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Oral health status and quality of life among pregnant women with oral health problems: a descriptive study

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Abstract

Introduction Oral health is essential for pregnant women to maintain their general health, well-being, and overall quality of life. The natural physiological process of pregnancy causes brief alterations in women's immune system, metabolism, hormone levels, and physical composition.

Methods A descriptive study was conducted among 258 pregnant women at selected primary health centers of Dakshina Kannada District, Karnataka state, India. Cluster sampling techniques were employed to choose the taluks. Six to seven primary health centers each were chosen randomly from two taluks, namely Bantwal and Belthangadi. Pregnant women were screened for oral health problems at antenatal clinics of Primary Health Centers. Pregnant women with oral health problems were recruited to assess the quality of life, and those with systemic diseases were excluded from the study. The data were collected using the demographic proforma, Oral health assessment tool, and oral health impact profile-14 scale.

Result The findings indicate that pregnant women had mild to moderate oral health problems (74.8%). Oral health problems had a mild impact on the quality of life of more than half (57.8%) of pregnant women and 42.2% had a moderate effect on quality of life. Study found a significant association of quality of life with the baseline characteristics like monthly income of the family (i.e. $F = 4.109$, $p = 0.008$) and previous information regarding oral health (i.e. $F = 5.581$, $p = 0.019$).

Conclusion This study found that most pregnant women had mild to moderate oral health problems, which affected their quality of life. Baseline variables such as family income and prior knowledge about oral health were associated with these outcomes. The study highlights the need for prenatal oral health counselling and the role of trained Community Health Workers in promoting good oral hygiene.

Keywords Pregnant women, Oral health status, Oral health related quality of life

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Introduction

Oral health is an index of the overall health of the body [1]. The natural process of pregnancy can cause a variety of physiological changes in the body, including in the oral cavity. These changes may lead to oral diseases if enough and timely care is not given. Pregnant women are at an increased risk of developing oral diseases, including periodontal disease and gingivitis, due to hormonal changes and the increased pH in the oral cavity during pregnancy [2–5]. The association between periodontal diseases and adverse pregnancy outcomes, including premature birth, low birth-weight infants, and preeclampsia, has garnered significant attention in recent years [6, 7] Studies in recent years have shown that the gingival inflammation of pregnant women significantly increased and peaked in the third trimester but dropped only at 3 months postpartum [8, 9] Oral bacteria may translocate directly into the system of the pregnant woman, which can reach the womb, causing localized inflammation and adverse pregnancy outcomes [10, 11].

Research on pregnant women has consistently shown that they lack enough understanding about oral health and have misconceptions about its significance and how it affects both their pregnancy and the dental and general health of their offspring [12, 13] Nonetheless, pregnant women around the world have a propensity to avoid going to the dentist [14]. Research has also demonstrated that negative attitudes, such as worries about dental procedures harming the foetus, discourage pregnant women from getting dental care [15]. It is possible that symptoms could negatively affect perception of oral health and oral health related quality of life (OHRQoL) [16]. The influence of pregnant women's oral health on their quality of life has been studied less than other health concerns, like emotional and systemic conditions [17].

Oral health screening is not a routine practice in many antenatal clinics in India, and there are no standard guidelines that ensure that all pregnant women receive regular screening, treatment, or referral to specialized dental professionals as part of their prenatal care. A serious observation on all these conditions regarding oral hygiene and its impact on the general health of pregnant women, and the shortage of prophylactic measures prevailing in the present medical setup regarding this, has led to this study.

Methods

A descriptive study was conducted among 258 pregnant women at selected primary health centers of Dakshina Kannada District, Karnataka state, India, from May to December 2024. Dakshina Kannada comprises five community development blocks (taluks). To ensure an unbiased selection process and enhance the generalizability of our findings, we employed a simple random sampling method using a lottery system to select two taluks out of the five. Bantwala and Belthangady were the taluks randomly chosen through this process. This method was selected to minimize selection bias and to provide a fair representation of the district's diverse socio-demographic and geographic characteristics. While the selected taluks may not capture every variation across the district, random sampling enhances the likelihood that the selected areas are reasonably representative of the broader population. Cluster sampling techniques were employed to select six and seven Primary Health Centers (PHCs) from Bantwal and Belthangadi taluks, respectively, using the lottery method. Each selected cluster, corresponding to PHCs, was anonymized and coded using alphabetical letters to maintain confidentiality and minimize bias during data analysis. The study included pregnant women who were registered in PHCs and residing permanently within the coverage area of the primary health centers.

The data collection tools were a baseline proforma, Chalmer's Oral Health Assessment Tool, and the oral health impact profile-14. Baseline proforma included ten items on maternal characteristics (age, education status, occupation, type of family, religion, number of deliveries, history of abortion, history of systemic disease, monthly income of the family, and previous information regarding oral health).

Oral health status was screened according to the criteria of Chalmer's Oral Health Assessment Tool [18]. It consists of eight categories (i.e., lips, tongue, gums and tissues, saliva, natural teeth, dentures, oral cleanliness, and dental pain). Each category is scored from 0 to 2;0 = healthy, 1 = changes in the health situation, and 2 = unhealthy. The inspection determines each category's score. The total score of the eight different categories can vary from 0 to 16, with the lower scores suggesting a healthier oral situation. If someone scores 1 or higher, they would be advised to visit an oral health care professional. Reliability of the Oral health assessment tool was established using the inter rater method (ICC = 0.96) [19].

