

RESEARCH ARTICLE

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Education to Implementation: A Mixed-Methods Study of Tobacco Cessation Counselling Practices Among Recently Graduated Dentists in India

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Abstract

Background: India bears a high burden of tobacco-related oral disease. The Dental Council of India (DCI) has recently mandated the establishment of Tobacco Cessation Centres (TCCs) in dental colleges and released operating guidelines to standardise their functioning. Evidence on how recently graduated dental practitioners engage with TCC-related competencies in actual practice remains limited. **Methods:** A sequential explanatory mixed-methods study was conducted among BDS graduates (2018 onwards) currently in clinical practice in Uttar Pradesh, India. A cross-sectional online survey (n = 264) assessed TCC practices, attitudes, perceived barriers, and support needs. A composite Attitude-and-Practice Score was generated, and univariate linear regression examined associations with participant characteristics. In the qualitative phase, eight semi-structured in-depth interviews were analyzed using reflexive thematic analysis and interpreted through the COM-B (Capability–Opportunity–Motivation–Behaviour) model. **Results:** Although 83.7% of respondents reported undergraduate posting in a TCC centre, only 37.1% had received additional cessation-related training and 14.8% reported personal tobacco use. Routine enquiry and brief advice were common, but pharmacotherapy use, structured follow-up and formal referral were inconsistent. The mean Attitude-and-Practice Score was approximately 74%, with personal tobacco use emerging as the only significant negative predictor. Qualitative analysis identified four interacting themes: procedure-driven clinical identity, system-level constraints, patient-related, challenges and training-related capability gaps. These collectively reflected limited capability, constrained opportunity, and fragile motivation within COM-B. **Conclusion:** Undergraduate training alone has not ensured routine tobacco cessation counselling among recently graduated dentists. Bridging the gap between training and practice requires competency-based education, supportive systems, and a shift in dentist's perceptions to value preventive counselling as an integral part of clinical care. Strengthening these elements is essential for enhancing the role of dental professionals in oral cancer prevention.

Keywords: Tobacco cessation counselling, Mixed-methods study, COM-B model, Dental education

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Introduction

Tobacco use is one of the most significant preventable causes of morbidity and mortality worldwide. The World Health Organization (WHO) estimates that more than 8 million deaths occur annually due to tobacco [1]. Nearly 80% of the world's 1.3 billion tobacco users reside in low- and middle-income countries, where health systems face severe challenges in addressing tobacco-related disease burdens [1].

India carries one of the heaviest burdens of tobacco consumption. The Global Adult Tobacco Survey (GATS-2, 2016–17) revealed that 28.6% of adults, approximately 267 million individuals use tobacco in some

form [2]. The situation is particularly concerning in Uttar Pradesh, where 35.5% of individuals aged 15 years and above consume tobacco [3]. The National Family Health Survey (NFHS-5, 2019–21) further reported that 38.0% of men and 8.9% of women aged ≥ 15 years currently consume tobacco [4]. This high prevalence is reflected in the country's disease profile: according to GLOBOCAN 2022, cancers of the lip and oral cavity are among the leading causes of cancer-related deaths in India [5].

Effective tobacco cessation counselling (TCC) is a cornerstone of reducing this burden. Evidence shows that behavioral counselling combined with pharmacological support substantially increases quit rates compared with unassisted attempts [6]. Even brief interventions,

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such as advice lasting less than three minutes have been demonstrated to improve quit attempts and long-term abstinence [7]. Dental professionals are uniquely positioned to contribute to tobacco cessation. Routine dental visits provide opportunities for screening, early detection of oral lesions, and delivery of cessation advice [8].

Despite its proven effectiveness, the delivery of TCC by dental professionals remains inconsistent [9]. Addressing these barriers is critical to transforming dentists from passive observers of tobacco-related disease into active agents of cessation support.

Recognizing the urgent need, India has advanced several policy measures. As a Party to the WHO Framework Convention on Tobacco Control (FCTC), the country is obligated under Article 14 to integrate cessation support into health systems [10]. In line with this, the Dental Council of India (DCI) has mandated the establishment of Tobacco Cessation Centers (TCCs) in dental colleges and issued operating guidelines to standardize their functioning across educational and clinical settings [11].

While these curricular reforms represent an important step forward, evidence regarding their impact on newly graduated dentists remains sparse. It is not clear whether recent graduates have translated theoretical knowledge into consistent clinical practice, how confident they feel in providing counselling, or what systemic and professional barriers continue to impede implementation.

