Impact of Oral Pain on Oral Health and Daily Performance in Pregnancy: A Cross-sectional Study

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ABSTRACT

Background
Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Pregnancy-related oral pain can affect emotional well-being, oral health-related quality of life, and general health. If left untreated, poor oral health may lead to premature delivery, pre-eclampsia, epulis gravidarum, tooth mobility, and other complications.

Objectives:
This study assessed the prevalence of oral pain, evaluated oral impacts on daily performance (OIDP), and examined associations between oral health, service utilization, and parity status during pregnancy.

Methods
A cross-sectional design was used, incorporating data on sociodemographic characteristics, pain symptomatology, oral impact on daily performance (OIDP), and clinical examination. Sociodemographic and pain variables were analyzed using descriptive statistics (frequencies, proportions, and summary statistics). Statistical significance was set at $p<0.05$.

Results
The median age was 30 years; most respondents (71%, n=149) had post-secondary education and were primigravida. Oral pain during pregnancy was reported by 29% (n=61) of respondents, predominantly mild and most commonly affecting the gingiva (16%, n=33). Pain, site of pain, and OIDP were significantly associated with parity (p=0.04, 0.010, 0.037, respectively), and OIDP was also related to trimester (p=0.04). Dental service utilization was 24% (n=50), with 17% (n=36) satisfied; satisfaction was higher among multigravida compared to primigravida (p=0.01). More women in the third trimester reported OIDP, while none in the first trimester did so (p=0.04).

Conclusion
Mild oral pain is a frequent experience during pregnancy, most often gingival in origin, and is associated with parity and trimester. These findings emphasize the need for routine oral health assessment during antenatal care, with timely management to reduce oral impacts on daily functioning.

Keywords: Pregnancy, Oral pain, Primigravida, Multigravida, Oral health-related quality of life

INTRODUCTION

Pain is a signal in the nervous system indicating that something may be wrong. It can range from mildly annoying to severely debilitating.[1–3] It is an unpleasant feeling, such as a prick, tingle, pinch, soreness, sting, burn, or ache,[1] and may be described as acute, chronic, nociceptive, neuropathic, or functional. Pain can also be generalized or localized, persistent, intense, or reduced. Such uncomfortable sensations may occur during pregnancy.[1,3] The estimated prevalence of pregnancy-related pain ranges from 16% to 54%, with considerable variation in severity and location across studies.[1,2,4]

The oral environment comprises both soft and hard tissues, and pain can arise from any of these structures at any time.[5,6]Pregnancy is defined as the state of having implanted products of conception located either in the uterus or elsewhere in the body.[2,4] It is a life experience that causes physiological and psychological changes in women.[5] During pregnancy, physical and hormonal changes

significantly affect various organ systems, including the oral cavity.[7] Pregnant women are more susceptible to gingivitis, tooth mobility, dental caries, tooth erosion, orofacial space infections, and the development of oral tumors. Thus, they should receive appropriate preventive oral health care.[2,8] Dental pain may be one of the most severe types of suffering experienced during pregnancy,[2,9] directly affecting emotional status, general health, and well-being, which may substantially impact fetal health.[2,7,10]

Pregnant women frequently require emergency dental services due to episodes of oral pain. However, many do not seek dental treatment due to fear and anxiety, low awareness of dental problems, misconceptions about the effects of dental treatment on fetal development, uncertainty about the safety of dental procedures during pregnancy, and the fact that obstetricians do not commonly recommend routine prenatal dental care.[5,7,11,12] Untreated pain may be associated with hypertension, anxiety, and depression—none of which are conducive to a healthy pregnancy.[5,10,13] Pregnancy can increase the risk of oral health problems due to factors such as elevated hormone levels (progesterone and estrogen), changes in eating habits, poor oral hygiene practices, and over-flossing.[13,14] Pain during pregnancy can arise from dental caries, gingival inflammation, tooth mobility, oral ulcers, and oral abscesses or cellulitis.[5,11,15]

Although several studies have shown that oral pain can cause significant discomfort,[14,16-18] little has been reported on its general implications for daily performance in pregnant women or how it affects oral functions. Very few studies have also documented the prevalence of oral pain in sub-Saharan Africa. This study thus aimed to determine the prevalence of oral pain in pregnant women across trimesters and parity at our institution and to evaluate its impact on oral functions and daily performance.

