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Identifying the Footprint of Substance Abuse Among Dental Professionals in Pakistan A Cross-Sectional Survey

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ABSTRACT

Background: *Substance abuse produces clinically detectable oral and behavioral sequelae that can present during routine dental care, positioning dental professionals to contribute to early recognition and referral; however, evidence on preparedness and practice patterns in Pakistan remains limited.* ***Objective:*** *To assess awareness, recognition, screening behaviors, perceived training needs, confidence, referral practices, and commonly encountered substances and oral manifestations of substance abuse among dental students and dental professionals in Pakistan.* ***Methods:*** *A cross-sectional online survey was conducted from June to September among 420 dental students and dental professionals across Pakistan using a structured, self-administered questionnaire distributed via professional and academic networks. Data were analyzed in SPSS v27 using descriptive statistics.* ***Results:*** *Of 420 respondents, 358 (85.2%) reported awareness of substance abuse and 340 (81.0%) reported ability to recognize physical/oral signs. Cigarettes were the most commonly encountered substance among dental patients (291; 69.3%), followed by alcohol (58; 13.8%). The most frequently recognized oral manifestations were oral lesions (134; 31.9%), xerostomia (127; 30.2%), and periodontal disease (118; 28.1%). Only 110 (26.2%) reported always screening for oral indicators during routine examinations, despite 313 (74.5%) reporting confidence in managing such patients. Awareness of referral pathways was reported by 284 (67.6%), and 287 (68.3%) reported having referred patients for treatment. Nearly all respondents endorsed the need for training (strongly agree/agree: 407; 96.9%), while 204 (48.6%) reported no formal training.* ***Conclusion:*** *Dental professionals in Pakistan demonstrate high awareness and recognition of substance abuse, but routine screening and formal training remain insufficient, indicating a critical implementation gap that supports integration of structured training and referral pathways into dental education and practice.*

Keywords: *substance abuse; dentistry; Pakistan; oral lesions; xerostomia; periodontal disease; screening; referral*

INTRODUCTION

Substance abuse remains a major and escalating global public health concern, defined as the use of psychoactive substances beyond medically indicated limits or for non-medical purposes, resulting in adverse physical, psychological, and social consequences (1). These substances—including tobacco products, alcohol, and illicit drugs—alter normal physiological functions and, with sustained use, contribute substantially to morbidity, mortality, and socioeconomic burden worldwide (2). From a healthcare perspective, substance abuse complicates disease prevention and management, increases healthcare utilization, and negatively affects patient–provider interactions, underscoring the need for early identification and intervention across clinical disciplines (3).

The oral cavity is particularly vulnerable to the effects of substance abuse, making dental professionals uniquely positioned to identify early manifestations of substance-related harm. Tobacco, alcohol, stimulants, and emerging substances such as vaping products are strongly associated with oral lesions, xerostomia, periodontal disease, dental caries, delayed wound healing, and increased risk of oral malignancies (4). These manifestations often present

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during routine dental visits, frequently before systemic complications become evident, positioning dental professionals as potential first-line identifiers of substance abuse (5). Despite this strategic role, the effective contribution of dentists to substance abuse recognition and referral depends on adequate knowledge, clinical confidence, and access to clearly defined referral pathways.

Existing literature suggests that while general awareness of substance abuse is increasing among healthcare providers, significant gaps persist in profession-specific training, particularly within dentistry (6). Studies conducted in diverse settings have shown that many dental practitioners feel insufficiently trained to recognize substance abuse through oral signs, are uncertain about appropriate referral mechanisms, or experience difficulty managing behavioral challenges such as patient aggression and non-compliance (7). These barriers not only limit early detection but may also discourage dentists from engaging proactively with substance-using patients, thereby missing opportunities for timely intervention (8).

