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Original Article

Knowledge, Awareness and Perception of Pregnancy Gingivitis Among Dental Professionals in Pakistan: A Cross-sectional Study

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ABSTRACT

Background: Pregnancy gingivitis is a reversible inflammatory condition triggered by hormonal fluctuations and plaque, affecting up to 100% of pregnant women worldwide. If left untreated, it may progress to periodontitis and contribute to adverse pregnancy outcomes such as preterm birth and low birth weight. Despite its clinical relevance, maternal oral health is often overlooked in both education and practice, particularly in developing countries such as Pakistan. Objective: This study aimed to assess the knowledge, awareness, and perceptions of dental professionals in Pakistan regarding pregnancy gingivitis, with emphasis on aetiology, clinical features, systemic implications, and preventive strategies. Methods: A cross-sectional observational survey was conducted nationwide from March to July 2025 using a validated online questionnaire distributed to undergraduate clinical students, house officers, postgraduate trainees, and general dentists. A total of 250 responses were analyzed using descriptive statistics in IBM SPSS (v27). Ethical approval was obtained from the PRIDE Center for Research and Learning Institute (PRIDE/ERB/2025/001). Results: General dentists represented the largest group (43.6%), with 50.6% reporting 1–5 years of experience. While 46.0% identified pregnancy gingivitis as multifactorial, 45.6% considered it primarily hormone driven. Only 45.6% recognized its association with adverse outcomes, and 60.4% reported that pregnant women are poorly informed. Preventive measures most frequently endorsed were regular dental checkups (67.2%), while key barriers included lack of patient interest (36.8%) and insufficient knowledge (26.0%). Conclusion: Substantial gaps exist in the professional knowledge and awareness of pregnancy gingivitis in Pakistan. Curriculum reform, interdisciplinary collaboration, and targeted awareness campaigns are urgently required to improve maternal oral health and reduce pregnancy-related complications.

Keywords: Pregnancy gingivitis, Dental professionals, Maternal oral health, Knowledge and awareness, Pakistan.

INTRODUCTION

Pregnancy gingivitis is a reversible inflammatory condition of the gingival tissues initiated by dental plaque in the presence of fluctuating sex hormones during pregnancy (1,2). The condition typically emerges in the first trimester, worsens during the second trimester, and subsides toward the final month, often resolving after delivery (1,2). Elevated levels of estrogen and progesterone increase vascular permeability, stimulate gingival crevicular fluid production, and alter the oral microbiome, leading to exaggerated inflammatory responses to plaque (3,4). Clinical signs such as gingival swelling, bleeding, and discomfort are frequently reported, with prevalence estimates ranging from 36% to nearly 100% of pregnant women globally (5). Although reversible, unmanaged gingivitis may progress to periodontitis, which has been linked with adverse maternal and neonatal outcomes, including preterm birth, low birth weight, and pre-eclampsia (6,7).

The importance of oral health during pregnancy extends beyond localized gingival changes to systemic maternal well-being and child health. Studies have demonstrated that maternal oral conditions influence fetal growth and may predispose children to poor oral health behaviors (8). Despite evidence that preventive and routine dental procedures can be performed safely during pregnancy, many healthcare providers hesitate to treat pregnant women due to misconceptions, lack of training, or prioritization of other health concerns (9,10). Furthermore, common pregnancy-associated symptoms such as nausea, vomiting, and acid reflux exacerbate oral hygiene challenges (4).

Globally, pregnant women frequently report inadequate guidance on oral care, reflecting insufficient emphasis by both dentists and physicians (11,12). This gap is particularly pronounced in low- and middle-income countries where socioeconomic constraints and limited health literacy reduce dental service utilization (13). In Pakistan, oral health remains a neglected aspect of maternal care, with limited research assessing professional knowledge and practice regarding pregnancy gingivitis (14).

Dental professionals play a critical role as frontline providers in identifying oral manifestations of systemic conditions and delivering preventive guidance to expectant mothers (15). However, international evidence suggests that knowledge gaps persist even among trained professionals. For example, studies in Hong Kong and Saudi Arabia reported poor awareness of the etiology and consequences of pregnancy gingivitis among both patients and dental practitioners, underscoring the need for targeted interventions (16,17). Recent systematic reviews confirm that improving maternal oral health through plaque control and periodontal therapy may mitigate risks of adverse pregnancy outcomes, highlighting the importance of interdisciplinary collaboration and public health integration (18,19). Nevertheless, in Pakistan, structured guidelines, curricular emphasis, and interprofessional efforts addressing pregnancy gingivitis remain scarce, creating an urgent need to evaluate professional preparedness.

