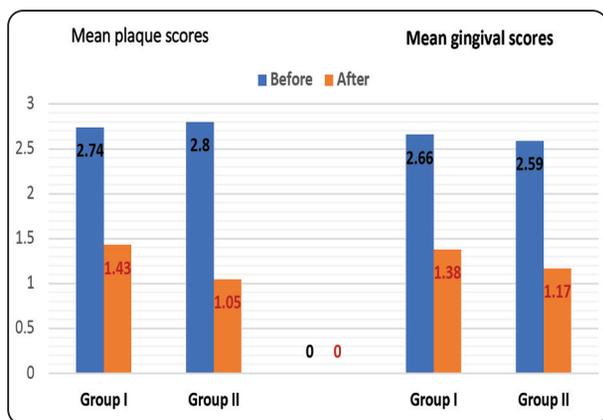


Fig. (2) The total mean plaque and gingival scores of the two groups before oral health education and after one month

The total reduction in plaque and gingival scores after one month, showed reduction percents of in plaque score were 47% and 62% for group I (one time) and group II (reinforced) respectively. Similarly high reduction in gingival score was

observed after one month among the two groups, the percentages were 49% and 55% for the two groups respectively. (Figure 3)

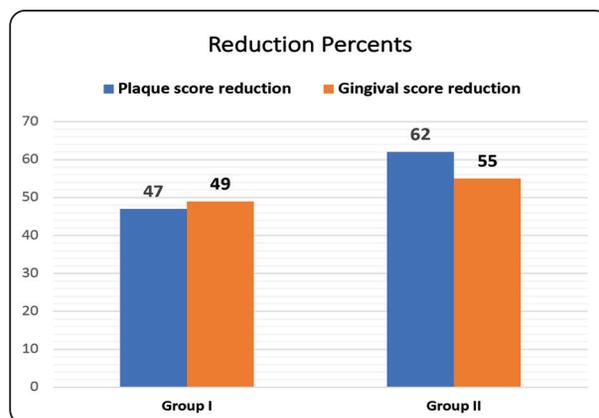


Fig. (3) The reduction plaque and gingival scores of the two groups before oral health education and after one month

DISCUSSION

The present study aimed to evaluate the effect of reinforced oral health educational audiovisual aid on the oral health among RPD wearers. Randomized controlled trials design was used which considered the gold standards to measure the effectiveness of a new intervention or treatment. Randomization process including allocation which was done using computer generator and concealment process using closed envelope was used to prevent selection bias. Blind process was ensured during examination of the participants at base line and after one month as the examiner was blind to the assigned groups to avoid detection bias.^[15]

This study was conducted on 40 patients their age ranges from 35 -55 years, it was confirmed that in oral health educational programs, sample size of the educational groups or their age did not seem to influence the effectiveness of any oral health educational study. Regarding the learning style, every person has a different learning characteristic for handling information, based on this, various educational methods can have a role in oral health education programs.^[16]

The present study not only evaluate the reinforced oral health education using audiovisual aid but evaluate its effect on oral health as one time session. The present study showed that, both one time and reinforced groups had significant reduction in plaque and gingival scores after one month follow up. Verbal method of health education can never suit for all learners, with the new technology, there is a need for incorporation of various newer methods in imparting oral health education. Although web-based audiovisual programs are found effective and can be updated periodically, they may not be feasible for all, due to different reasons such as technology literacy, affordability, and accessibility. The present study uses audiovisual aid in the one time and in reinforced group as audiovisual demonstration

through illustration can clarify any point better than other health educational techniques.^[5,17]

The present study showed high reduction (47% and 62%) in plaque scores and (49% and 55%) reduction in gingival scores. The observed reduction in the two intervention groups for plaque and gingival scores after one time and reinforced health education, confirmed by different studies among older patients where the range of effectiveness was 3% to a 50% reduction in plaque scores among participants.^[18,19] Nicol et al.^[19] showed a 35% reduction in plaque scores when evaluated after 6 months follow up. They concluded that oral health education in long term studies was not effective in reduction of plaque. Another systematic review concluded that, different studies which provided oral prophylaxis regularly along with oral health education were usually more effective.^[20] The present study showed significant improvement in both plaque and gingival scores in reinforced group (1.05 and 1.17) than one time group. Different studies have shown that oral health education can be effective to change tooth brushing behavior, studies used repetition or periodic reinforcement showed reduction on plaque index or improvement in gingival health.^[21-24]

The present study recommended periodic reinforcement of oral hygiene instructions among removable partial dentures wearers as the oral health educational studies showed an improvement in the outcome measures no matter what design, sample size or interventional variables were used.

CONCLUSION

Reinforced oral health education is effective in improving the practicing regarding oral hygiene measure and reducing the plaque accumulation and improving the gingival health in patients with removable partial dentures with moderate and poor oral hygiene.

