



Smoking Cessation Counseling: Practices, Determinants, and Barriers in a Sample of Iranian Primary Care Dentists

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ABSTRACT

Objectives: Despite the successful tobacco smoking cessation counseling (TSCC) efforts of dental professionals, Iranian primary care dentists have not fully utilized their potential for TSCC provision. Thus, this study assessed the TSCC practices and their associations with socio-professional attributes, knowledge, and attitude, and explored the TSCC barriers and their socio-professional determinants in a sample of Iranian primary care dentists.

Materials and Methods: This cross-sectional study was conducted at Comprehensive Healthcare Centers (CHCs) in Tehran Province, Iran from March to June 2019. All dentists practicing in these centers (n=190) completed self-administered questionnaires regarding TSCC-related knowledge, attitude, practice, and barriers. Simple and multiple linear regression and multiple logistic regression tests were used for statistical analyses.

Results: The respondents (n=180, response rate=93%) were predominantly females (81.6%), recent graduates (69.6%), and non-cigarette smokers (90.2%), with a mean age of 34±9.98 years. Most performed 'Ask' (90.6%) and 'Advise' (69.1%), while a few were engaged in 'Assess' (33.7%) and fewer in 'Assist,' with 21.3% making physician referrals and 31.5% making psychologist referrals. Non-smokers (B=0.80, 95% CI: 0.19 to 1.40; P=0.01), and those with a more positive attitude (B=0.06, 95% CI: 0.04 to 0.08; P<0.001) were more likely to provide TSCC. The main identified barriers included "absence of educational resources for patients", "time constraints", and "lack of patient cooperation."

Conclusion: Although the selected sample of Iranian primary care dentists performed "Ask" and "Advise" more frequently than their peers, their TSCC practice required further improvement through simplified guidelines, customized pathways, training, team work, and resource advocacy.

Keywords: Tobacco Use; Smoking; Smoking Cessation; Dentists; Primary Health Care; Iran

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INTRODUCTION

Tobacco smoking is responsible for a significant number of avoidable fatalities globally, resulting in loss of more than eight million lives each year [1]. The majority of such deaths occur in low- and middle-income

countries (LMICs), which account for about 80% of the global smoking population [1]. It is projected that 70% of the 10 million tobacco-related deaths expected by 2030 will occur in these nations [2]. Iran, a Middle Eastern LMIC, faces significant challenges due to tobacco

smoking. The 14% smoking prevalence among the Iranian adults results in nearly 50,000 deaths annually and incurs costs exceeding 2 trillion Iranian Rials each year [3,4].

Tobacco smoking can cause a variety of oral complications [5]. It causes tooth and restoration discoloration, diminishes the sense of taste, and decelerates wound healing [6]. In addition, several studies have reported that smoking increases the mean Decayed, Missing, and Filled Teeth index by 1.2 points, doubles the risk of periodontal disease, raises the likelihood of tooth loss by 1.5 times, and elevates the risk of oral cancer by 7 to 10 times [6-8]. Nonetheless, smoking cessation can improve and even reverse most of these complications [6,9,10].

Although most smokers have the desire to quit, they may fail up to 30 times before quitting successfully, and only 3-5% quit without an external aid [10-12]. Quit rates are lower in LMICs where resources and infrastructure are lacking to combat tobacco use [13,14]. In such contexts, health professionals, given their credibility and influence on the community, can significantly contribute to smoking cessation efforts as advocates, leaders, and role models [10,15].

Global health organizations such as the World Health Organization (WHO) and the FDI World Dental Federation endorse tobacco smoking cessation counseling (TSSC) provided by dental professionals [6,9]. Dental professionals can achieve a remarkable 70% increase in long-term quit rates through TSSC due to their regular engagement with smokers, longer appointment periods with patients, and focusing only on the oral cavity, where early signs and symptoms of smoking appear [1,6,9,10,16].