Given these knowledge gaps and the public health relevance of maternal oral health, this study aimed to assess the knowledge, awareness, and perceptions of dental professionals in Pakistan regarding pregnancy gingivitis through a nationwide cross-sectional survey. Specifically, it sought to determine professional understanding of etiology, clinical features, systemic implications, and preventive strategies, thereby identifying barriers to effective education and care. The study hypothesized that significant deficiencies exist in the knowledge and awareness of dental professionals concerning pregnancy gingivitis, with potential implications for maternal and neonatal outcomes.

MATERIAL AND METHODS

This study employed a descriptive cross-sectional design to evaluate the knowledge, awareness, and perceptions of pregnancy gingivitis among dental professionals in Pakistan. The design was selected to capture a representative snapshot of current professional understanding and practices within a defined period, addressing the identified research gap in maternal oral health education and preventive strategies (20). The study was conducted nationwide across both public and private dental institutions from March 17 to July 19, 2025, thereby encompassing a wide geographical spread to improve generalizability.

Eligible participants included undergraduate dental students in their clinical years (third and fourth year), house officers, postgraduate trainees, and general dental practitioners actively engaged in clinical practice in Pakistan. Exclusion criteria were foreign-trained professionals, non-dental healthcare providers, and individuals with prior personal pregnancy-related periodontal experiences, to minimize potential bias from experiential knowledge. Recruitment employed a convenience non-probability sampling strategy. Invitations were disseminated via professional dental networks, institutional contacts, and social media platforms. Participation was entirely voluntary, and informed consent was obtained electronically before beginning the questionnaire. Respondents were assured of anonymity, confidentiality, and the right to withdraw at any stage without penalty.

Data were collected using a structured, revalidated questionnaire administered through Google Forms. The instrument was developed after a review of existing literature and previously validated surveys addressing periodontal knowledge in pregnancy (21,22). To ensure reliability and clarity, the tool was pilot tested among 15 dental professionals, with subsequent refinements incorporated; these responses were excluded from the final analysis. The finalized questionnaire comprised 18 closed-ended items grouped into four domains: demographic information (age, gender, designation, years of experience, practice setting), knowledge of pregnancy gingivitis (etiology, signs, hormonal influence), awareness of maternal and fetal health implications, and perceptions regarding the importance of oral health screening and education during pregnancy. Items were designed as binary (yes/no) and multiple-choice responses to reduce recall bias and ambiguity.

Sample size was determined using the World Health Organization (WHO) calculator for cross-sectional studies, assuming a 50% prevalence rate, a 95% confidence level, and a 5% margin of error. The minimum required sample was 250 participants, which was achieved, thereby ensuring adequate statistical power and feasibility for subgroup analysis. Data were exported from Google Forms into Microsoft Excel and subsequently analyzed using IBM SPSS Statistics software, version 27 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies and percentages, were generated for categorical variables. Complete case analysis was used to handle missing data, as item-level response rates exceeded 95%. Inferential tests were not conducted given the primarily descriptive aim of the study.

To ensure methodological rigor and reproducibility, multiple steps were implemented. Bias was minimized by excluding individuals with personal pregnancy-related periodontal experiences and by standardizing the questionnaire structure. Data confidentiality was preserved through anonymous responses and secure storage of electronic records. The study received ethical approval from the Ethical Review Board of the PRIDE Center for Research and Learning Institute (Reference Number: PRIDE/ERB/2025/001), with all procedures conducted in accordance with the Declaration of Helsinki.

RESULTS

A total of 250 dental professionals completed the survey, representing a diverse mix of roles and experience levels (Table 1). General dentists formed the largest group at 43.6% (n=109), followed by undergraduate clinical students at 26.4% (n=66), house officers at 22.8% (n=57), and postgraduate trainees at 7.2% (n=18). Almost half of the participants (50.6%, n=126) reported one to five years of practice experience, while 45.6% (n=114) had less than one year, reflecting the relatively early stage of most respondents' professional careers.