In low- and middle-income countries, including Pakistan, substance abuse poses an additional challenge due to high prevalence of tobacco use, increasing accessibility of recreational drugs, and limited integration of behavioral health training within dental curricula (9). Although Pakistan has a growing dental workforce, empirical data examining dental professionals' awareness, recognition practices, and management of substance abuse–related oral conditions remain sparse. Available regional studies have largely focused on substance abuse prevalence among youth or general populations, with limited attention to the preparedness and experiences of dental professionals who routinely encounter its oral sequelae (10). This lack of profession-specific evidence represents a critical knowledge gap, particularly in understanding whether dental professionals are adequately equipped to identify substance abuse, manage associated oral conditions, and navigate referral systems within the local healthcare context.

Furthermore, the majority of existing studies do not comprehensively evaluate the intersection of clinical recognition, confidence in management, perceived barriers, and referral practices among dental students and practicing dentists within a single framework (11). Without such integrated assessment, it is difficult to design targeted educational interventions or policy recommendations that strengthen the role of dentistry in substance abuse prevention and early care. Addressing this gap is essential for improving patient outcomes, enhancing interdisciplinary collaboration, and supporting public health efforts aimed at reducing the burden of substance abuse (12).

Therefore, the present study was designed to systematically assess the awareness, recognition, and management of substance abuse–related oral manifestations among dental students and dental professionals in Pakistan. Specifically, it aims to evaluate the types of substances most commonly encountered in dental practice, the oral conditions associated with substance abuse as recognized by dental professionals, their confidence and preparedness in managing such patients, perceived barriers to care, and awareness of referral pathways. By generating context-specific evidence, this study seeks to inform curriculum development, continuing professional education, and clinical guidelines, thereby strengthening the contribution of dental professionals to the early detection and management of substance abuse within the Pakistani healthcare system.

METHODS

This study employed a cross-sectional observational design to evaluate the awareness, recognition, and management of substance abuse and its oral manifestations among dental

students and dental professionals in Pakistan. A cross-sectional approach was selected as it allows for the assessment of prevailing knowledge, perceptions, and clinical practices within a defined population at a specific point in time, which is appropriate for exploratory assessment of professional preparedness and behavioral patterns related to substance abuse in dental settings. Data collection was conducted over a four-month period from June to September, encompassing participants from multiple urban and semi-urban regions across Pakistan, thereby enhancing geographic representation and contextual relevance.

The study population comprised undergraduate dental students and practicing dental professionals actively engaged in clinical training or patient care. Eligible participants included preclinical and clinical undergraduate dental students, house officers, postgraduate residents, and general dental practitioners. Individuals without clinical exposure, non-dental personnel, respondents who submitted incomplete questionnaires, and those who declined electronic informed consent were excluded to ensure data quality and relevance to the study objectives. Participants were selected using a non-probability convenience sampling strategy, which was appropriate given the nationwide scope of the study and the absence of a centralized sampling frame for dental professionals in Pakistan.

Recruitment was carried out through established academic and professional dental networks, including institutional communication groups and social media platforms commonly used by dental students and practitioners. An invitation message outlining the purpose of the study, voluntary nature of participation, confidentiality assurances, and eligibility criteria was disseminated electronically. Interested participants accessed the survey through a secure online link. Prior to initiating the questionnaire, all participants provided electronic informed consent, which was mandatory to proceed. Participation was anonymous, no personally identifiable information was collected, and each respondent was allowed a single submission to prevent duplicate entries.

Data were collected using a structured, self-administered questionnaire developed following an extensive review of existing literature on substance abuse and oral health. The questionnaire was designed to capture information across four core domains: demographic and professional characteristics; awareness and knowledge of substance abuse; recognition of oral and behavioral signs associated with substance abuse; and experiences, confidence, barriers, and referral practices related to the management of substance abuse patients in dental practice. Demographic variables included age group, gender, professional designation, and city of practice or study. Awareness was operationally defined as self-reported familiarity with the concept of substance abuse and commonly abused substances. Recognition was defined as the ability to identify physical, oral, or behavioral indicators suggestive of substance abuse during dental examination. Management-related variables included self-reported confidence in treating such patients, experiences of patient aggression or misbehavior, and knowledge of referral pathways. Several items allowed multiple responses to capture the complexity of clinical encounters.

