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Integrating Community- Based Interventions and Medical Education to Reduce Tobacco- Related Oral Diseases: A Public Health Approach in Community Dentistry and Medicine

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ABSTRACT

Background: Tobacco consumption is a major preventable cause of oral cancer, leukoplakia, and periodontal disease. This study assessed the twofold effect of community-based interventions and medical education on the reduction of oral health risks that are caused by tobacco.

Methods: A community-based comparative interventional study was carried out in March-August 2024. There were 320 participants who were randomized into the Community Intervention Arm (n = 160) and the Educational Integration Arm (n = 160). Demographic factors, tobacco and oral lesions were measured at baseline. Also, 80 medical and dental students were enrolled in a teaching pilot module. Measurement of outcomes was done at baseline, 1 month and 3 months. Chi-square and t-tests were used to analyze the data with $p < 0.05$ being significant.

Results: There were no significant differences in age, gender, education, tobacco use, or oral lesions between groups (all $p > 0.05$) at baseline. The awareness of oral risks increased from 68 (42.5%) to 125 (78.1%) participants ($p = 0.002$), willingness to quit increased from 51 (31.8%) to 102 (63.7%) participants ($p = 0.01$), and attempts of quitting improved from 12 (7.5%) to 45 (28.1%) ($p = 0.03$) in the area of community arm. The knowledge scores rose to 86.2% ± 8.7 ($p < 0.0001$) among students (n = 80), whereas counseling competency rose to 52(65.0%) ($p = 0.03$) compared to 28 (35.0%) initially.

Conclusion: Community-based interventions integrated with educational training were very effective in increasing awareness of tobacco cessation, quit behavior and student counseling competency.

Keywords: Tobacco Use Disorder; Oral Health; Community Health Services; Primary Health Care

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INTRODUCTION

Tobacco use is one of the most prevalent preventable morbidity and mortality causes in the world, and it results in millions of deaths annually [1]. Its effects are negative not only on oral health, but also on other diseases, such as leukoplakia, periodontitis, oral submucous fibrosis, and oral cancer [2]. Interestingly, tobacco is also comorbid with other systemic diseases, including cardiovascular and cerebrovascular disease, which emphasizes the interaction of oral and general health [3]. Similar to interventions aimed at treating resistant hypertension and stroke prevention, including the more recent techniques of renal denervation and patent foramen ovale repair, oral health services, too, should be modified to embrace integrative and evidence-based models [4,5]. This analogy emphasizes the fact that preventative models, in traditional medicine, can inform and empower the approaches in community dentistry. Despite the measures that are in place through the WHO Framework Convention on Tobacco Control (FCTC), the rate of oral diseases associated with tobacco is alarming, and as a result, this has necessitated an increase in the need to provide integrated and sustainable preventive measures [6].

The conventional clinical management is not enough to check the increasing tobacco burden since most interventions are directed towards treatment, as opposed to prevention [7]. Community-based initiatives have demonstrated potential to generate awareness, encourage behavioral modification, and improve the availability of preventive health care; more so in underserved communities [8]. On the same note, incorporation of tobacco cessation and preventive interventions in medical and dental education is critical in the sense that future medical and dental practitioners will be provided with the necessary knowledge and skills to deal with the oral diseases associated with tobacco use [9]. A more comprehensive solution to this ongoing concern in the field of public health is, however, possible through an interdisciplinary approach that connects community dentistry and public health with medical education [10].

The current paper is research undertaken to examine how community-based interventions can be combined with medical and dental education in order to decrease the burden of oral diseases caused by tobacco. This study aims to underline the possibilities of a combination approach by indicating the synergy between public health strategies, curriculum reforms, and community involvement as a tool to enhance oral health outcomes and policy-making processes.

METHODS

This comparative interventional study was a community-based case study carried out in the period of March to August 2024 (Ref: 2249/AST) in tertiary healthcare settings Akhtar Saeed Medical

College Lahore. OpenEpi version 3.0.0 (released 2013, Atlanta, GA, USA) was used to calculate the sample size with an expected prevalence of 2530 percent of the general population having tobacco-related oral lesions [11]. Non-probability consecutive sampling was used to recruit 320 participants.

