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Impact of Community-Based Oral Health Education Programs on Periodontal Disease Awareness and Prevention

Muhammad Junaid Hashmi[1], Hussain Mujtaba Malik[2], Saleem Adil[3], Shabir Ahmad[4], Muhammad Sami Iqbal[5], Hammal Khan Naseer Baloch[6]

[1] Assistant Professor, Shahida Islam Medical and Dental College, Lodhran,
[2] MPH, Boston University School of Public Health.
[3] Associate Professor Community Medicine, Pak Red Crescent Medical and Medical College, Dina Naath, Lahore.
[4] Associate Professor Community Medicine, Poonch Medical College, Rawalakot AJK.
[5] PhD Scholar, Associate Professor (B-19), Preventive and Public Health Dentistry Department, Bolan Medical College, Quetta.
[6] Associate Professor Community Dentistry, Dental Section, Bolan Medical College, Quetta, Balochistan.

Abstract

Community-based oral health education programs have emerged as a promising strategy to enhance periodontal disease awareness and prevention. This experimental study evaluated the impact of a structured three-month interactive education intervention on periodontal knowledge, plaque index, and gingival status among 200 adult participants randomly assigned into intervention and control groups (n=100 each). Pre- and post-intervention assessments included validated questionnaires and clinical examinations. The intervention group demonstrated a significant increase in periodontal knowledge (mean score increase: 45.2±12.7 vs. 5.8±9.3; $p<0.001$) and significant improvement in clinical indices: plaque index reduced from 2.4±0.6 to 1.2±0.4 ($p<0.001$), and gingival index decreased from 1.9±0.5 to 0.9±0.3 ($p<0.001$). The control group showed no significant change. These results indicate that the program effectively enhanced awareness and promoted measurable oral health improvements. The discussion highlights the novel incorporation of culturally tailored visual aids and peer-led sessions as contributing factors to sustained behavior change. In conclusion, community-based oral health education significantly improves periodontal health metrics and knowledge, fills a critical gap by demonstrating intervention efficacy in low-resource settings, and supports wider implementation with longitudinal follow-up to assess retention and cost-effectiveness.

Keywords: periodontal awareness; community education; plaque index; randomized intervention; oral health behavior

Introduction

Periodontal disease remains a persistent public health concern worldwide, characterized by progressive destruction of supporting tissues around the teeth. Despite global efforts to increase awareness, prevalence remains high, particularly in underserved communities. Emerging evidence from post-2022 intervention studies suggests that targeted community-based educational strategies can significantly influence periodontal health literacy and behavior. Introducing peer-led interactive sessions and culturally appropriate educational materials has transformed passive information delivery into active learning processes that foster sustainable oral hygiene practices.1-4. Recent epidemiological surveys highlight that adult literacy in periodontal prevention remains deficient; however, multimodal education interventions have demonstrated statistically significant gains in short-term knowledge and behavior metrics. For instance, digital reminder systems coupled with group workshops achieved 30–40% reduction in plaque scores among low-income participants. These findings create an impetus for controlled trials that integrate behavior change theories within community frameworks to address both intrapersonal and socio-environmental barriers.5-7

Behavior change constructs such as self-efficacy and social norms have been leveraged to optimize program design. Incorporating vicarious learning through peer testimonies and hands-on demonstrations has proven more effective than traditional didactic sessions. Moreover, COVID-era constraints accelerated innovation in small-group delivery and outreach through local NGOs, enabling health education continuity.8-10

This study advances the field by implementing a randomized, community-based oral health education program with rigorous pre-post assessment of both knowledge and clinical endpoints. A secondary focus lies in the statistical evaluation of intervention efficacy using robust analytical methods. By situating the investigation within an accessible socioeconomic context and measuring tangible outcomes, this work addresses a key research gap: the paucity of experimentally validated models demonstrating periodontal improvement through community engagement.

The integration of culturally tailored visual aids and interactive modules builds on recent pilot studies, yet few have systematically evaluated their impact using randomized designs and clinically relevant indices. Additionally, the use of validated questionnaires to quantify awareness

allows correlation analysis between knowledge gains and clinical improvements. Consequently, the study offers novel insights into the mechanisms and scalability of oral health promotion strategies.

Methodology

This randomized controlled trial enrolled 200 adults aged 18–65 from , Shahida Islam Medical and Dental College, Lodhran. Sample size calculation using Epi Info software estimated that 90 participants per group would detect a 25% change in plaque index (α=0.05, power=0.80), inflated to 100 per arm to account for potential dropouts. Participants were randomly allocated in a 1:1 ratio into intervention and control groups using computer-generated blocks.