To enhance clarity, comprehensibility, and face validity, the questionnaire underwent pilot testing among a small group of dental professionals prior to full deployment. Feedback from the pilot phase informed minor refinements in wording and item sequencing to improve interpretability while maintaining content integrity. The finalized questionnaire was distributed electronically using Google Forms, with built-in logic to ensure completion of mandatory items and reduce missing data. Responses were automatically timestamped and stored in a secure database accessible only to the research team.

The target sample size was set at 420 participants to provide adequate precision for estimating key proportions related to awareness, recognition, and management practices,

assuming moderate prevalence of these outcomes within the dental population and accounting for potential non-response or incomplete data. This sample size also allowed for subgroup comparisons across professional categories, gender, and levels of training with sufficient statistical power for exploratory analyses.

Collected data were systematically exported from the online platform into Microsoft Excel for initial screening, coding, and verification. Data integrity checks were performed to identify duplicate entries, inconsistencies, or incomplete responses, which were excluded prior to analysis. The cleaned dataset was then imported into the Statistical Package for Social Sciences (SPSS) version 27.0 for statistical analysis. Descriptive statistics, including frequencies and percentages, were calculated to summarize participant characteristics and response distributions. Associations between categorical variables, such as professional designation and awareness, recognition, confidence, or referral practices, were assessed using chi-square tests of independence. Where appropriate, subgroup analyses were conducted to explore differences between students and practicing dentists. Missing data were minimal due to mandatory response settings and were handled through complete-case analysis.

Several methodological steps were implemented to minimize bias and enhance internal validity. Anonymous participation reduced social desirability bias, while standardized electronic data collection minimized interviewer and transcription bias. Restricting eligibility to clinically active dental trainees and practitioners improved construct validity by ensuring that responses reflected relevant clinical experience. Clear operational definitions were applied consistently across analyses to reduce misclassification.

Ethical approval for the study was obtained from the Research Ethics and Review Board of the PRIDE Center for Research and Learning Institute under reference number PRIDE/ERB/2025/038, dated 20 October 2025. The study was conducted in accordance with the principles of the Declaration of Helsinki. Participants were informed of their right to withdraw at any time without consequence, and confidentiality was strictly maintained throughout the research process. All data were analyzed in aggregate form and stored securely to ensure reproducibility and transparency.

RESULTS

A total of 420 completed questionnaires were analyzed. As shown in Table 1, males constituted 249 (59.3%) of participants and females 171 (40.7%). In terms of professional status, the largest group was house officers 97 (23.1%), followed by final-year BDS students 87 (20.7%) and third-year students 74 (17.6%).

First-year and second-year BDS students contributed 51 (12.1%) and 45 (10.7%), respectively, while general dentists comprised 39 (9.3%) and postgraduate residents 27 (6.4%), reflecting representation across undergraduate training and early professional practice.

Table 2 summarizes the substances most commonly reported among patients presenting to dental care with suspected substance use. Cigarette use was predominant, reported by 291 participants (69.3%).

Alcohol use was reported by 58 (13.8%), while 47 (11.2%) indicated other substances. Less frequently reported were ice/methamphetamine 16 (3.8%) and vaping products 8 (1.9%). Because this was a multiple-response item, these proportions represent the percentage of respondents selecting each substance type rather than mutually exclusive categories.

Participant perceptions regarding the need for training are detailed in Table 3 and demonstrate an overwhelming endorsement for capacity building. A total of 251 respondents

(59.8%) strongly agreed and 156 (37.1%) agreed that dentists require training to recognize and manage oral signs and symptoms associated with substance abuse, yielding a combined agreement of 407 out of 420 (96.9%). Only 9 (2.1%) disagreed and 4 (1.0%) strongly disagreed, indicating very limited resistance to integrating formal training into professional development.