Despite the endorsements and opportunities, only about 10-25% of dental professionals routinely provide TSSC [9,17]. A similar pattern of such a low engagement has been witnessed among Iranian senior dental students and private dentists [18-20]. However, limited data are available on TSSC practices of Iranian primary care dentists. This knowledge gap should be addressed since both the WHO and the FDI World Dental Federation identify primary care setting as the

optimal setting for smoking cessation counseling [6,9]. Additionally, Iranian primary care services are valuable for smoking cessation research due to their extensive coverage and high patient load [21,22].

Therefore, the present study investigated the TSSC practices of Iranian primary care dentists in Tehran Province and assessed the relationship between such practices and socio-professional attributes, TSSC knowledge, and TSSC attitude. Furthermore, it explored the dentists' barriers against TSSC provision as well as the socio-professional determinants of such barriers.

MATERIALS AND METHODS

This study followed the STROBE checklist [23].

Study design and ethical considerations:

The present cross-sectional study was conducted in Tehran Province, Iran between March and June 2019 after obtaining approval from the ethics committee of Tehran University of Medical Sciences (Ethics code: IR.TUMS.DENTISTRY.REC.1397.174). Prior to data collection, one investigator explained the study objectives to the participants and emphasized on voluntary participation, anonymity preservation, and data confidentiality. It was also stated that completing the questionnaire would mean giving an informed consent for participation in the study.

Setting:

Tehran Province was chosen as the study setting for three main reasons. First of all, it is Iran's most populated province, with nearly 13 million residents [24], and home to the capital of Iran, Tehran. Also, it is a predominantly urban area, and Iranian urban primary care services claim to have close to 100% coverage in this province [22]. Additionally, urban primary care in Iran is delivered through Comprehensive Healthcare Centers (CHCs), each serving approximately 37,500 individuals [21]. All CHCs in Tehran Province were included in the sampling frame.

Study population:

Practicing dentists in all Tehran's CHCs were eligible for participation, and data were collected from all eligible participants using a census sampling method (n=190).

Research procedure:

Sessions were held with the CHC managers to explain the study objectives and design, and seek their collaboration. Following coordination, arrangements were made such that one of the investigators could attend the quarterly sessions of the CHC managers routinely held for Tehran Province's CHC dentists to discuss the problems, find solutions, and exchange ideas. During these sessions, the investigator provided the dentists with explanations outlined in the study design and ethics section, distributed the questionnaires, offered necessary clarifications as the questionnaires were being completed, and collected the completed questionnaires.

Research tools:

A self-administered Persian questionnaire was developed and utilized for this study. The knowledge questions were adopted from previous studies [25,26]; while, the attitude, practice, and barrier questions were designed using previous studies and the United States Public Health Department guidelines [25-27]. The English translation of the questionnaire is provided as a supplementary file (Supplementary Material 1).

To assess the face validity of the questionnaire, a group of 10 dentists and a panel of experts (comprising of 6 community oral health professors and 1 epidemiology professor) were consulted to examine the response formats, phrasing, and readability. The panel was then asked to evaluate the questionnaire's content validity by rating the questions regarding relevance, simplicity, clarity, and necessity using a Likert scale ranging from 1 to 4. Following their feedback, revisions were made, resulting in a scale content validity index of 0.77. For reliability assessment, the questionnaire was administered among a subset of the original participants twice, with a two-week interval (these responses were excluded from the main statistical analysis). The agreement coefficient was calculated for each question, with values ranging from 60% to 97.5% for all questions. The final questionnaire comprised of five sections on socio-professional attributes and TSCC-related knowledge, attitude, practice, and barriers.

Independent variables:

1. Socio-professional attributes included age (in years), gender (male, female), years since graduation, site of practice (city of Tehran, neighboring towns), years of practice at public dental centers, simultaneous private practice (yes, no), CHC employment status (on governmental service: a mandatory service for newly graduated Iranian health professionals [22], official employment, contractual employment, others), years of CHC practice (less than 6 months, less than 1 year, less than 18 months, less than 24 months, 2 to 5 years, 5 to 10 years, 10 to 15 years, 15 to 20 years, 20 to 25 years, 25 to 30 years), cigarette, hookah, and pipe smoking status (never smoked, used to smoke but quit, smoking once a month or less, smoking two or three times a month, smoking two or three times a week, smoking once a day or more), and presence of smoker(s) in the immediate family (yes, no).