Therefore, the present mixed-methods study was conducted in Lucknow, India, to evaluate the attitudes, current practices, and perceived barriers of dentists who graduated after 2018 toward delivering tobacco cessation counselling. The findings aim to inform targeted strategies and strengthening the role of dental professionals in advancing national tobacco control goals.

Materials and Methods

Study design and participants

This was a sequential explanatory mixed-methods study conducted among recently graduated dental practitioners in Uttar Pradesh, India. In the first phase, a cross-sectional online survey was used to document tobacco cessation counselling (TCC) practices, attitudes and barriers. The second phase consisted of in-depth interviews (IDIs) to clarify and expand on the survey findings.

The target group comprised BDS graduates who had completed their degree in 2018 or later, corresponding to the period when DCI introduced institutional Tobacco Cessation Centers and were currently engaged in clinical practice (private or government). Dentists who were not practicing clinically, or who declined participation, were not included.

Sample size

Sample size for the quantitative component was estimated using a single-proportion formula, assuming 21.2% of dentists provide TCC based on Rajesh et al. [12], with a 5% absolute margin of error and 95% confidence

level. The minimum required sample size was 257, which was rounded to 260 for operational feasibility.

Quantitative phase

Questionnaire development and structure

A structured self-administered questionnaire was drafted after reviewing relevant literature and consulting experts in Public Health Dentistry. The final tool comprised three sections:

Part I: Demographic, Educational Exposure and Personal Factors

Part II: Practice and Attitude-Based Questions

Part III: Barriers and Recommendation-Based Questions

Measurement properties of the instrument were evaluated before the main survey. Expert review yielded an average item-level content validity index (I-CVI) of 0.82, and pilot testing demonstrated good internal consistency with Cronbach's $\alpha = 0.86$. Minor wording refinements were made based on pilot feedback.

Data collection

The questionnaire was converted into a Google Forms survey. The first mandatory item acted as an eligibility filter, allowing respondents to proceed only if they indicated (a) BDS graduation in 2018 or later, and (b) current involvement in clinical practice; those not meeting both criteria were automatically exited from the form.

The survey link, along with the participant information and consent statement, was disseminated via professional WhatsApp groups, e-mail lists and peer networks of dentists in Uttar Pradesh. Participation was voluntary and anonymous. Two reminder messages were sent at intervals of about one week to maximize response. Completed responses were downloaded in spreadsheet format for analysis.

Data analysis

Data were analyzed using IBM SPSS version 24. Categorical variables were summarized as frequencies and percentages, and continuous variables as mean with standard deviation (SD). Group differences were examined with Chi-square test, independent t-test or one-way ANOVA, depending on the scale of measurement.

From selected Likert-type items on attitudes and practice, a composite Attitude-and-Practice Score (percentage) was created, with higher values indicating a more favourable orientation towards TCC. Univariate linear regression was applied to explore associations between this score and key dentist characteristics. A p -value < 0.05 was considered statistically significant.

Qualitative phase

In-depth interviews

To explain and enrich the survey findings, a qualitative phase using semi-structured IDIs was conducted. Dentists who fulfilled the same eligibility criteria as in the quantitative phase and indicated willingness for further participation were approached purposively to ensure variation in practice type and level of TCC engagement.

The interview guide was informed by quantitative

results and explored: feasibility of incorporating TCC into routine practice; experiences with follow-up and relapse; perceived adequacy of training and confidence; views on financial incentives; patient resistance; and suggestions to strengthen TCC delivery. Interviews were held in a quiet setting, lasted approximately 30–45 minutes, were audio-recorded with permission, and continued until thematic saturation was reached. Recordings were transcribed verbatim, anonymized and, where necessary, translated into English.

Thematic analysis and theoretical framing

Transcripts were analyzed using reflexive thematic analysis. Two researchers independently performed initial open coding on a subset of interviews, then compared and refined codes to develop a shared coding framework. This framework was applied to the remaining transcripts with iterative modification. Codes were grouped into categories and then into broader themes capturing dentists' experiences of TCC.

The final thematic structure centered on four domains; clinical priorities, practice barriers, patient barriers and training & capability which were then interpreted through the COM-B model (Capability, Opportunity, Motivation–Behaviour) to understand how different factors facilitated or hindered TCC behaviour among early-career dentists.