Clinical recognition, preparedness, and patient-related challenges are presented in Table 4. Most participants, 340 (81.0%), reported being able to recognize physical or oral signs suggestive of substance abuse in patients, whereas 80 (19.0%) reported inability to do so. Awareness of referral pathways was reported by 284 (67.6%), while 136 (32.4%) did not know how or where to refer patients requiring substance abuse services.

Confidence in treating patients with substance abuse issues was reported by 313 (74.5%), whereas 107 (25.5%) did not feel confident. Notably, 259 (61.7%) participants reported experiencing misbehavior or aggression from substance abuse patients during treatment, compared with 161 (38.3%) who did not, highlighting a common behavioral barrier in clinical encounters.

Routine screening behaviors are shown in Table 5. Only 110 respondents (26.2%) reported that they always check for oral signs and symptoms suggestive of substance abuse during normal dental examinations.

The majority reported performing such checks inconsistently, with 216 (51.5%) selecting sometimes and 66 (15.7%) selecting rarely. A smaller subset, 28 (6.6%), reported never assessing such signs, indicating that systematic screening remains limited even among respondents who otherwise report recognition capability and confidence.

Table 1. Demographic and Professional Characteristics of Participants (n = 420)

Variable	Category	n	%
Gender	Male	249	59.3
	Female	171	40.7
Professional status	General dentist	39	9.3
	Postgraduate resident	27	6.4
	House officer	97	23.1
	1st-year BDS	51	12.1
	2nd-year BDS	45	10.7
	3rd-year BDS	74	17.6
	Final-year BDS	87	20.7

Table 2. Substances Reported Among Dental Patients With Suspected Substance Use (Multiple Response)

Substance	n (selected)	% of respondents
Cigarettes	291	69.3
Alcohol	58	13.8
Ice/methamphetamine	16	3.8
Vaping products	8	1.9
Other substances	47	11.2

Table 3. Perceived Need for Training in Recognition and Management of Substance Abuse

Response	n	%
Strongly agree	251	59.8
Agree	156	37.1
Disagree	9	2.1
Strongly disagree	4	1.0

Table 4. Clinical Recognition, Confidence, and Patient-Related Challenges (n = 420)

Variable	Category	n	%
Ability to recognize physical/oral signs	Yes	340	81.0
	No	80	19.0
Awareness of referral pathways	Yes	284	67.6
	No	136	32.4
Confidence in treating substance abuse patients	Yes	313	74.5
	No	107	25.5
Experienced patient aggression/misbehavior	Yes	259	61.7
	No	161	38.3

Table 5. Frequency of Screening for Oral Signs of Substance Abuse

Frequency	n	%
Always	110	26.2
Sometimes	216	51.5
Rarely	66	15.7
Never	28	6.6

Table 6. Oral Manifestations Associated with Substance Abuse (Multiple Response)

Oral condition	n (selected)	% of respondents
Oral lesions	134	31.9
Xerostomia/dry mouth	127	30.2
Periodontal disease	118	28.1
Other conditions	41	9.8

Oral conditions most commonly associated with substance abuse are summarized in Table 6. Oral lesions were the most frequently identified manifestation, selected by 134 respondents (31.9%), closely followed by xerostomia or dry mouth reported by 127 (30.2%). Periodontal disease was selected by 118 (28.1%), while other oral conditions were reported by 41 (9.8%). As with Table 2, this was a multiple-response item; therefore, percentages reflect the proportion of respondents identifying each manifestation rather than exclusive patient categories.

Beyond the tables, 265 participants (63.1%) reported having treated patients with substance abuse issues, while 155 (36.9%) reported no such experience. Referral practice was reported by 287 (68.3%), whereas 133 (31.7%) had not referred a patient for substance abuse treatment.