Analysis of professional knowledge regarding pregnancy gingivitis revealed marked variation (Table 2). Nearly half of the respondents (46.0%, n=115) correctly identified its multifactorial nature involving plaque, hormonal influences, and bacterial infection, while 45.6% (n=114) attributed it exclusively to hormonal changes. Only 8.0% (n=20) considered poor oral hygiene alone as the primary cause. With respect to timing, 40.4% (n=101) reported that the second trimester was most affected, followed by the third trimester (22.0%, n=55) and the first trimester (14.8%, n=37), whereas 22.8% (n=57) believed it occurred equally throughout pregnancy. Swollen gums were overwhelmingly recognized as the most common sign (91.2%, n=228), followed by bleeding gums (79.6%, n=199), halitosis (44.8%, n=112), and tooth mobility (14.8%, n=37).

Awareness of systemic and educational implications was less consistent (Table 3). While 45.6% (n=114) of respondents agreed that pregnancy gingivitis is associated with adverse outcomes such as preterm birth or low birth weight, the majority—54.4% (n=136)—denied this association. Regarding severity, nearly half (48.8%, n=122) rated pregnancy gingivitis as a moderately serious condition, while 28.4% (n=71) considered it mildly serious, and only 15.6% (n=39) classified it as very serious. A minority of 7.2% (n=18) did not perceive it as a dental health concern. Educational gaps were apparent, with 45.6% (n=114) reporting that pregnancy gingivitis is inadequately addressed in dental curricula, while 38.4% (n=96) felt it was sufficiently covered, and 16.0% (n=40) remained uncertain. Similarly, patient awareness was judged insufficient by 60.4% (n=151), compared to 25.2% (n=63) who believed pregnant women were sufficiently informed, and 14.4% (n=36) who were unsure. Perceptions of prevention and professional responsibilities demonstrated encouraging yet uneven attitudes (Table 4). The majority of respondents considered dental checkups during pregnancy (67.2%, n=168) and twice-daily brushing (26.8%, n=67) as the main preventive strategies, with a smaller proportion (6.0%, n=15) endorsing scaling before pregnancy. In terms of professional development, dental school curricula (60.0%, n=150) and journal articles (59.2%, n=148) were the most cited sources of knowledge updates, followed by online resources (55.2%, n=138), continuing education (45.6%, n=114), and conferences (37.6%, n=94).

Table 1. Participant Characteristics (N = 250)

Variable	Category	Frequency (n)	Percentage (%)	p-value*
Role	General dentists	109	43.6	
	Undergraduates	66	26.4	
	Postgraduate trainees	18	7.2	
	House officers	57	22.8	
Years of experience	<1 year	114	45.6	
	1–5 years	126	50.6	
	>5 years	10	4.0	
Major cities of respondents	Rawalpindi, Peshawar, Hyderabad	—	—	—

Table 2. Knowledge of Pregnancy Gingivitis

Variable	Response option	n	%	p-value*
Primary cause of pregnancy gingivitis	Hormonal changes	114	45.6	
	Poor oral hygiene	20	8.0	
	Multifactorial (hormonal + plaque + bacteria)	115	46.0	
Most affected trimester	First	37	14.8	
	Second	101	40.4	
	Third	55	22.0	
	Equal throughout	57	22.8	
Common clinical signs (multiple response)	Swollen gums	228	91.2	
	Bleeding gums	199	79.6	
	Bad breath	112	44.8	
	Tooth mobility	37	14.8	

Table 3. Awareness of Systemic and Educational Implications

Variable	Response category	n	%	p-value*
Association with adverse pregnancy outcomes	Yes	114	45.6	
	No	136	54.4	
Perceived seriousness of pregnancy gingivitis	Not serious	18	7.2	
	Mild	71	28.4	
	Moderate	122	48.8	
	Very serious	39	15.6	
Adequacy of dental education on pregnancy gingivitis	Adequately addressed	96	38.4	
	Inadequately addressed	114	45.6	
	Unsure	40	16.0	
Patient awareness of risks	Sufficient	63	25.2	
	Insufficient	151	60.4	
	Unsure	36	14.4	