METHODS

We obtained ethical approval for the study from the Lagos State University Health Research Committee (LREC/06/10/2811). The study utilized a self-administered questionnaire design followed by an intra-oral examination conducted by investigators. A total purposive sampling technique was employed to better align the sample with our study objectives. All pregnant patients seen during the study period (February 2024–February 2025) were recruited following informed consent.

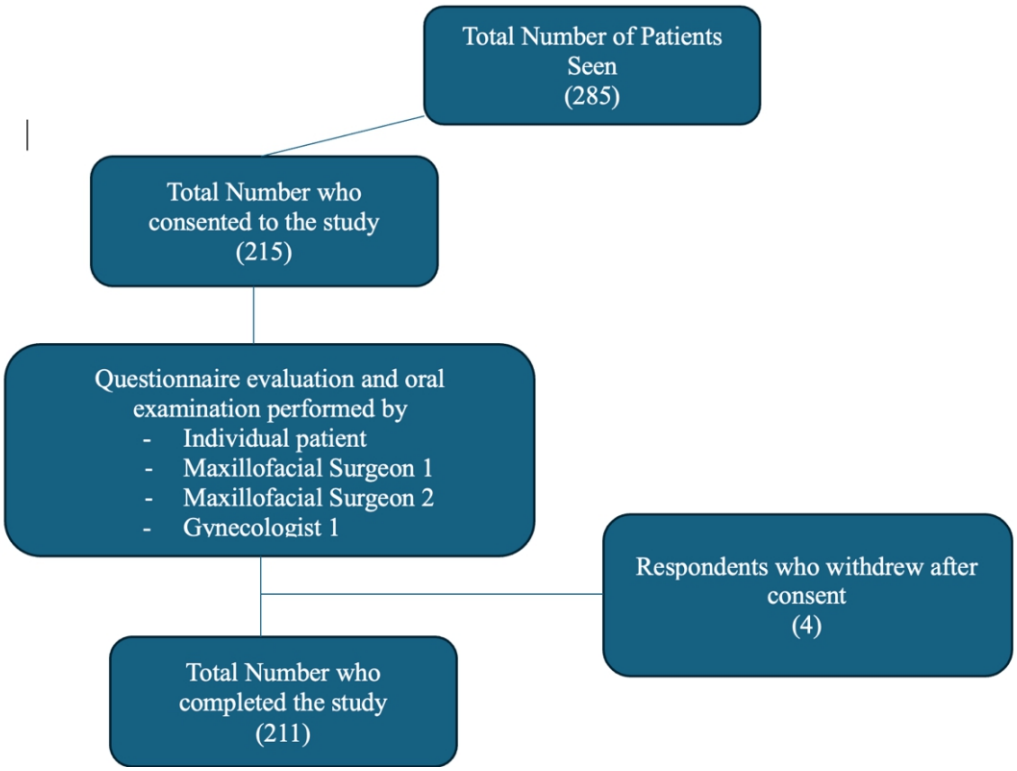

Figure 1: STROBE Flowchart of included Respondents

The self-administered questionnaire comprised four sections:
i) sociodemographic characteristics, ii) pain symptomatology, iii) oral impact on daily performance (OIDP), and
iv) clinical examination.

Sociodemographic variables included age, ethnicity, education level, parity, and current pregnancy trimester. Pain variables included pain intensity (assessed with Visual Analogue Scale, VAS), site of pain, trimester of pain onset, intervention sought, and outcome of dental utilization. The OIDP variables assessed routine oral functions such as eating, speaking, sleeping, and daily activities. Following questionnaire completion, investigators examined caries activity, gingival, and periodontal status using the DMFT index, gingival bleeding index, and simplified oral hygiene index. The study was conducted and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines and the Declaration of Helsinki.