Mixed-Methods Integration

Integration of quantitative and qualitative strands occurred at multiple stages of the study. Quantitative survey findings informed the purposive selection of participants for qualitative interviews and guided the development of the interview guide by identifying areas requiring deeper exploration. During the interpretation phase, quantitative results and qualitative themes were integrated and mapped onto the COM-B framework to explain the observed gap between knowledge and practice in tobacco cessation counselling.

Ethical considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee (Ref. Code: XXXII-PGTSC-IIA/P42). Digital informed consent was obtained prior to completion of the online questionnaire, and audio-recorded consent was secured from all interview participants. Data were stored securely, analyzed in de-identified form and reported without revealing individual identities.

Results

Quantitative findings

Participant Characteristics

A total of 264 dentists participated in the study. The mean age of participants was 26.83 ± 2.89 years. Most respondents were practicing in private clinics (66.3%), while 33.7% were employed in government or public healthcare facilities. A large majority reported having completed a posting in a Tobacco Cessation Centre (TCC) (83.7%). Among those posted, the duration varied, with 38.0% completing a 15-day posting, 26.2% a one-week posting, 24.9% a one-month posting, and 10.9% reporting postings longer than one month. Additional TCC-related training or workshops were attended by 37.1% of participants. Personal tobacco use was reported by 14.8% of respondents, among whom dual use of smoking and smokeless tobacco was most common (40.8%) (Table 1).

Tobacco Cessation Counselling Practices

Tobacco cessation counselling practices among participants are presented in Figure 1. Nearly half of the respondents (45.8%) reported always educating patients about the harmful effects of tobacco, while 31.8% did so often. Gradual reduction (tapering) was the preferred cessation approach among the majority of participants (86.4%), compared with abrupt cessation (13.6%). The most commonly reported counselling

Table 1. Demographic, Practice and Training Characteristics of Participants

Variable	Category	n	%
Age (years)	Mean $\pm$ SD	26.83 $\pm$ 2.89	—
Current practice setting	Private clinic	175	66.3
	Government/public facility	89	33.7
Had posting in Tobacco Cessation Centre (TCC)	Yes	221	83.7
	No	43	16.3
Duration of TCC posting	15 days	84	38
	1 week	58	26.2
	1 month	55	24.9
	>1 month	24	10.9
Attended additional TCC training/workshops	Yes	98	37.1
	No	166	62.9
Personal use of tobacco	Yes	39	14.8
	No	225	85.2
Form of tobacco used (among users)	Smoking	19	38.8
	Smokeless	10	20.4
	Both	20	40.8

n (%), Number of participants (percentage); SD, Standard deviation

Table 2. Attitude-and-Practice Score by Participant Characteristics

Variable		Attitude & Practice Score (%)		Significance	
		Mean	SD	statistic	p-value
Gender	Male	73.65	10.67	t=0.519	0.604
	Female	74.39	12.18		
Age	20 - 29 years	74.33	11.04	F=1.22	0.296
	30 - 39 years	71.97	15.69		
	40 - 49 years	65.74	3.21		
Posting in TCC	No	73.58	12.56	t=0.28	0.777
	Yes	74.12	11.26		
Current practice setting	Private clinic	73.14	11.86	t=2.10	0.041*
	Government/public facility	75.78	10.47		
Personally use any form of tobacco	No	75.14	10.66	t=3.23	0.002*
	Yes	67.66	13.76		

Mean $\pm$ SD; t, independent sample t-test; F, One-way ANOVA; *p < 0.05 statistically significant; TCC, Tobacco Cessation Centre