Inclusion criteria were: permanent dentition, absence of periodontal treatment in prior six months, and willingness to attend all sessions. Exclusion criteria comprised systemic illnesses influencing periodontal health (e.g., diabetes), pregnancy, antibiotic or anti-inflammatory use in the previous three months, and cognitive impairment that could hinder participation. Verbal informed consent was obtained from all participants, in line with ethical guidelines, and confidentiality was maintained.

Baseline assessments included a validated 20-item questionnaire measuring periodontal knowledge, scored 0–100. Clinical examinations recorded the Silness-Loe Plaque Index (0–3) and Loe-Silness Gingival Index (0–3) performed by calibrated examiners (kappa=0.82). The intervention comprised six weekly interactive group sessions of 90 minutes each, combining didactic content, visual aids, peer testimonials, and tooth-brushing demonstrations. Printed educational booklets were provided. The control group received no intervention but underwent identical assessments.

Data collection occurred immediately pre- and post- intervention (week 12). Statistical analysis was performed using SPSS v28. Knowledge and clinical index changes were compared using paired t-tests within groups and independent t-tests between groups. Significance was defined as $p<0.05$.

Results

Table 1. Demographic characteristics of participants

Variable	**Intervention (n=100)**	**Control (n=100)**	**p-value**
Age (years, mean±SD)	38.5±12.4	39.2±11.8	0.68
Female, n (%)	58 (58%)	60 (60%)	0.76
Education ≥ Secondary, n (%)	72 (72%)	70 (70%)	0.75

Demographic data were comparable between groups, with no significant differences in age, sex distribution, or education level.

Table 2. Knowledge and clinical outcomes pre- and post-intervention

Outcome	**Intervention Pre**	**Intervention Post**	**Control Pre**	**Control Post**	**Between-group p**
Knowledge score (%) mean±SD	42.5±15.2	87.7±10.3	44.0±14.8	49.8±15.0	<0.001
Plaque index mean±SD	2.4±0.6	1.2±0.4	2.3±0.5	2.2±0.5	<0.001
Gingival index mean±SD	1.9±0.5	0.9±0.3	1.8±0.6	1.7±0.5	<0.001

All outcomes in the intervention group showed statistically significant improvement ($p<0.001$), while changes in the control group were minimal and non-significant.

Table 3. Correlation between knowledge improvement and clinical outcomes (intervention group)

Correlation	**r-value**	**p-value**
Δ Knowledge vs Δ Plaque index	–0.62	<0.001
Δ Knowledge vs Δ Gingival index	–0.58	<0.001

Significant negative correlations indicate greater knowledge gains were associated with larger clinical improvements.

Discussion

The marked increase in periodontal knowledge and concurrent clinical improvements demonstrate the strong efficacy of community-based education. Knowledge scores nearly doubled, reinforcing evidence that structured educational modules with visual aids translate into behavioral change. The 50% reduction in plaque index and 47% decrease in gingival index align with recent trials that emphasize the role of peer-led interventions in low-resource settings.11-13

The significant correlations between knowledge gain and clinical indices suggest a direct dose–response relationship: greater understanding fosters improved hygiene practices. This bridges a notable gap in existing literature, where awareness does not always translate into measurable oral health improvements. The randomized design and clinically relevant endpoints give added weight to these findings.14-17

Novel elements of this study include culturally tailored materials and peer testimonials, which likely enhanced participant engagement and retention. These elements have been underexplored in recent experimental studies and address socio-cognitive barriers to behavior change. Furthermore, the community center setting ensures scalability and real-world applicability outside traditional clinical environments.18-20

Methodological strengths include adequate sample size powered for clinical outcomes, low dropout rates, and use of calibrated examiners. The absence of significant changes in the control group reduces the likelihood of secular trends influencing results.

Limitations include the short follow-up period, which does not capture long-term retention of behavior change. Self-reported knowledge scores may be subject to social desirability bias, though clinical measures provide objective corroboration. Future studies should incorporate six- to twelve-month follow-up and cost-effectiveness analysis.

The intervention's success in a resource-limited environment supports expansion of similar programs through community health workers. Integration with digital reinforcement tools may further bolster long-term outcomes.

In sum, the study provides robust evidence that community-based oral health education can significantly improve both awareness and periodontal health. This aligns with a growing body of research and addresses critical gaps in translating knowledge to clinical benefit.

Conclusion

Community-based education significantly enhanced periodontal knowledge and reduced plaque and gingival indices, demonstrating the value of culturally tailored, peer-led interventions. This research fills a gap by empirically linking enhanced awareness to clinical improvement in low-resource settings, and future work should explore sustainability and cost-effectiveness.

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