Data Analysis

Data analysis was performed using the R Programming Language. Sociodemographic variables were analyzed using descriptive statistics and presented as frequency tables, proportions, and summary statistics. Pain variables were analyzed descriptively using means or medians. Associations between symptoms and demographic characteristics were analyzed using Student's t-test, ANOVA, or their non-parametric alternatives (Wilcoxon rank-sum test and Kruskal–Wallis test) when necessary. Categorical associations were tested using Pearson's chi-square test with Fisher's exact approximation when indicated. Statistical significance was set at $p<0.05$.

RESULTS

Of the 285 patients seen during the study period, 215 (75.4%) agreed to participate and provided informed consent; however, only 211 (74%) respondents completed the study (Figure 1). Table 1 shows the sociodemographic characteristics of the respondents. The median age was 30 years (IQR: 7 years). Yoruba ethnicity comprised 62% (n=131) of all respondents. Most respondents (71%, n=149) had post-secondary education, were in their first pregnancy (58%, n=122), and were in the second trimester (46%, n=97). The majority were Christian (74%, n=157).(Table 1)

Table 1: Sociodemographic characteristics of respondents

Characteristic	N = 211[1]
Age	30.0 (27.0, 34.0)
Religion	
Christian	157 (74%)
Muslim	54 (26%)
Ethnicity	
Igbo	50 (24%)
Yoruba	131 (62%)
Others	30 (14%)
Education Status	
Secondary	62 (29%)
Tertiary	149 (71%)
Employment Status	
Employed	91 (43%)
Self-employed	91 (43%)
Unemployed	29 (14%)
Parity	
0	122 (58%)
1	78 (37%)
2	11 (5.2%)
Trimester	
First	25 (12%)
Second	97 (46%)
Third	89 (42%)
[1]Median (Q1, Q3); n (%)	

Pain Symptomatology Across Parity Status

Twenty-nine percent (n=61) of all respondents reported episodes of oral pain during pregnancy, with 16% (n=33) experiencing pain in the first trimester. All respondents with painful episodes reported mild pain on the Visual Analogue Scale (VAS), with scores ranging from 1 to 3. The gingiva was the most common site of pain (16%, n=33). Ten percent (n=22) of all respondents indicated that pain affected their daily performance.

Pain experience varied significantly across parity status (p=0.04). Twenty-five percent (n=30) of primigravida respondents reported painful episodes, compared to 55% of multigravida respondents. The site of pain (p=0.01) and the impact of pain on daily performance (p=0.037) also showed significant variation by parity (Table 2). However, no significant differences were observed in VAS scores (p=0.87) or the trimester in which painful episodes began (p=0.98).Table 2: Pain variables across parity status in respondents

Table 2: Pain variables across parity status in respondents

Characteristic	Overall N = 211[1]	0 N = 122[1]	1 N = 78[1]	2 N = 11[1]	p-value[2]
Pain in pregnancy	61 (29%)	30 (25%)	25 (32%)	6 (55%)	0.041
Trimester					0.2
Nil	150 (71%)	92 (75%)	53 (68%)	5 (45%)	
1st	33 (16%)	18 (15%)	11 (14%)	4 (36%)	
2nd	19 (9.0%)	8 (6.6%)	10 (13%)	1 (9.1%)	
3rd	9 (4.3%)	4 (3.3%)	4 (5.1%)	1 (9.1%)	
Current episode	56 (27%)	28 (23%)	23 (29%)	5 (45%)	0.2
VAS	0.00 (0.00, 2.00)	0.00 (0.00, 0.00)	0.00 (0.00, 2.00)	0.00 (0.00, 3.00)	0.5
Site of pain					0.010
Nil	152 (72%)	92 (75%)	55 (71%)	5 (45%)	
Gum	33 (16%)	16 (13%)	15 (19%)	2 (18%)	
Teeth	16 (7.6%)	12 (9.8%)	3 (3.8%)	1 (9.1%)	
Both	10 (4.7%)	2 (1.6%)	5 (6.4%)	3 (27%)	
OIDP	22 (10%)	11 (9.0%)	7 (9.0%)	4 (36%)	0.037
[1]n (%); Median (Q1, Q3)					
[2]Fisher's exact test; Kruskal-Wallis rank sum test					