2. The knowledge score was measured by 6 questions based on the 5As protocol (Ask, Advise, Assess, Assist, and Arrange) [27] with Likert scale responses ranging from strongly disagree (scored 1) to strongly agree (scored 5) and a total score of 6 to 30, according to the methodology of a previous study [25].

3. The attitude score was measured using 16 questions based on the 5As protocol, TSCC responsibilities, TSCC significance, training requirements, and dentists' capabilities with Likert scale responses ranging from strongly disagree (scored 1) to strongly agree (scored 5) and a total score of 16 to 80, according to the methodology of a previous study [25].

Outcome variables:

The practice score was measured by 5 "yes or no" questions based on the 5As protocol [27], with a score of 2 for "yes", 1 for "no", and a total score of 5 to 10, according to the methodology of previous studies [25,26]. The questions addressed dentists' practice based on the 5As with a slight modification of not including a specific question on the "Arrange" item. This exclusion was due to the CHCs' high workload, making it impractical for dentists to perform

“Arrange” by personally scheduling follow-up appointments.

The barriers were assessed using 15 questions with Likert scale responses ranging from 1 (indicating no importance) to 5 (indicating extremely high importance). This variable was not scored according to the methodology of a previous study [18].

Statistical analysis:

Data were entered into IBM SPSS Statistics for Windows, version 24. Descriptive data were expressed as percentage, mean, standard deviation, and range. Based on the distribution of responses and in methodological alignment with previous studies [18, 28], socio-professional attributes were categorized as follows: “under 35” and “35 and above” for age, “less than 5 years”, and “5 years and above” for years since graduation, “less than 2 years” and “2 years and above” for history of public practice, and “contractual or on governmental service”, “official and others” for CHC employment status. Additionally, those who “never smoked” and “smoked and quit” were classified as non-smokers, and all others were classified as smokers. Also, “none”, “low”, and “moderate importance” responses to questions on barriers were grouped together as “low importance”, while “high” and “extremely high importance” responses were grouped together as “high importance” to be analyzed as categorical outcome variables and based on their distributions.

A simple linear regression assessed the relationship between practice score, socio-professional attributes, knowledge score, and attitude score to identify independent variables that were associated with outcome variables with P-values below 0.2. These variables were then included in a multiple linear regression model (forward method). A second similar regression model was developed (excluding knowledge and attitude scores) to assess the relationship between socio-professional attributes and practice score (the results of these two models were explained only in the text). Finally, multiple logistic regression (forward

method) was applied to assess the relationship between TSCC barriers and socio-professional attributes. Significance was set at 0.05 for all tests.

RESULTS

One-hundred and eighty CHC dentists completed the questionnaires, resulting in a response rate of 93%.

Socio-professional attributes:

The majority of the participating dentists were females (81.60%), with a mean age of 34 ± 9.98 years. Of the participants, 69.6% had graduated less than 5 years ago, 71.8% were contractual and governmental service employees, and 66.47% had less than 2 years of public practice history. Most of the participants (90.2%) had never smoked cigarettes, and a small percentage (13.2%) had smoked tobacco i.e., either cigarette, hookah, or pipe (Table 1).

Table 1. Socio-professional attributes in a sample of Tehran primary care dentists (n=180)

Variable	Number (%)
Sex	
Male	32 (18.4%)
Female	142 (81.6%)
Age	
Under 35 years	122 (70.9%)
35 years and older	50 (29.1%)
Years since graduation	
Under 5 years	112 (69.6%)
5 years and above	49 (30.4%)
Employment status	
Contractual/ governmental service	125 (71.8%)
Official and other	49 (28.2%)
History of public practice	
Under 2 years	115 (66.5%)
2 years and above	58 (33.5%)
Site of practice	
City of Tehran	82 (47.4%)
Neighboring towns	91 (52.6%)

TSCC practices:

The participants' mean practice score was 7.46 ± 1.35 . As demonstrated in Figure 1, the majority of the participants performed “Ask” (90.4%) and “Advise” (69.1%), while only a little more than one-third (33.7%) engaged in “Assess”.