Table 4. Perceptions and Preventive Strategies

Variable	Response category	n	%	p-value*
Source of updates (multiple response)	Dental school curriculum	150	60.0	
	Research articles/journals	148	59.2	
	Online resources	138	55.2	
	Continuing education courses	114	45.6	
	Conferences/workshops	94	37.6	
Barriers to patient education	Lack of patient interest	92	36.8	
	Not part of routine care	74	29.6	
	Insufficient professional knowledge	65	26.0	
	Lack of time	20	8.0	
Preventive measures endorsed	Dental checkups during pregnancy	168	67.2	
	Twice-daily tooth brushing	67	26.8	
	Scaling before pregnancy	15	6.0	
Professional recommendations to improve	Awareness campaigns for pregnant women	178	71.2	
	Increased curricular focus	167	66.8	
	Collaboration with gynecologists	164	65.6	
	Better patient–dentist communication	147	58.8	
	Workshops/seminars for professionals	141	56.4	
	Digital/online resources	126	50.4	

Barriers to patient education were primarily patient-related, with 36.8% (n=92) citing lack of patient interest, followed by structural or professional challenges such as being outside routine care (29.6%, n=74), insufficient knowledge (26.0%, n=65), and lack of time (8.0%, n=20). When asked about strategies for improvement, the most frequently endorsed interventions included awareness campaigns targeting pregnant women (71.2%, n=178), increased curricular focus (66.8%, n=167), interprofessional collaboration between dentists and gynecologists (65.6%, n=164), enhanced patient communication (58.8%, n=147), workshops for professionals and students (56.4%, n=141), and digital platforms (50.4%, n=126).

Overall, the results highlight a paradoxical profile: while most professionals can identify common signs and recognize preventive strategies, many underestimate the systemic risks of pregnancy gingivitis and consider current educational frameworks inadequate. These findings suggest substantial opportunities for curricular reform, awareness campaigns, and interprofessional approaches to maternal oral health.

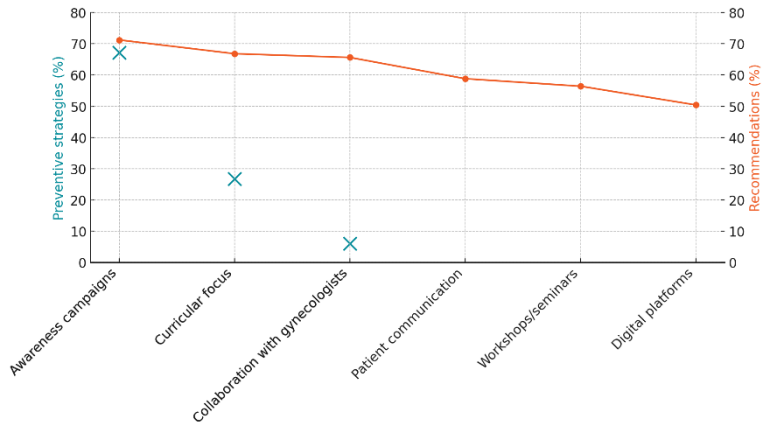

Figure 1 Preventive Measures vs. Professional Recommendations for Managing Pregnancy Gingivitis

The integrated visualization compares preventive strategies endorsed by dental professionals with their recommended actions for improving awareness and management. The scatter points show that 67.2% considered regular dental checkups as the most effective preventive measure, compared with 26.8% supporting twice-daily brushing and 6.0% recommending scaling before pregnancy. The overlaid trend line highlights professional recommendations, with strong support for awareness campaigns (71.2%), curricular reform (66.8%), and interdisciplinary collaboration (65.6%). Lower but still substantial endorsement was seen for patient–dentist communication (58.8%), workshops (56.4%), and digital platforms (50.4%). The graph illustrates a consistent trend: while preventive practices are narrowly concentrated on dental checkups, professional consensus strongly favors a broader, multi-level strategy to address knowledge gaps and improve maternal oral health outcomes.

DISCUSSION

This nationwide cross-sectional study assessed the knowledge, awareness, and perceptions of dental professionals in Pakistan regarding pregnancy gingivitis. The findings reveal that although a majority of participants correctly recognized swollen gums (91.2%) and bleeding gums (79.6%) as hallmark signs of the condition, significant misconceptions persist about its etiology and systemic implications. Nearly

half of the respondents (45.6%) perceived pregnancy gingivitis as solely hormone-driven, while an almost equal proportion (46.0%) identified it as multifactorial. This division suggests a partial understanding of the interplay between hormonal fluctuations, plaque, and bacterial colonization, reflecting inconsistencies in professional knowledge that may influence clinical practice (23).