Regarding training exposure, 216 respondents (51.4%) reported having received formal training to identify substance abuse through oral signs, while 204 (48.6%) reported no formal training, reinforcing the observed training gap despite strong perceived need for education

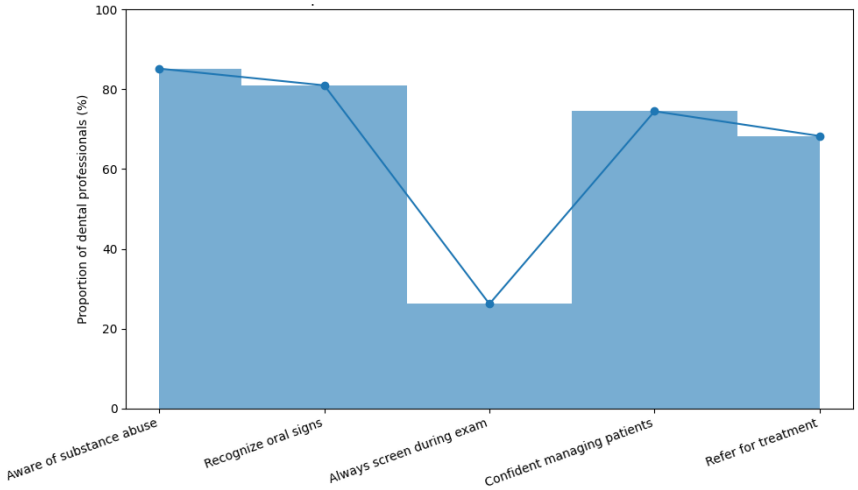

Figure1 . Continuum of preparedness and action for substance abuse care in dental practice

This figure illustrates a pronounced attenuation between cognitive readiness and consistent clinical action among dental professionals. While awareness of substance abuse was high at 85.2% and recognition of related oral signs remained substantial at 81.0%, the proportion of respondents who reported always screening for substance abuse indicators during routine dental examinations dropped sharply to 26.2%, representing a relative reduction of nearly 69% from recognition to routine screening. In contrast, self-reported confidence in managing patients with substance abuse issues rebounded to 74.5%, and 68.3% reported referring affected patients for appropriate treatment. This nonlinear pattern highlights a critical implementation gap: although most dental professionals possess awareness, recognition ability, and confidence, these attributes do not consistently translate into systematic screening behavior. Clinically, this disconnect suggests missed opportunities for early identification and intervention at the chairside level, underscoring the need for structured screening protocols and training interventions that convert knowledge and confidence into routine preventive practice.

DISCUSSION

The present study provides comprehensive insight into the awareness, recognition, and management of substance abuse–related oral conditions among dental students and dental professionals in Pakistan, highlighting both strengths and critical gaps along the continuum from knowledge to clinical action. The findings demonstrate that although overall awareness of substance abuse was high at 85.2% and a substantial proportion of participants (81.0%) reported the ability to recognize physical or oral signs suggestive of substance abuse, this recognition did not consistently translate into routine screening behavior or structured clinical practice. This discrepancy underscores an important implementation gap between cognitive preparedness and preventive clinical action.

One of the most salient findings was the pronounced decline from recognition to consistent screening, as illustrated in the preparedness continuum figure. Only 26.2% of respondents reported always assessing oral signs of substance abuse during routine dental examinations, despite high levels of awareness and recognition. This nonlinear pattern suggests that recognition alone is insufficient to ensure preventive engagement and that systematic screening may be constrained by competing clinical priorities, time limitations, or lack of

formal protocols. Similar gaps between knowledge and practice have been reported in other healthcare disciplines, where absence of structured screening tools and uncertainty about subsequent steps limit proactive substance abuse identification (23).

Cigarette smoking emerged as the most frequently encountered substance among dental patients, reported by 69.3% of participants, followed by alcohol use at 13.8%. These findings are consistent with national and regional data indicating widespread tobacco use and rising alcohol consumption in South Asian populations (24). Correspondingly, oral lesions (31.9%), xerostomia (30.2%), and periodontal disease (28.1%) were the most commonly identified oral manifestations. These conditions are well-documented sequelae of chronic tobacco and alcohol exposure and reinforce the clinical relevance of dental settings as strategic points for early detection of substance-related harm (25).