Pain Symptomatology by Trimester

The proportion of respondents experiencing oral pain was highest in the first trimester (44%) and lowest in the third trimester (26%); this difference was not statistically significant (p=0.2). The highest pain intensity (VAS score 3.0) was reported during the first trimester. Regarding the oral impact on daily performance (OIDP), significantly more respondents in the third trimester reported impacts on daily activities, while no respondents in the first trimester reported such effects (p=0.04). These findings are detailed in Table 3

Table 3: Pain variables across Trimesters in respondents

Characteristic	Overall N = 211[1]	First N = 25[1]	Second N = 97[1]	Third N = 89[1]	p-value[2]
Pain in pregnancy	61 (29%)	11 (44%)	27 (28%)	23 (26%)	0.2
Trimester					0.2
Nil	150 (71%)	14 (56%)	70 (72%)	66 (74%)	
1st	33 (16%)	7 (28%)	16 (16%)	10 (11%)	
2nd	19 (9.0%)	4 (16%)	8 (8.2%)	7 (7.9%)	
3rd	9 (4.3%)	0 (0%)	3 (3.1%)	6 (6.7%)	
Current episode	56 (27%)	9 (36%)	24 (25%)	23 (26%)	0.5
VAS	0.00 (0.00, 2.00)	0.00 (0.00, 3.00)	0.00 (0.00, 1.00)	0.00 (0.00, 2.00)	0.6
Site of pain					0.4
Nil	152 (72%)	15 (60%)	71 (73%)	66 (74%)	
Gum	33 (16%)	8 (32%)	14 (14%)	11 (12%)	
Teeth	16 (7.6%)	2 (8.0%)	7 (7.2%)	7 (7.9%)	
Both	10 (4.7%)	0 (0%)	5 (5.2%)	5 (5.6%)	
OIDP	22 (10%)	0 (0%)	8 (8.2%)	14 (16%)	0.04
[1]n (%); Median (Q1, Q3)					
[2]Pearson's Chi-squared test; Fisher's exact test; Kruskal-Wallis rank sum test					

Dental Service Utilization in Pregnant Respondents

Fifty respondents (24%) reported utilizing dental services during their pregnancy, with 36 (17%) expressing satisfaction with the care received. Satisfaction rates varied significantly by parity status: 55% (n=6) of multigravida respondents reported satisfaction, compared to 11% (n=14) of primigravida respondents (p =0.01). Although a higher proportion of dental service utilization occurred during the first trimester, no statistically significant association was observed between trimester and service utilization (Table 4).

Table 4. Dental Utilization and Satisfaction Amongst Respondents

Characteristic	Overall N = 211[1]	0 N = 122[1]	1 N = 78[1]	2 N = 11[1]	p-value[2]
Dental Utilization	50 (24%)	24 (20%)	21 (27%)	5 (45%)	0.10
Satisfaction	36 (17%)	14 (11%)	16 (21%)	6 (55%)	0.01
Characteristic	Overall N = 211	First N = 25	Second N = 97	Third N = 89	p-value[2]
Dental Utilization	50 (24%)	7 (28%)	23 (24%)	20 (22%)	0.8
Satisfaction	36 (17%)	8 (32%)	22 (23%)	6 (29%)	0.12
[1]n (%), [2]Pearson's Chi-squared test					

Oral Impact on Daily Performance

Although 16% of respondents reported painful episodes during pregnancy, only 10% (n=22) indicated that these episodes negatively impacted their daily performance. The most commonly affected activity was eating and mastication, followed by resting and relaxation (Figure 1). Brushing was the least affected daily activity. Other impacted activities included talking and performing major work.