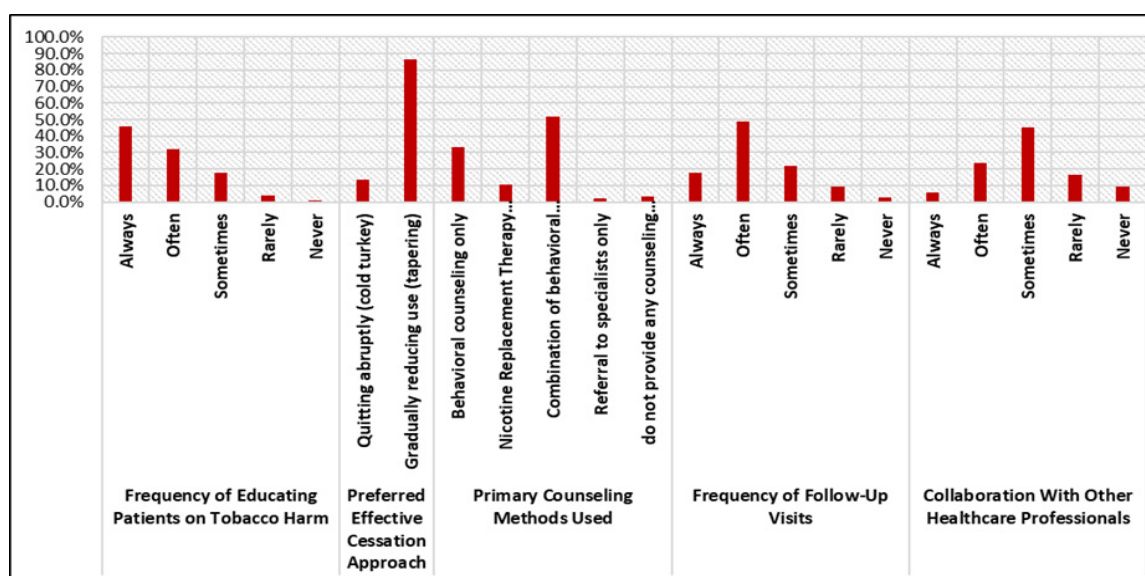


Figure 1. TCC Practices among Participants

method was a combination of behavioral counselling and nicotine replacement therapy (51.9%), followed by behavioral counselling alone (33.0%). Follow-up visits were conducted often or always by 66.3% of participants. Collaboration with other healthcare professionals was reported most frequently as occasional (45.1%), while

29.2% reported collaborating often or always.

Attitudes and Confidence Towards Tobacco Cessation Counselling

Attitudes and confidence related to tobacco cessation counselling are shown in Figure 2. Almost all participants

Table 3. Univariate Linear Regression Analysis of Predictors of Attitude-and-Practice Score

Parameter	Dependent: Attitude & Practice Score (%)				
	B	SE	t-value	p-value	effect size
Intercept	59.09	6.85	8.63	0	0.225
Gender	-0.36	1.39	-0.26	0.798	0
20 - 29 years	10.42	6.54	1.59	0.112	0.01
30 - 39 years	10.38	7	1.48	0.139	0.008
Not Posted in TCC	1	1.97	0.51	0.613	0.001
Pvt & Govt	-2.19	1.57	-1.39	0.165	0.007
Tobacco Use	-7.17	2	3.59	<0.001	0.048

Dependent: Attitude & Practice Score (%); B, Unstandardized regression coefficient; SE, Standard error; t, t-test statistic; p-value, Probability value; Effect size, Measure of strength of association.