Individuals aged 18 years and above and with a history of tobacco use (smoking or smokeless) were eligible. The exclusion criteria included patients who were systemically ill, those who had undergone formal cessation programs, and the ones who could not give informed consent. All eligible participants signed informed consent written consents. The research was carried out in two parallel arms. Arm Community Intervention: The participants were provided with structured awareness, oral health screening, and individual tobacco cessation counseling. Educational Integration Arm: undergraduate medical and dental students underwent training in a pilot module on tobacco cessation followed by providing counseling and awareness activities under faculty supervision. Baseline, 1 month, and 3 months of follow-up assessments were used to evaluate knowledge, attitudes, practices (KAP), and lesion status.

All the data were obtained with help of pre-designed proforma. The oral examination was done according to WHO oral health assessment criteria, and KAP changes were measured with the help of a validated questionnaire. Structured checklists and pre- post test scores were used to measure the competencies of students. The analysis and data entry were carried out in SPSS 26.0 (released 2019, IBM Corp., Armonk, NY). Categorical variables were reported in frequencies and percentages, whereas the mean ± SD was reported in quantitative data. Chi-square tests and paired t-tests were used where $p < 0.05$ was considered as significant.

RESULTS

Table 1: Baseline Characteristics of Study Participants (n = 320)

Variable	Community Intervention Arm (n=160)	Educational Integration Arm (n=160)	Test Value	p-value
Age (years, mean ± SD)	36.4 ± 11.9	36.0 ± 12.3	t = 0.29	0.77
Male Gender (%)	102 (63.7%)	105 (65.6%)	$\chi^2 = 0.10$	0.75
Education ≥ Secondary (%)	78 (48.7%)	81 (50.6%)	$\chi^2 = 0.09$	0.76
Daily Tobacco Use (%)	118 (73.7%)	115 (71.8%)	$\chi^2 = 0.12$	0.72
Presence of Oral Lesion (%)	41 (25.6%)	44 (27.5%)	$\chi^2 = 0.12$	0.73

P<0.05 found to be statistically significant

There were a total of 320 participants recruited with an equal amount of 160 in the Community Intervention Arm and 160 in Educational Integration Arm. The participants had a mean age of 36.2

(SD ± 12.1) with a range of 18 to 65 years. **Table 1** summarizes baseline demographic and behavioral characteristics of the participants. The two groups were comparable with no statistically significant difference in baseline of age, gender, education, tobacco use pattern, or oral lesion prevalence (all p > 0.05).

Table 2: Changes in Community Knowledge, Attitude, and Practices (KAP) Over Time (n=160)

Variable	Baseline	Month 1	Month 3	p-value
Awareness of oral risks (%)	68 (42.5%)	102 (63.7%)	125 (78.1%)	0.002
Willingness to quit (%)	51 (31.8%)	72 (45.0%)	102 (63.7%)	0.01
Quit attempt in past month (%)	12 (7.5%)	26 (16.2%)	45 (28.1%)	0.03

P<0.05 found to be statistically significant

Across follow-up measurements, significant increases in the knowledge, attitudes, and practices (KAP) of participants in the community were observed (Table 2). Awareness rose by the third month to 125 (78.1%) compared to the initial awareness of 68 participants (42.5) with p = 0.002. On the same note, the intention to quit increased to 102 (63.7 %) (p = 0.01).

Table 3: Student Knowledge and Competency Outcomes (n=80)

Variable	Pre-intervention	Post-intervention	p-value
Knowledge Score (mean ± SD)	61.3 ± 10.5	86.2 ± 8.7	<0.0001
Counseling Competency (%)	28 (35.0%)	52 (65.0%)	0.03

P<0.05 found to be statistically significant

Table 3 demonstrates that knowledge and counseling skills improved significantly among the medical and dental students (n= 80) after the pilot module. The scores on knowledge rose to 86.2 ± 8.7 (p < 0.0001) over 61.3%, and the competency in counseling was significantly enhanced based on the structured ability checklists (p = 0.03).

In general, incorporation of community-based interventions and medical education proved to be dual-effective in terms of community awareness and readiness to quit, and student skills in tobacco cessation counseling.