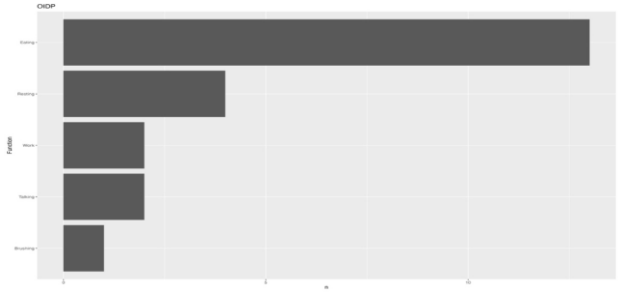

Figure 1. Activities affected by painful episodes during pregnancy

1.0 (IQR 1.0). No significant association was observed between caries activity or periodontal status and demographic variables such as religion, educational status, or employment. However, the DMFT index varied significantly by parity status, with multigravida respondents exhibiting higher DMFT scores compared to primigravida respondents (p=0.03) (Figure 2).

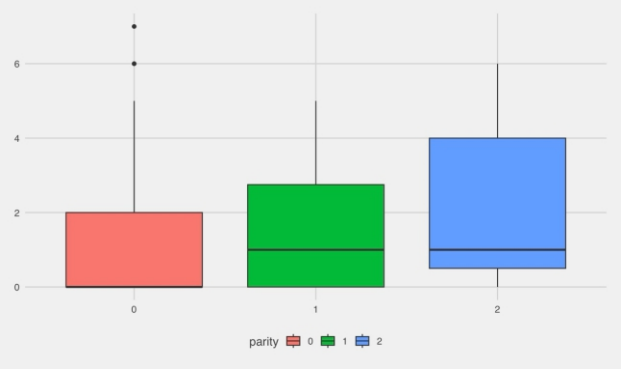

Figure 2: Boxplot showing DMFT scores across parity status

Caries Activity, Periodontal and Oral Hygiene Status

Caries activity and periodontal status were assessed using the DMFT index, OHI-S (Oral Hygiene Index-Simplified), and Gingival Bleeding Index (GBI). The median values across respondents were as follows: DMFT 1.0 (IQR 2.0), OHI-S 1.8 (IQR 1.3), and GBI

Despite higher OHI-S scores observed among primigravida respondents, no statistically significant differences in oral hygiene status were found across parity groups (p=0.3). Similarly, no significant differences in caries activity (DMFT index) or periodontal status (GBI) were observed across the three trimesters of pregnancy in this study (Table 5).

Table 5: Caries Activity and Periodontal Status Across Trimesters

Characteristic	First N = 25[1]	Second N = 97[1]	Third N = 89[1]	p-value[2]
DMFT	1.00(2.00)	1.00(2.00)	1.00(2.00)	0.78
OHIS	1.80 (1.30, 2.10)	1.60 (1.00, 2.40)	1.80 (1.20, 2.30)	0.7
GBI	1.00 (0.00, 1.00)	1.00 (0.00, 1.00)	1.00 (0.00, 1.00)	0.8
[1]n (%); Median	[2]Kruskal-Wallis			

DISCUSSION

Findings: Prolonged or recurrent oral pain can lead to an exhausted, frightened, and hysterical mother who may be incapable of decision-making.[4,19,20] Oral pain may interfere with the mother's emotional response to her baby. In extreme cases, the experience may discourage future pregnancy. Several of these reactions are often subject to the physical and hormonal changes that occur during this period.[8,11,21] The significant impacts of these hormones on women's organ systems also reflect on the oral cavity. The anatomical configuration within the oral cavity, as previously documented, has the potential to induce discomfort through various mechanisms, including but not limited to infections (such as gingival inflammation and abscess formation), periodontitis, neoplasms, trauma, and dental caries.[4,19,20] A proportion of these conditions may arise from dietary habits, particularly a sugar-laden diet, which significantly impacts microbial load, with direct consequences manifesting as dental caries.[4,19] Moreover, factors such as oral hygiene practices and hormonal fluctuations, notably those observed during pregnancy, play a pivotal role in this dynamic.