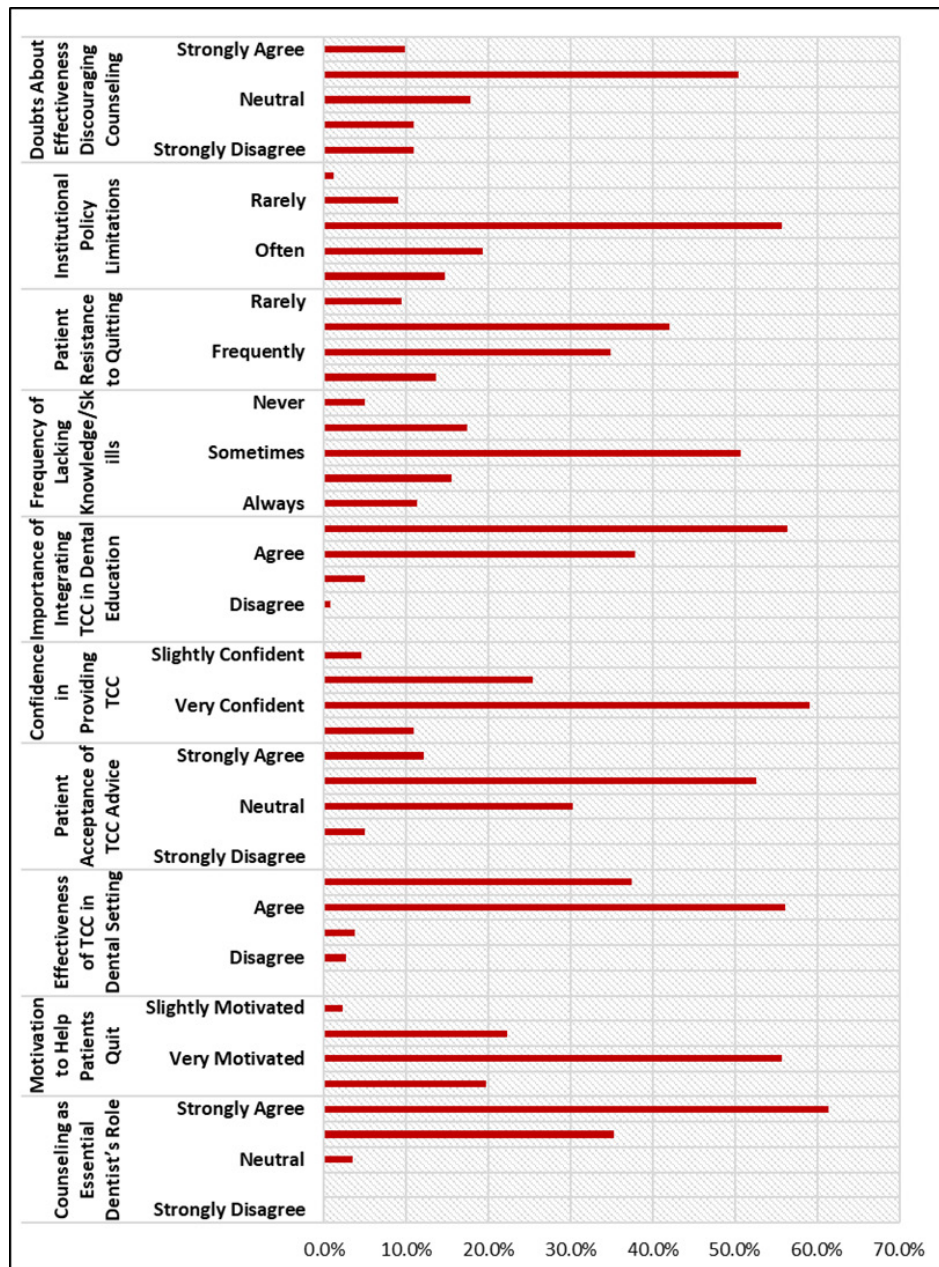


Figure 2. TCC Attitudes among Participants

agreed that providing tobacco cessation counselling is an essential part of a dentist's professional role (96.6%). High levels of motivation to help patients quit tobacco were reported, with 75.4% indicating they were very or extremely motivated. Confidence in providing tobacco cessation counselling was also high, with 70.1% reporting being very or extremely confident. More than 90% of respondents agreed that tobacco cessation counselling can be effective when delivered in dental settings.

Perceived Barriers and Support Needs

Perceived barriers to tobacco cessation counselling and resource needs are summarized in Figure 3. The most frequently reported barriers included lack of time (64.4%), lack of patient interest (61.7%), insufficient training in tobacco cessation counselling (54.2%), and lack of educational materials (46.6%). Patient resistance to quitting and limited confidence in counselling skills were

also commonly reported. To strengthen tobacco cessation counselling services, participants most frequently recommended additional training programs (74.6%), improved availability of educational materials (66.7%), collaboration with specialists (55.3%), and financial incentives for providers (52.7%).

Attitude-Practice Score and Predictors

Mean attitude-and-practice scores (expressed as percentages) by participant characteristics are presented in Table 2 and were treated as a continuous quantitative variable. Differences were examined using independent samples t-tests and one-way ANOVA. No statistically significant differences were observed by gender ($p=0.604$), age group ($p=0.296$), or prior posting in a TCC ($p=0.777$). Participants practicing in government or public healthcare facilities had significantly higher scores than those in private practice (75.78 ± 10.47 vs. 73.14 ± 11.86 ;