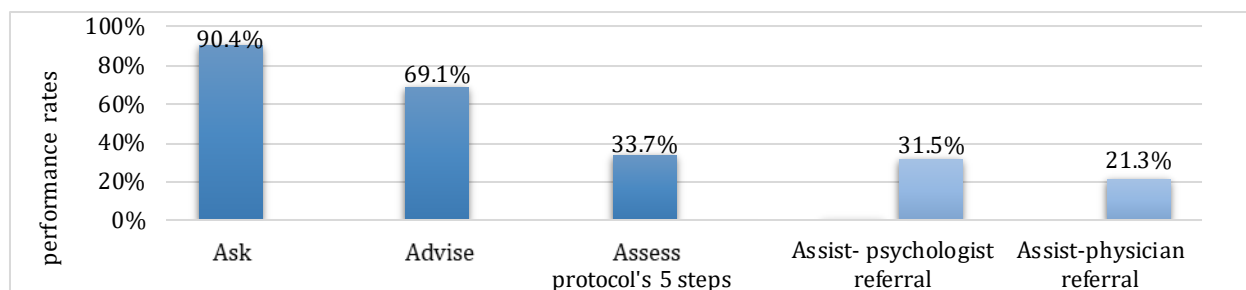


Fig. 1. Smoking cessation counseling practices by a sample of Tehran primary care dentists (n=180)

As demonstrated in Table 2, non-smoking participants obtained higher practice scores than smokers [mean difference (MD)=-0.89, 95% CI: -1.33 to -0.40, P=0.001]. Additionally, participants with higher attitude scores

obtained higher practice scores (MD=0.06, 95% CI: 0.04 to 0.08, P<0.001), while those with higher knowledge scores obtained lower practice scores (MD=-0.11, 95% CI: -0.22 to 0.002, P=0.04).

Table 2. Influence of socio-professional attributes, tobacco smoking cessation counseling (TSCC), knowledge scores, and TSCC attitude scores on TSCC practice scores of a sample of Tehran primary care dentists (n=173^a)

Variables	Variable categories	Number	Mean practice scores (std. ^b)	MD ^c of practice scores ^d (95% CI)	P-Value
Sex	Female	141	7.49 (1.32)	0.24 (0.28 to 0.76)	0.37
	Male	32	7.25 (1.50)		
Age	Under 35 years	121	7.40 (1.31)	0.22 (-0.66 to 0.23)	0.32
	35 years and older	50	7.62 (1.44)		
Years since graduation	< 5 years	111	7.36 (1.33)	-0.28 (-0.72 to 0.16)	0.20
	5 and above	56	7.64 (1.41)		
Employment status	Contractual/ governmental service	124	7.41 (1.34)	-0.12 (-0.57 to 0.33)	0.60
	Official and others	49	7.53 (1.42)		
Public practice history	Less than 2 years	114	7.46 (1.37)	-0.17 (-0.41 to 0.45)	0.94
	2 years and above	58	7.45 (1.31)		
Site of practice	City of Tehran	81	7.54 (1.38)	0.19 (-0.23 to 0.60)	0.39
	Neighboring towns	91	7.36 (1.35)		
Simultaneous private practice	Yes	57	7.42 (1.43)	-0.20 (-0.54 to 0.42)	0.94
	No	114	7.44 (1.33)		
Tobacco smoking status	Yes	23	6.70 (0.97)	-0.89 (-1.33 to -0.40)	0.001
	No	150	7.56 (1.37)		
Smoker(s) in immediate family	Yes	45	7.22 (1.28)	-0.32 (-0.78 to 0.15)	0.18
	No	126	7.54 (1.28)		
Knowledge score	-	178	-	-0.11 (-0.22 to 0.002)	0.04
Attitude score	-	178	-	0.06 (0.04 to 0.08)	<0.001