With respect to sociodemographic characteristics and behavioral lifestyle of respondents, empirical studies have indicated that the educational background of expectant mothers can significantly affect their oral hygiene practices.[11,15] Specifically, pregnant women with lower levels of educational attainment have been found to exhibit poorer oral health outcomes during gestation. They may possess limited knowledge regarding the implications of oral health on pregnancy outcomes.[7,14,18] This observation contrasts with findings from the current study, wherein a considerable proportion of participants possessed post-secondary educational qualifications. It is noteworthy that academic knowledge does not inherently equate to practical awareness or application of oral hygiene education.[16-18] The absence of adequate oral hygiene education, coupled with a lack of experience in effectively maintaining an optimal oral environment during pregnancy, may account for the findings detailed in this research. The second trimester is frequently characterized by the emergence of inflammatory responses initially observed during the first trimester, which may stem from inadequate oral hygiene practices or the hormonal alterations that accompany pregnancy.[2,12,21] The findings of the present investigation indicate a substantial prevalence of oral pain among pregnant women, with primigravida experiencing a rate of 16% and multigravida mothers exhibiting a significantly higher rate of 55%. This underscores the critical necessity of incorporating oral health care into prenatal care protocols.

Our data indicate that oral pain is a prevalent issue among expectant mothers. A recent systematic review has elucidated that the periodontium, serving as a supportive structure, is a target tissue for estrogen and progesterone receptors, which become activated due to elevated hormonal levels during gestation, ultimately leading to intensified inflammatory responses.[4,8,10] This elevation in hormonal concentration is associated with the onset or exacerbation of gingivitis, resulting in the formation of gingival granulomas and the progression of preexisting periodontitis, which is characterized by increased redness, edema, and a higher tendency toward bleeding and pain.[17] The pain experienced by most patients in this study, primarily originating from gingival diseases in the first trimester, affected the sleep of approximately 10% of the study participants. It is essential to examine the consequences of oral pain on both the maternal and fetal subjects and to ascertain whether such discomfort results in favorable or detrimental outcomes for either entity.[7,10,15,18] The manifestation of pain and its subsequent alleviation may exert both physiological and psychological effects.[10,13,22]

Our findings also show that the pain experienced by expectant mothers was most pronounced during the first trimester and diminished significantly during the third trimester, with the Visual Analogue Scale (VAS) ratings being highest in the initial trimester. The underlying causes for these phenomena can be attributed to the inadequate or lack of oral health education received by women or most pregnant women.[13,14,16] The first trimester represents a phase when the physical and physiological transformations characteristic of pregnancy initiate. These transformations may encompass alterations in diet and hormonal influences stemming from elevated levels of estrogen and progesterone, which enhance the permeability of oral vascular structures while diminishing immunocompetence during gestation, thereby heightening the susceptibility to and severity of oral inflammation. The pain may originate from inflamed gingival tissues, compromised periodontium, dental caries, dental abscesses, or gingival tumours.[2,3,5,16]The repercussions of pain on daily activities may inhibit mastication, provoke anxiety, hinder adequate relaxation, and detrimentally affect other engagements, potentially culminating in more severe fetal complications.[3,10,23]