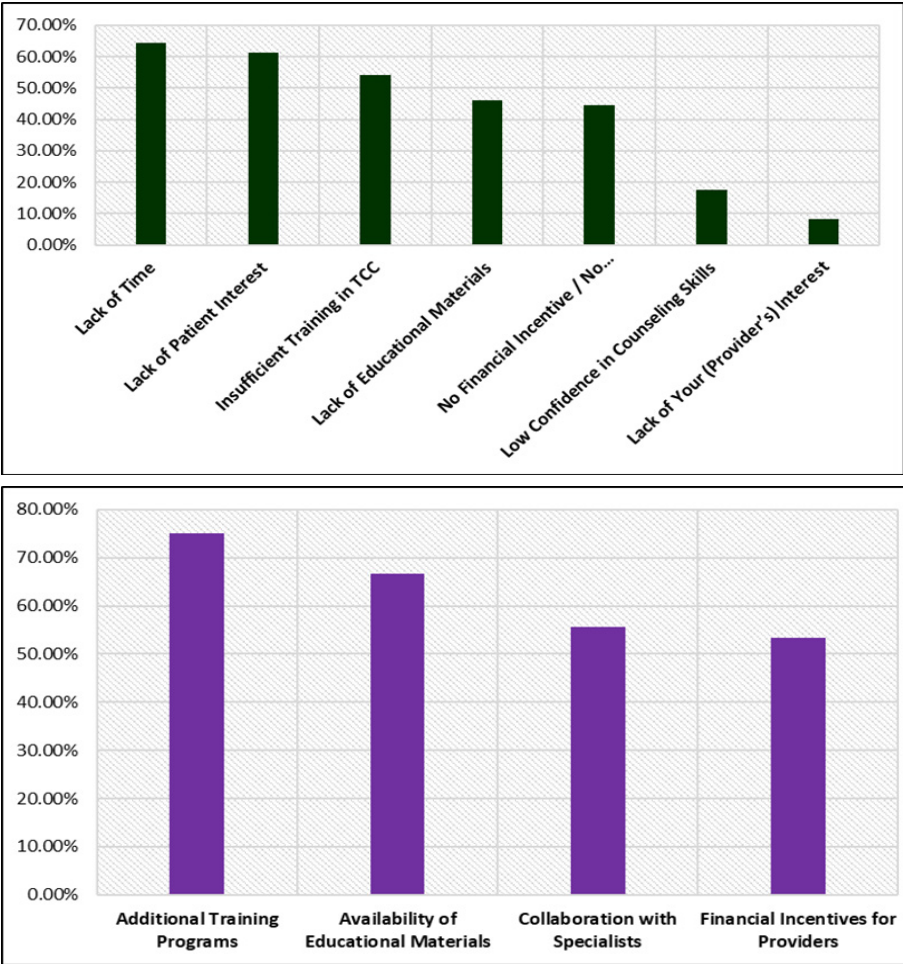


Figure 3. Perceived Barriers and Resource Needed for Strengthening TCC

$p = 0.041$), while participants reporting personal tobacco use had significantly lower scores than non-users (67.66 ± 13.76 vs. 75.14 ± 10.66 ; $p = 0.002$).

Associations with Training and Practice Setting

Univariate linear regression analysis of predictors of attitude-and-practice scores is shown in Table 3. Tobacco use was a significant negative predictor of attitude-and-practice scores ($B = -7.17$, $p < 0.001$). Other variables, including gender, age group, posting in a TCC, and

practice setting, were not significantly associated with the outcome score.

Qualitative Findings

Semi-structured interviews with eight early-career dentists yielded four interconnected themes that explained why tobacco cessation counselling (TCC) remains irregular despite positive attitudes reported in the survey. These themes relate to clinical priorities, practice-level barriers, patient-related barriers and training and capability

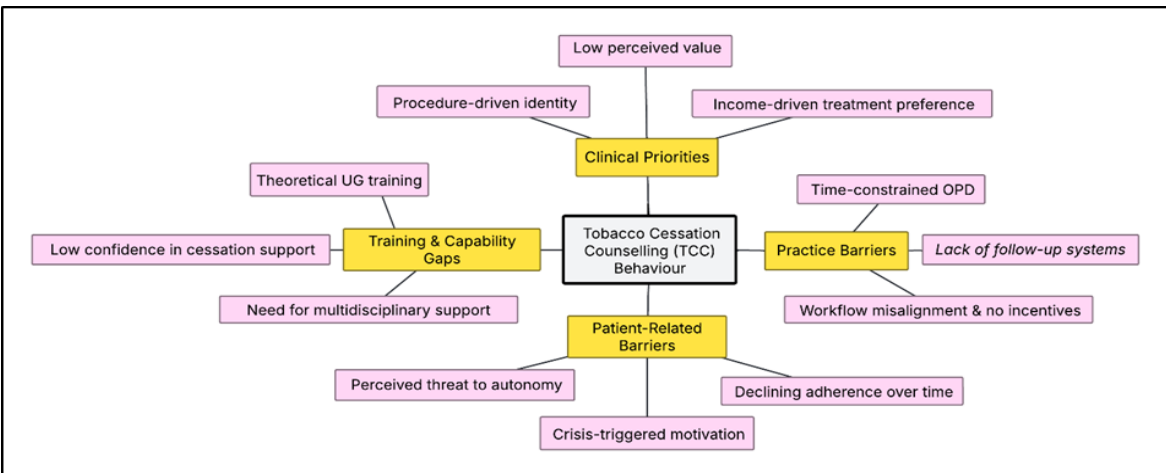


Figure 4. Thematic Map of Qualitative Findings on TCC Behaviour

gaps (Figure 4).