^aSeven dentists did not respond to at least one question in this section; ^b standard deviation; ^c Mean difference; ^d Regression coefficient

Variables with $P < 0.2$ (knowledge score, attitude score, years since graduation, presence of a smoker in the immediate family, and tobacco smoking status) were included in the first multiple linear regression model (forward method). Out of these, only the attitude score was found to be related to the practice score, as participants with higher attitude scores were more likely to achieve higher practice scores ($B = 0.06$, 95% CI: 0.04 to 0.08; $P < 0.001$). However, the differences in practice scores between the groups were negligible (less than 1.5%).

The second model of multiple linear regression (which excluded knowledge and attitude scores) revealed that only tobacco smoking status was associated with the practice score, with non-smokers being more likely to achieve higher practice scores ($B = 0.80$, 95% CI: 0.19 to 1.40; $P = 0.01$).

Barriers against TSCC:

The participants perceived “absence of educational resources for patients (brochures or pamphlets)”, “time constraints”, and “lack of patient cooperation” as the most important

barriers against TSCC; while deeming “tobacco smoking being a personal matter”, “lack of self-confidence”, and “fear of losing patients” as the least important ones (Fig 2). As illustrated in Table 3, considering the influence of socio-professional attributes on TSCC barriers, female dentists were more likely to consider “lack of reimbursement” as a substantial barrier compared to male dentists, and tobacco-smoking dentists were more likely to perceive this barrier as significant compared to their non-smoking counterparts ($OR = 0.34$, 95% CI: 0.14 to 0.84, $P = 0.02$ and $OR = 0.27$, 95% CI: 0.09 to 0.83, $P = 0.02$, respectively). Moreover, non-smoking dentists had an increased likelihood of struggling with “lack of confidence” than smoking dentists ($OR = 10.73$, 95% CI: 1.43 to 85.68, $P = 0.02$) and contractual and governmental service dentists had higher odds of considering “time constraints” as an important barrier compared to those with official/other employment status ($OR = 0.036$, 95% CI: 0.18 to 0.73, $P = 0.005$).