One of the most concerning findings was that more than half of the professionals (54.4%) did not associate pregnancy gingivitis with adverse pregnancy outcomes such as preterm birth and low birth weight. This is in sharp contrast to robust international evidence establishing a strong association between maternal periodontal disease and poor obstetric outcomes For example, a systematic review concluded that periodontal interventions during pregnancy can mitigate the risk of preterm delivery, underscoring the importance of preventive dental care The lack of awareness among Pakistani dental professionals indicates a critical educational gap that may compromise the integration of oral-systemic health into routine care. Similar deficiencies have been documented in other regions. A study in Hong Kong reported that fewer than 40% of pregnant women recognized the role of hormonal changes in pregnancy gingivitis while Saudi research highlighted poor understanding among both patients and practitioners regarding oral-systemic health links

Educational inadequacies were a recurring theme in this study, with 45.6% of respondents reporting that pregnancy gingivitis is insufficiently addressed in dental curricula. This aligns with earlier findings from Pakistan, where oral health education during pregnancy remains fragmented and under-prioritized Additionally, 60.4% of professionals believed that pregnant patients are inadequately informed about the risks of gingivitis, echoing international reports of low awareness and poor patient counseling during prenatal care The barriers reported—chiefly lack of patient interest (36.8%) and insufficient professional knowledge (26.0%)—further highlight the systemic challenges to delivering effective patient education. Evidence from Latin America and South Asia suggests that sociocultural barriers, coupled with low health literacy, exacerbate these gaps and require targeted, community-based interventions

The preventive attitudes reported in this study were promising yet narrow in scope. While 67.2% of participants endorsed routine dental checkups during pregnancy, fewer emphasized simple preventive practices such as regular tooth brushing or scaling before pregnancy. Moreover, the overwhelming support for awareness campaigns (71.2%) and interprofessional collaboration with gynecologists (65.6%) suggests that professionals recognize the need for systemic solutions. International models of integrated care, where obstetricians and dentists collaborate to deliver oral health counseling, have demonstrated improved maternal outcomes and greater acceptance of dental visits during pregnancy Adoption of similar strategies in Pakistan could bridge professional knowledge gaps and address patient-level barriers.

The implications of these findings are twofold. First, there is a need to strengthen undergraduate and postgraduate dental curricula with greater emphasis on oral-systemic health, particularly the impact of periodontal disease on pregnancy outcomes. Embedding this knowledge early in training may correct misconceptions and improve future practice behaviors. Second, public health strategies should prioritize maternal oral health as a component of prenatal care. Community outreach, digital platforms, and workshops can serve as effective tools for raising awareness and empowering women to seek timely preventive care. Integrating dental and obstetric services may also reduce fragmented care and align with broader global recommendations for maternal health promotion (24,25).

This study is not without limitations. The cross-sectional design limits causal inference, and reliance on self-reported responses may not fully reflect clinical behaviors. The predominance of young professionals and clustering of responses in three cities may restrict generalizability. Furthermore, the descriptive nature of the analysis precluded exploration of subgroup differences, which could provide additional insight into the variability of knowledge across professional roles. Despite these limitations, the study provides novel insights into an under-researched area in Pakistan and establishes a foundation for future intervention studies.

In summary, the results underscore substantial deficiencies in the knowledge and awareness of pregnancy gingivitis among Pakistani dental professionals, particularly regarding its systemic implications. The findings call for urgent curricular reforms, strengthened patient education, and interprofessional collaboration to promote maternal oral health. Addressing these gaps is essential not only for improving oral health outcomes but also for mitigating pregnancy-related complications and enhancing neonatal well-being.

CONCLUSION

This study highlights critical deficiencies in the knowledge, awareness, and perceptions of pregnancy gingivitis among dental professionals in Pakistan. Although most respondents recognized common clinical signs and acknowledged the preventive role of regular dental visits, misconceptions about etiology and a lack of awareness regarding systemic implications were evident. More than half of the participants failed to link pregnancy gingivitis with adverse outcomes such as preterm birth and low birth weight, underscoring a serious gap in professional understanding. Furthermore, findings revealed inadequacies in dental education, insufficient patient counseling, and barriers such as limited patient interest and inadequate professional training. To address these challenges, it is imperative to integrate oral–systemic health concepts into dental curricula, foster interdisciplinary collaboration with obstetricians, and develop targeted awareness campaigns that engage both professionals and pregnant women. By prioritizing maternal oral health through education, preventive care, and community outreach, healthcare systems can mitigate the impact of pregnancy gingivitis and reduce associated risks for mothers and infants.

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