Theme 1: Clinical Priorities

Participants described a strongly procedure-driven professional identity, where mastering clinical skills such as root canal therapy and extractions was seen as central to their future livelihood. In contrast, TCC was viewed as important but peripheral to what defines them as dentists.

“As budding dentists, we are more eager to master RCT and extractions; those are our bread and butter in private practice.”

Several participants felt that students naturally gravitate towards income-generating procedures, which results in less engagement with TCC, even when it is formally included in the curriculum.

“Students focus more on income-based procedures, so even if TCC is in the curriculum, we don’t give it as much importance.”

Preventive counselling was therefore acknowledged as valuable, but it did not receive the same priority as operative work when dentists thought about their future practice.

Theme 2: Practice Barriers

Dentists reported multiple system-level constraints that limited routine implementation of TCC. High patient load and the pace of outpatient departments left little time for extended discussions or systematic follow-up.

“In a busy OPD we can advise once, but there is no system for follow-up; it becomes impossible to continue.”

In addition, TCC was rarely treated as a billable or formally recognised service, which further reduced its priority within daily workflow.

“If TCC becomes a payable service, it will feel more normal to include it in our routine.”

“Even patients will take it more seriously if they are paying for counselling.”

Together, time pressure, lack of follow-up systems and absence of incentives contributed to TCC being fitted in opportunistically rather than as a structured part of care.

Theme 3: Patient-Related Barriers

Participants frequently described patient-side challenges that made sustained TCC difficult. Resistance to advice was especially common among older adults, who were perceived as sensitive to being questioned about their habits.

“Older patients feel judged when we ask them about their habit; they don’t like being told to quit.”

Dentists also noted that many patients only treated counselling seriously after experiencing visible harm, such as oral lesions.

“Most patients start thinking seriously about quitting only when they already have some lesion or problem.”

Even among those initially motivated, engagement often declined over time, which in turn reduced dentists’ enthusiasm.

“Patients are very motivated in the first visit, but their motivation drops later, and that also affects our interest to keep counselling.”

These experiences created a sense that maintaining

long-term change was “pushing against the tide,” especially without structured follow-up support.

Theme 4: Training and Capability Gaps

Although most participants had undergone a TCC posting during undergraduate training, they felt that the exposure was largely theoretical, with limited opportunity for supervised clinical counselling.

“We learned the theory, but clinical practice was very limited in my under graduation.”

Dentists reported low confidence in handling resistant users, planning follow-up or prescribing NRT independently.

“Even though I can motivate initial tobacco users, I’m not confident to handle resistant patients or to prescribe NRT.”

Many suggested that more hands-on training, clearer protocols and access to multidisciplinary support (such as psychiatry or behavioral experts) would be needed before they could integrate TCC more consistently into practice.

Discussion

This mixed-methods study explored tobacco cessation counselling (TCC) practices among early-career dentists in India using the COM-B (Capability–Opportunity–Motivation–Behaviour) framework. Although dentists reported positive attitudes toward counselling, the quantitative findings revealed predominantly brief interventions, minimal pharmacotherapy, and limited follow-up, mirroring national challenges in preventive oral cancer control [1–5]. Similar attitude–practice discrepancies have been reported among Indian dental interns [12] and private practitioners [13], underscoring that supportive beliefs alone do not translate into sustained behavioural counselling.

Capability: Knowledge Without Skill

Despite most respondents reporting undergraduate exposure to tobacco control, counselling confidence remained low. This aligns with earlier institutional research showing that dental training remains theory-oriented, with inadequate supervised practice [12]. Comparable competency deficits have been reported among dental students in Iran [14] and Sri Lanka [15], indicating a broader regional challenge. A systematic review on tobacco cessation training reported that most dental curricula worldwide emphasise information rather than competency assessment or behavioral skill acquisition [16]. In line with our findings, these studies collectively suggest that awareness-driven training may increase knowledge, yet fails to build counselling capability, particularly in motivational interviewing, relapse support and nicotine replacement therapy (NRT).