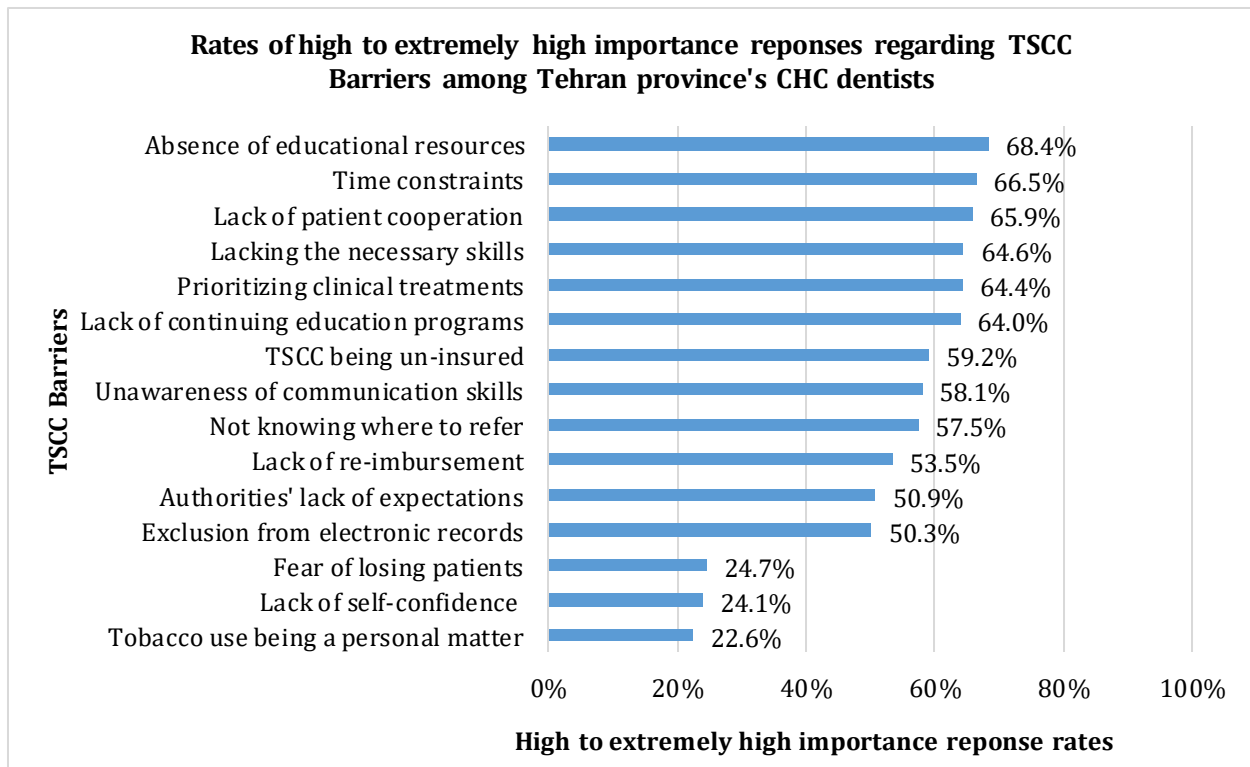


Fig 2. “High importance” responses to questions on barriers (n=180) by a sample of Tehran primary care dentists.

Table 3. Influence of socio-professional attributes on the barriers against tobacco smoking cessation counseling practices by a sample of Tehran primary care dentists (n=163^a)

Barrier	Socio-professional attributes	Socio-professional attribute categories	OR ^b (95% CI ^c)	P-value
Tobacco use being personal	Age	Under 35 years*	2.53	0.02
		35 years and older	(1.19 to 5.40)	
Time constraints	Employment status	Contractual/governmental service*	0.036	0.005
		Official and others	(0.18 to 0.73)	
Lack of reimbursement	Tobacco smoking status	Yes*	0.27	0.02
		No	(0.09 to 0.83)	
Lack of reimbursement	Sex	Female*	0.34	0.02
		Male	(0.14 to 0.84)	
Fear of losing patients	Site of practice	City of Tehran*	0.43	0.02
		Neighboring towns	(0.21 to 0.89)	
Fear of losing patients	Tobacco smoking status	Yes*	0.38	0.05
		No	(0.15 to 1)	
Lack of continuing professional education	Site of practice	City of Tehran*	0.47	0.02
		Neighboring towns	(0.24 to 0.90)	
TSCC being un-insured	Simultaneous private practice	Yes*	2.70	0.004
		No	(1.38 to 5.26)	
Authorities' lack of expectations	Public practice history	Less than 2 years*	2.66	0.01
		2 years and above	(1.25 to 5.69)	
Authorities' lack of expectations	Simultaneous private practice	Yes*	2.89	0.006
		No	(1.36 to 6.12)	
TSCC electronic record excluded	Sex	Female*	0.26	0.005
		Male	(0.10 to 0.66)	
TSCC electronic record excluded	Site of practice	City of Tehran*	0.31	0.001
		Neighboring towns	(0.16 to 0.60)	
Lack of confidence	Tobacco smoking status	Yes*	10.73	0.02
		No	(1.34 to 85.68)	
Lack of confidence	Smoker(s) in immediate family	Yes*	0.36	0.01
		No	(0.16 to 0.80)	

^a Seventeen dentists did not respond to at least one question in this section; ^b Odds ratios; ^c confidence interval; * Reference categories