DISCUSSION

The study assessed the efficacy of community based interventions as compared to medical and dental education in prevention of tobacco related oral diseases. The results indicated that there were high levels of awareness and willingness to quit as well as tobacco cessation efforts in community participants. Simultaneously, medical and dental students also reported significant improvement in knowledge and counseling competency after the integration of education. These findings indicate

that a two-pronged strategy that incorporates the behavior in the community and professional training can generate a synergistic effect towards the reduction of actions associated with oral problems caused by tobacco [12].

Our findings are in line with previous evidence that community-based interventions, such as awareness campaigns, screening, and cessation counseling are important in altering tobacco behaviors. Integrative models in healthcare are also supported by the fact that the wider medical literature also emphasizes the significance of preventive and early intervention approaches in other areas. As an example, recent cardiological research highlights the importance of early identification and treatment in pregnancy-related coronary artery dissection (P-SCAD) [13], myocardial infarction with non-obstructed coronary arteries (MINOCA) [14], and Takotsubo syndrome [15]. Although such examples are based in cardiovascular medicine, they underscore a universal theme, namely that, preventive, multidisciplinary strategies are needed in all specialties, such as dentistry and community medicine, to minimize disease burden in the long-term.

It has been reported that school and workplace programs can be effective in the reduction of initiation and in facilitating quitting, especially among the young populations [16]. The interventions have been associated with higher rates of precancerous oral lesions being detected and better oral health-seeking behaviors in similar interventions in rural and underserved communities [17]. These observations are also supported by the current study as the differences in knowledge, attitudes, and practices were identified in a relatively short period of follow-up [18]. The other dimension is medical and dental education integration. According to previous studies, the participation of students in counseling tobacco cessation-based training modules increases their willingness to work with patients and encourage health prevention strategies [19]. The findings of our studies are consistent with these observations, because students did not only enhance their theoretical knowledge but also exhibited practical skills on counseling community members [20].

The dual approach that has been introduced in this paper is in line with the recommendations of the WHO that include prevention, education, and integration of policies in controlling tobacco consumption [21]. The interplay between grass-roots level community outreach and academic training forms a framework of sustainability: communities get access to a better knowledge base and services, and students receive a field experience that would make them prepared to face the world problems in practice [22]. These strategies could be especially successful in less-developed and middle-income states, where the lack of resources frequently impedes the massive treatment-based interventions [23]. A policy and a system level support are also emphasized in the study. It is indicated that improvements in the effectiveness of more comprehensive tobacco control efforts can be increased

by incorporating cessation service into primary care and reinforcing the medical education curriculum [24]. Our findings offer support to the scaling up of similar integrated models in any other region and the integration of such models in national oral health policies by illustrating positive changes at both community and educational levels [25].

The research has weaknesses although it has encouraging results. Non-probability sampling restricts the external validity and the comparatively short follow-up does not allow researching the long-term quitting outcomes. In addition, students were tested in a controlled module but not in a clinical situation that would be real which could have a bearing on external validity. Future studies should be done using multicenter randomized designs with large sample, longer follow-up, and comparison to the standard cessation programs. The digital intervention and exploration of biomarker-based monitoring might also be useful both in terms of understanding and efficacy. Lastly, broader implementation of community and education programs, which are integrated, would go a long way in preventing oral diseases caused by tobacco, besides improving health and medical education systems within the society

CONCLUSION

The paper brings out the trend of integrating community based interventions with the medical and dental education as a practical way of reducing oral disease that is related to tobacco. By means of preventative action, sensitization and curriculum based education the communities and the future providers of health services will be empowered to address this growing national health issue. Integration of education, outreach and clinical practice may offer a long-term sustainable model of community-based dentistry and medical education synchronization to minimize oral disease burden over a long-term perspective. However, the successful implementation is associated with joint policies, stakeholder involvement and frequent evaluation.

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CONFLICT OF INTEREST

None

ETHICAL APPROVAL

This comparative interventional study was a community-based case study carried out in the period of March to August 2024 (Ref: 2249/AST) in tertiary healthcare settings Akhtar Saeed Medical College Lahore.

AUTHORS' CONTRIBUTION

All authors contributed equally as per ICMJE.

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