Regarding oral health indices and dental service utilization, a high DMFT index score signifies the progression of dental caries and subsequently denotes the decline of oral hygiene.[7,3,16]The DMFT

observed in our study is relatively low, suggesting a satisfactory level of oral hygiene as evidenced by few occurrences of dental caries. However, the gingival bleeding index remains elevated. Within the framework of the present investigation, it was discerned that 50% of women availed themselves of dental services during their pregnancy; nevertheless, despite a considerable proportion of participants experiencing dental discomfort in the initial trimester, a greater number of multigravida women actively pursued dental intervention in comparison to primigravida women. Some of the expectant mothers suffering from discomfort sought treatment more frequently during the first trimester, with a limited number expressing contentment with the care received. Notwithstanding the detrimental effects of pain on various daily life activities, including feeding, verbal communication, resting, occupational responsibilities, sleep, and oral hygiene practices, only a small fraction of mothers demonstrated an inclination to utilize dental services. Findings from the study indicate that women who undergo pain (including recurrent dental discomfort) during pregnancy are more likely to exhibit symptoms of depression and anxiety in the third trimester, thereby presenting an elevated risk for postnatal depression.[4,7] A higher DMFT in multigravida ($p = 0.03$) was noted in this study. Msagati et al.[25] hypothesized that this could be related to the cumulative effect of dental caries with advancing age and hormonal changes during multiple pregnancies.

Implications: This study revealed the attendant implications of sociodemographic characteristics, education level, and oral hygiene practices of pregnant women, dental utilization during pregnancy, and their effect on oral pain during pregnancy. The challenges faced by pregnant women in addressing their dental care requirements may have been exacerbated by factors such as the financial burden of out-of-pocket expenses for treatment, ongoing debates regarding the safety of dental interventions during pregnancy,[16,22] and a general lack of awareness concerning available therapies for pregnant women during the prenatal phase.[8,7,21] Pain exerts its influence through the stress response, which is activated directly by the sympathetic nervous system and indirectly through the hormonal actions of noradrenaline and adrenaline. This may result in diminished placental perfusion and hyperventilation in mothers, consequently raising maternal carbon monoxide levels and potentially leading to fetal hypoxemia.[3,23] It is evident from the research that dental services are significantly underutilized during the gestational period, a trend that has been observed on an international scale.[4,12,16,18,22] Pregnant mothers and their doctors usually avoid dental treatment during pregnancy because of the absence of clinical guidelines for dental management in pregnancy, lack of practice standards, and anxiety about fetal safety during dental procedures.[7,19] Insufficient and improper daily oral hygiene practices may lead to the accumulation of plaque and other related debris. The formation of plaque and calculus is frequently associated with diets high in sugar and carbohydrate content.[19,24] Neglecting to adopt effective oral hygiene practices may result in the formation of plaque-related problems such as halitosis, gingival inflammation, gingival bleeding, periodontitis, or dental mobility and discomfort.[7,18,24] It is imperative for pregnant women, considering the findings of this study, to acquire and implement optimal oral health education personally and within their communities.[14,19]

Trade-Offs (Limitations): The major limitation of the study is the self-reported design, which often leads to biases such as recall bias and respondents offering socially acceptable responses. Respondents may not be able to assess specific questions accurately. Being a single-centre study, there may also be sampling bias, and the results may not be generalizable to other regions and zones in the country. As a cross-sectional study, it lacks the inherent capacity to detect authentic causal relationships between analyzed variables.

Take-Home (Conclusion): Oral pain and its functional impacts are common in pregnancy yet remain under-addressed, with low utilization and satisfaction of dental services. Strengthening maternal oral health programs, integrating dental screening into antenatal care, and expanding access to quality services are critical for improving maternal well-being.

Expectations for Future Research: To circumvent the inherent limitations of the study, a multicentre study from different geopolitical zones of the country can be explored to reveal a stronger association between pregnancy and oral health and functions.

Recommendations: There should be a robust interdisciplinary approach to the management and evaluation of pregnancy, which should involve oral clinicians. Regular oral examination should be done in pregnancy in tandem with other aspects of antenatal and postnatal care. This will not only improve the overall health of pregnant women, but it will also help prevent early oral health challenges that are associated with pregnancy. Increased dental utilization during pregnancy will establish or reinforce dental awareness in mothers, easily transferable to their offspring.

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