DISCUSSION

The present study examined the TSCC practices of primary care dentists of Tehran Province, the socio-professional, knowledge, and attitude determinants of their practice, barriers in this regard, and the socio-professional determinants of the barriers. The results revealed that while the majority of Tehran primary care dentists performed "Ask" and "Advise", only about one-third engaged in "Assess" and "Assist". Positive attitudes towards TSCC and non-smoking status were

significantly associated with greater TSCC implementation. Moreover, participants identified "absence of educational resources for patients," "time constraints," and "lack of patient cooperation" as significant barriers against TSCC. Contractual dentists and those on governmental service viewed "time constraints" as a more substantial barrier compared to their officially employed counterparts. Additionally, non-smoking dentists were more inclined to consider "lack of confidence" as a significant barrier

compared to their smoking counterparts. In alignment with previous studies [18-20,28-31], the participants of the present study demonstrated greater engagement in the initial steps of the 5As protocol, with less involvement in later steps. Their engagement was high in "Ask," moderate to high in "Advise," mid-range in "Assess," and moderate to low in "Assist," compared to engagement rates which ranged from 51% to 96% in American dental professionals, 26% to 84% in Kuwaiti dental professionals, and 4% to 74%, and 20% to 66% in two groups of Iranian dental professionals [18,20,29-31].

The association discovered between positive attitudes and superior TSCC practice was anticipated, as it has been frequently reported in previous studies [20,29,32]. These studies also indicated that the attitudinal factors relevant to effective TSCC include recognizing the importance and effectiveness of such practices, feeling knowledgeable and prepared to intervene, and willingness to intervene [20,29,32]. The present study participants might have exhibited superior TSCC practice due to their favorable attitude towards TSCC, which could have resulted in increased motivation, confidence, and dedication to patient care. Such positive attitudes may have contributed to the overall improvement in the quality of TSCC practice observed among the participants.

The literature was conflicting regarding the relationship between dentists' smoking status and their TSCC practices [33]. In agreement with the present study, non-smoking dentists in England and Saudi Arabia were more likely to provide TSCC [28,34]; whereas, no such associations were observed among periodontists in the United States or dentists in United Arab Emirates [31,35]. Participants who did not smoke in the present study probably exhibited better TSCC practices because they may strongly dislike smoking or have a clearer comprehension of the health risks of smoking.

"Absence of educational resources for patients" as the participants' main barrier was an unexpected finding of the present study supported by some previous studies [18,36].

This barrier was potentially and particularly significant for the participants because they were mostly recent graduates with limited practice experience who probably felt uncomfortable discussing TSCC with patients and thus, relied heavily on external aids.

"Time constraints", the participants' second most important barrier, is a common global challenge faced by dental professionals [18,28-31]. Interestingly, Australian oral health practitioners and primary prevention-focused oral healthcare providers, did not consider time limitations as a major TSCC obstacle [36], potentially because of their prevention-focused training and professional role description [37]. However, the participants of the present study were mostly inexperienced, lacked the necessary TSCC skills (reported as their fourth top barrier), and probably struggled with insufficient TSCC training similar to other Iranian dental professionals [18-20]; all these factors may contribute to time allocation challenges.

The participants' third most important barrier, "lack of patient cooperation", is also a common worldwide challenge among dental professionals. Both the United States periodontists and Iranian private-practice dentists faced similar difficulties with "low patient acceptance," "patient resistance," and "patient disinterest" [18,31]. However, Kuwaiti dentists and Australian oral health practitioners did not deem patients' resistance, non-compliance, or offense-taking as major barriers [30,36]. Similar to previous studies, where dentists often felt unsure and anxious about patients' reactions to TSCC due to their lack of confidence in providing such care and their subpar communication skills [33,38], the participants of the present study probably experienced a similar pattern that was also aggravated by their limited practice experience. Contractual dentists and those on governmental service were more likely to consider "time constraints" as a significant barrier compared to their officially employed counterparts. This somewhat aligns with less experienced Indian dental practitioners struggling more with "lack of time" than their experienced counterparts [39]. Interestingly, however, experienced Saudi

Arabian dentists were more likely to perceive "lack of time" as a substantial barrier than their inexperienced peers [28]. The predominance of recent graduates in contractual employment and governmental service may explain struggling with time management due to their inexperience in balancing clinical patient care and preventive care, resulting in longer consultations and task prioritization difficulties. Non-smoking dentists were more likely to consider "lack of confidence" as a significant barrier compared to their smoking counterparts, a trend also observed among non-smoking Saudi Arabian dentists [28]. The non-smoking dentists' lack of personal smoking experience may have caused them to feel they lack understanding and insight into the issue, thereby diminishing their confidence in their TSCC provision skills.