REFERENCES

1. Georgios S. Ch. Oral Health Conditions of Older People; Focus on the Balkan Countries, University of Minnesota, School of Dentistry, Advanced Education Program in Periodontology, USA. *Balk Journal of Dental Medicine*. 2015; 19: 59-64.
2. Berghoff J. How audio-visuals enhance the learning process and increase case acceptance. *RDH*. 2013; 33.
3. Jain S, Jain M, Khan K, Panday K, Bagban A. Evaluating the use of Audio-Visual Aids in Knowledge Gained by Patients Visiting a Dental College in Greater Noida International Healthcare Research Journal. 2017;1(9):278-283.
4. Dula L, Ahmedi F, Lila-Krasniqi Z and Shala K. Clinical Evaluation of Removable Partial Dentures on the Periodontal Health of Abutment Teeth: A Retrospective Study. *The Open Dentistry Journal*. 2015; 9: 132-139.
5. Stegeman CA, Zydney J. Effectiveness of multimedia instruction in health professions education compared to traditional instruction. *J Dent Hyg*. 2010; 84:130-6.
6. Shah N, Mathur VP, Kathuria V, Gupta T. Effectiveness of an educational video in improving oral health knowledge in a hospital setting. *Indian J Dent*. 2016; 7:70-5.
7. AlZarea BK. Dental and Oral Problem Patterns and Treatment Seeking Behavior of Geriatric Population. *The Open Dentistry Journal*. 2017; 11: 230-236.
8. Jang JY, Lee DH. Effects of oral health promotion program on oral function in the elderly. *Korean J. Health Ser. Manag*. 2016; 10:141-151.
9. Lim CH, Lee HJ, Park GE. Effects of oral care interventions on oral health and oral health-related quality of life among denture-wearing older adults. *Korean J. Adult Nurs*. 2021; 33: 76-86.
10. Ki J, Jo K, Cho K, Park J, Cho J and Jang J. Effect of Oral Health Education Using a Mobile App (OHEMA) on the Oral Health and Swallowing-Related Quality of Life in Community-Based Integrated Care of the Elderly: A Randomized Clinical Trial. *Int. J. Environ. Res. Public Health*. 2021; 18:11679.
11. Ribeiro DG, Jorge JH, Varjão FM, Pavarina AC, Garcia PP. Evaluation of partially dentate patients' knowledge about caries and periodontal disease. *Gerodontology*. 2012;29(2): 253-258.
12. Ercalik-Yalcinkaya S, Özcan M. Association between oral mucosal lesions and hygiene habits in a population of removable prosthesis wearers. *J Prosthodont*. 2015; 24(4):271-8
13. Milward P, Katechia D, Morgan MZ. Knowledge of removable partial denture wearers on denture hygiene. *Br Dent J*. 2013;215(10): E20.
14. Loe H. The Gingival Index, the Plaque Index and the Retention Index System. *The J of periodontology*.1967;38:610
15. Hariton, EMD, and Locascio JJ. Randomized controlled trials—the gold standard for effectiveness research. *BJOG*. 2018; 125(13): 1716.
16. Osmari D, Fraga S, Braun KO, Unfer B. Behaviour of the Elderly with Regard to Hygiene Procedures for and Maintenance of Removable Dentures. *Oral Health Prev Dent*. 2016; 14:21-6.
17. Eaton KA, Reynolds PA, Cox MJ. Top of the pops – CD-ROM and DVDs in dental education. *Br Dent J*. 2008; 204:203-7.
18. Mariño R, Calache H, Wright C, Schofield M, Minichiello V. Oral health promotion programme for older migrant adults. *Gerodontology*. 2004; 21:216-25.
19. Nicol R, Petrina Sweeney M, McHugh S, Bagg J. Effectiveness of health care worker training on the oral health of elderly residents of nursing homes. *Community Dent Oral Epidemiol*. 2005; 33:115-24.
20. Nakre P, Harikiran G. Effectiveness of oral health education programs: A systematic review *Journal of International Society of Preventive and Community Dentistry*. 2013; 3.
21. Rodrigues JA, dos Santos PA, Baseggio W, Corona SA, Palma-Dibb RG, Garcia PP. Oral hygiene indirect instruction and periodic reinforcements: effects on index plaque in schoolchildren. *J Clin Pediatr Dent*. 2009;34(1):31-4.
22. Shenoy RP, Sequeira PS. Effectiveness of a school dental education program in improving oral health knowledge and oral hygiene practices and status of 12- to 13-year-old school children. *Indian J Dent Res*. 2010;21(2):253-9.
23. D'Cruz AM, Aradhya S. Impact of oral health education on oral hygiene knowledge, practices, plaque control and gingival health of 13- to 15-year-old school children in Bangalore city. *Int J Dent Hyg*. 2013;11(2):126-33.
24. Haleem A, Khan M, Sufia S, Chaudhry S, Siddiqui M and Khan A. The role of repetition and reinforcement in school-based oral health education-a cluster randomized controlled trial *BMC Public Health*. 2016:16:2.