Opportunity: System-Level Constraints

Clinical opportunity emerged as a critical barrier. High outpatient loads, lack of designated counselling space, absence of recall systems, and no reimbursement discouraged routine TCC delivery. These organisational constraints reflect previous evidence that tobacco

counselling remains marginalised in workflows without structural prompts, documentation protocols or financial models [9]. Although the Dental Council of India has mandated Tobacco Cessation Centres in dental colleges and issued operating guidelines for their functioning [17], our findings suggest inadequate implementation in both public and private settings. Similar systemic barriers have been observed among dentists in Yemen, where economic pressures and insufficient policy translation limit counselling integration [18]. Thus, the problem appears structural rather than individual, shaped by healthcare priorities favouring procedural revenue over preventive engagement.

Motivation: Ethical Support but Fragile Practice

Participants expressed ethical responsibility toward counselling, consistent with findings among Sri Lankan dental trainees [15] and Saudi hygienists [19]. However, personal tobacco use negatively affected counselling practices, aligning with evidence from Mumbai where tobacco-using dentists were less likely to prescribe NRT or deliver structured advice [20]. Comparable trends among Japanese dentists suggest that provider habits and self-identity influence counselling intensity [21]. Additionally, resistance from older or habitual users discouraged repeated engagement, leading dentists to prioritise operatory procedures perceived as valued by patients. A mixed-methods study in India similarly reported that dentists initially counsel but withdraw follow-up when patient motivation declines [22]. These results indicate that motivation alone cannot sustain counselling without support for relapse management and behavioural reinforcement.

Implications

To improve TCC outcomes, tobacco-related education must shift from knowledge-heavy to competency-driven instruction that includes supervised counselling, role-play and feedback-based skill assessment. Embedding TCC into routine workflows through mandatory documentation of tobacco status, brief advice protocols and referral linkages with psychiatry or community medicine can improve feasibility and reduce dependence on personal enthusiasm. Aligning reimbursement mechanisms and recognition with global tobacco control frameworks may help reduce perceived conflict between preventive counselling and procedure-based revenue, especially within private practice settings.

Limitations

Self-reported behaviours may be affected by social desirability bias, and cross-sectional data cannot infer causality. Findings represent dentists from a single state and may not reflect senior practitioners. COM-B was used only as a qualitative interpretive framework, not as a measured construct. The small qualitative sample and lack of focus group discussions may have limited diversity of viewpoints.

In conclusion, this study reveals a persistent gap between positive professional attitudes and actual delivery of tobacco cessation counselling (TCC) among

recently graduated dental practitioners in India. Although most recognise cessation as a professional and ethical responsibility, counselling remains limited, opportunistic, and rarely includes pharmacotherapy or structured follow-up. Barriers stem not only from limited clinical capability but also from inadequate institutional opportunity, particularly in private practice, where preventive counselling competes with procedure-driven revenue. Policy and education reforms must therefore prioritise competency-based training, system-level integration and incentive alignment to ensure TCC becomes a routine, reimbursable and evidence-based component of dental care.

Author Contribution Statement

Conceptualization and study design were carried out by Dr. Gummalla Sreeja and Dr. Gaurav Mishra. Data collection was performed by Dr. Gummalla Sreeja, Dr. Deepak S, Dr. Sifpsa Diwakar, Dr. Aayushi Aggarwal, and Dr. Aditya Agarwal. Data analysis and interpretation were undertaken by Dr. Gummalla Sreeja and Dr. Gaurav Mishra, with methodological guidance from Dr. Vinay Kumar Gupta and Dr. Sumit Kumar. Qualitative analysis and thematic interpretation were conducted by Dr. Gummalla Sreeja and Dr. Nishita Kankane. The manuscript was drafted by Dr. Gummalla Sreeja and critically revised for intellectual content by Dr. Gaurav Mishra, Dr. Vinay Kumar Gupta, Dr. Sumit Kumar, and Dr. Nishita Kankane. All authors reviewed, approved the final manuscript, and agree to be accountable for all aspects of the work.

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Scientific Approval

The study protocol was reviewed and approved by the Institutional Ethics Committee of King George's Medical University, Lucknow, India (Ref. Code: XXXII-PGTSC-IIA/P42). No ethical issues were encountered throughout the study and all procedures were conducted in accordance with ethical standards and the principles of the Declaration of Helsinki.

Data Availability:

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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