To enhance smoking cessation practices among Iranian primary care dentists, a comprehensive, multifaceted approach is required. Tailored executive pathways should be devised for different primary care settings, and the mandatory documentation of TSCC provision should be linked to recognition or financial compensation from primary care authorities. Simplified versions of the 5As protocol, such as Ask-Advise-Refer [33], should be integrated into Iranian TSCC guidelines to streamline the practice and facilitate progression. TSCC training should be offered based on smoking status, as the literature emphasizes on attitude cultivation among smoking dentists, and knowledge expansion among non-smoking dentists [34,40]. Smoking should be discouraged in the Iranian primary dental care setting through workshops, counseling, and peer support groups. Positive attitudes toward TSCC can be cultivated by establishing it early as a professional duty in dental schools, integrating it comprehensively in the undergraduate educational curricula, and regularly updating it in continuing education programs, with official recognition and celebration from Iranian primary care authorities.

Addressing TSCC barriers also requires a multifaceted approach. Iranian primary care

authorities should allocate resources to developing patient-literacy educational content. Tailored training programs should focus on time management for less experienced dentists and building confidence in TSCC provision for non-smoking dentists. Practical training in dental schools and continuing education programs should emphasize on efficient 5As implementation within 3-5 minutes [9]. Mentorship programs should be established where experienced dentists guide colleagues in time management and confidence building. A team-based TSCC approach should involve other primary dental care staff, such as oral health technicians, dental hygienists, and dental assistants, to alleviate time pressures [22,31]. Additionally, Iranian primary care dentists should be informed that patients generally welcome and expect TSCC, alongside receiving communication skills training in dental schools and continuing education programs [33,38].

Strengths, limitations, and future directions:

The strengths of the present study included its underexplored population and setting, census sampling method, high response rate, scored and specifically-developed questionnaire, and assessment of TSCC barriers' socio-professional determinants. It also had several limitations. The cross-sectional design, although suitable for study objectives, limited causal inference. The self-report measures, commonly utilized in the TSCC literature, may have introduced the bias of social desirability into the study. The sample skewed towards female recent graduates under the age of 35 years (which was the result of Iranian Ministry of Health's dentist deployment arrangements in urban CHCs) might have affected the generalizability of the findings to all Iranian primary care dentists. Lastly, not investigating the participants' performance of "Arrange" step of the 5As protocol may have reduced study comparability.

Future research could involve primary care dentists across other provinces of Iran as well as the primary care dentists of other LMICs, seek the opinions of other primary dental care team members and patients with regards to TSCC, collect qualitative data especially on dentists' TSCC barriers, assess dentists' TSCC practice in

alternative ways such as electronically-documented referrals, and conduct interventions with adequate follow-ups to explore the impact of established executive routes on dentists' TSCC practice.

CONCLUSION

The current study highlighted inadequate TSCC practice in a group of primary care dentists in Iran, demonstrating the correlation between non-smoking habits, favorable attitudes, and effective TSCC delivery, while also pointing out the main obstacles faced in providing TSCC. In order to support Iranian primary care dentists in their role as the key advocates for smoking cessation, it is suggested to introduce simplified local protocols, personalized action plans, and specialized training in both undergraduate and continuing education courses. Furthermore, promoting team-based strategies and securing essential resources could boost their efforts in helping patients to quit smoking.

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CONFLICT OF INTEREST STATEMENT

None declared.

DATA AVAILABILITY STATEMENT

The datasets generated and analyzed during the current study are not publicly available due to TUMS data sharing policies. They can be made available by the corresponding author on reasonable request.

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