Encouragingly, nearly three-quarters of respondents (74.5%) reported confidence in managing patients with substance abuse issues, and 68.3% had referred such patients for further treatment. However, this apparent confidence coexisted with substantial structural and behavioral challenges. Almost one-third of participants (32.4%) were unaware of referral pathways, indicating that confidence may reflect comfort with dental management rather than competence in integrated care. The lack of clear referral knowledge is concerning, as effective management of substance abuse requires interdisciplinary coordination beyond symptomatic dental treatment. Previous studies have emphasized that without clearly defined referral systems, healthcare providers are less likely to initiate discussions about substance use or pursue timely referrals, even when clinical indicators are present (26).

Another critical barrier identified in this study was patient-related behavioral difficulty. A high proportion of participants (61.7%) reported experiencing misbehavior or aggression from patients with substance abuse during treatment. Such encounters may discourage clinicians from engaging in thorough history-taking or screening and may partially explain the low rate of consistent screening observed. This finding aligns with earlier evidence suggesting that fear of confrontation, perceived safety risks, and uncertainty in managing challenging behaviors significantly influence provider willingness to address substance use in clinical encounters (27). Addressing these concerns requires not only clinical training but also education in communication strategies, de-escalation techniques, and ethical management of vulnerable patient populations.

Formal training emerged as a central theme across multiple findings. Although 96.9% of respondents agreed or strongly agreed on the need for training, nearly half (48.6%) reported having received no formal instruction on identifying substance abuse through oral signs. This mismatch between perceived need and actual training exposure highlights a curricular and professional development gap. Integrating structured education on substance abuse recognition, screening, and referral into undergraduate dental curricula and continuing professional development programs may help bridge the gap between recognition and action. Evidence from international settings suggests that targeted training interventions can significantly improve screening frequency, referral rates, and provider confidence in managing substance-using patients.

The findings of this study should be interpreted in light of certain limitations. The use of a non-probability convenience sampling strategy may limit generalizability, and self-reported measures are subject to recall and social desirability bias. Additionally, the cross-sectional design precludes causal inference regarding the relationship between training, confidence, and clinical behaviors. Nevertheless, the large sample size, inclusion of multiple professional categories, and nationwide recruitment strengthen the internal validity and contextual relevance of the results.

In summary, while dental professionals in Pakistan demonstrate high awareness and recognition of substance abuse and its oral manifestations, significant gaps persist in routine screening practices, referral pathway knowledge, and formal training. The observed disconnect between preparedness and preventive action represents a missed opportunity for early intervention. Strengthening dental education, establishing clear referral frameworks, and addressing behavioral and safety concerns within clinical settings are essential steps toward enhancing the role of dental professionals in the multidisciplinary response to substance abuse.

CONCLUSION

In conclusion, this study demonstrates that although dental students and dental professionals in Pakistan exhibit high levels of awareness and recognition of substance abuse and its oral manifestations, a substantial gap persists between knowledge and consistent clinical practice. Cigarette smoking was the most commonly encountered substance, with oral lesions, xerostomia, and periodontal disease being the most frequently recognized oral conditions. Despite relatively high confidence in managing affected patients and moderate referral practices, routine screening during dental examinations and formal training in substance abuse recognition remain insufficient. These findings underscore the need for structured educational interventions, incorporation of substance abuse–related competencies into dental curricula, and establishment of clear referral pathways to enable dental professionals to effectively contribute to early identification, appropriate management, and multidisciplinary care of individuals with substance abuse, ultimately improving both oral and overall health outcomes.

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DECLARATIONS

Ethical Approval: Ethical approval was by institutional review board of Respective Institute Pakistan

Informed Consent: Informed Consent was taken from participants.

Authors' Contributions:

Concept: NR, JK, SA; Design: SA; Data Collection: NR, JK, SA, ZC; Analysis: JK; Drafting: NR, ZC, JK; Supervision & Critical Revision: M.F

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