The effectiveness of the Oral Health Assessment Tool stems from the fact that it requires little training [20]. The investigator underwent training organized by the Ministry of Health and Family Welfare in New Delhi and was certified as a Training of Trainers on health promotion.

The Oral Health Impact Profile-14 questionnaires assessed the Oral Health Related QoL among pregnant women [19]. This tool is used to assess the impact of oral conditions on oral health-related quality of life across seven dimensions: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. It is composed of 14 questions about the impact of oral conditions in aspects of a patient's daily life, and the answer choices are from never to very often (never = 0; hardly ever = 1;

occasionally = 2; often = 3; and very often = 4). The OHIP-14 score range is 0–56; higher scores denote higher frequency of negative impacts. The coefficient reliability of the OHIP-14 item instrument is 0.944 [21].

Sample size calculation

The sample size is calculated using the formula,

$$n = \frac{Z^2{}_{1-\alpha/2}\ (p)\,(1-p)}{\mathrm{E}^2}$$

Here, Z = 1.96, the standard normal score, p = 40.7% anticipated proportion of oral hygiene care, E = 6%, margin of error. The total sample size was calculated to be 258.

Ethical approval declaration

Ethical clearance was obtained from the Institutional Ethical Committee-1, dated 24/4/2023 (YEC-1/2023/023). Administrative permission was obtained from the District Health Officer and Karnataka State Ethical Committee. Informed consent was obtained from all pregnant mothers. All methods were carried out following relevant guidelines and regulations. The study adhered to the Declaration of Helsinki.

Data collection

Pregnant women were screened for oral health problems at antenatal clinics of Primary Health Centers. The material used to assess the oral health status is disposable gloves, a mask, a wooden tongue depressor, and mouth mirrors. Participants of the study were informed about the details of the study in their language, and informed consent was obtained. Firstly, the baseline proforma was administered to collect data on maternal characteristics. Chalmer's oral health assessment tool was used to screen the oral health status of pregnant women in sitting positions at antenatal clinics and primary health centers. Screening each woman took approximately 5 to 10 min.

Pregnant women with oral health problems were recruited to assess the quality of life using the Oral Health Impact Profile-14 questionnaires; those with systemic diseases were excluded from the study. The approximate time mothers took to respond to the tool was 15 to 20 min. After collecting the data, the pregnant women were referred for dental care (Fig. 1).

Statistical analysis

The statistical calculations were performed using Statistical Package for the Social Sciences (SPSS) version 23. Descriptive statistics were used to summarize the baseline variables of the pregnant women. Using frequencies and percentages, categorical variables such as baseline proforma and oral health status indicators were presented. To assess pregnant women's oral health-related quality of life (OHRQoL), scores across different domains were summarized using mean, standard deviation, and median values, depending on the data distribution. To evaluate the association between the quality of life of pregnant women with oral health problems and their baseline variables, a Generalized Linear Model (GLM) was employed.

Result

Table 1 depicts the baseline characteristics of pregnant women. It is found that, out of 258, the maximum subjects (35.3%) were aged between 31 and 35 years, and the mean age was 29.83 ± 5.044. The maximum participants have a high school education (41.1%). Half of the subjects (50.4%) were homemakers. The majority of participants come from nuclear families (62.8%). Hinduism is the predominant religion (65.9%). The highest number of participants had two deliveries (52.7%). The vast majority (92.2%) reported no history of abortion. Most participants (92.6%) do not have any systemic disease conditions. The majority of families (47.7%) earn between Rs 10,000–15,000 per month. The majority of pregnant women (75.6%) did not receive information regarding oral health.

Table 2 depicts that in relation to lips, only 23.6% of pregnant women had smooth and pink lips, whereas 76.4% of them had dry and red lips at the corners. In relation to the tongue, most pregnant women, 86.1% have a patchy, red, and coated tongue, and 13.9% have a healthy tongue that is normal, moist, rough, and pink. With regards to gums and tissue, most of them, 74.8% had dry, shiny, rough gums, 7.4% had swollen, bleeding, ulcer gums, and 17.8% had healthy gums that were pink. In relation to saliva, 81.3% had healthy free-flowing saliva, which is watery and moist tissue, and 18.7% had a change in saliva that is dry, sticky tissue, and little saliva. With regards to teeth, 62.4% had 1–3 decayed teeth, 34.1% no decayed teeth, whereas 3.5% had 4 + decayed and worn down teeth. In relation to oral cleanliness, 48.1% were clean with no food particles in the mouth, 45.3% had food particles in 1–2 areas of the mouth, and 6.6% of pregnant women found food particles in most of the areas of the mouth. In relation to dental pain, out of 258 screened, 48.8% had no physical signs of dental pain, such as no behavioral, verbal, or physical signs of dental pain, and 45% had a change in pain, which included verbal and behavioral signs of pain. Whereas 6.2% had severe pain, large ulcers, and verbal and behavioral pain signs.

Table 3 depicts that the majority of the pregnant women had mild to moderate oral health problems (74.8%).

Out of 258 pregnant women, 203 had oral health problems. Nineteen pregnant women were excluded because

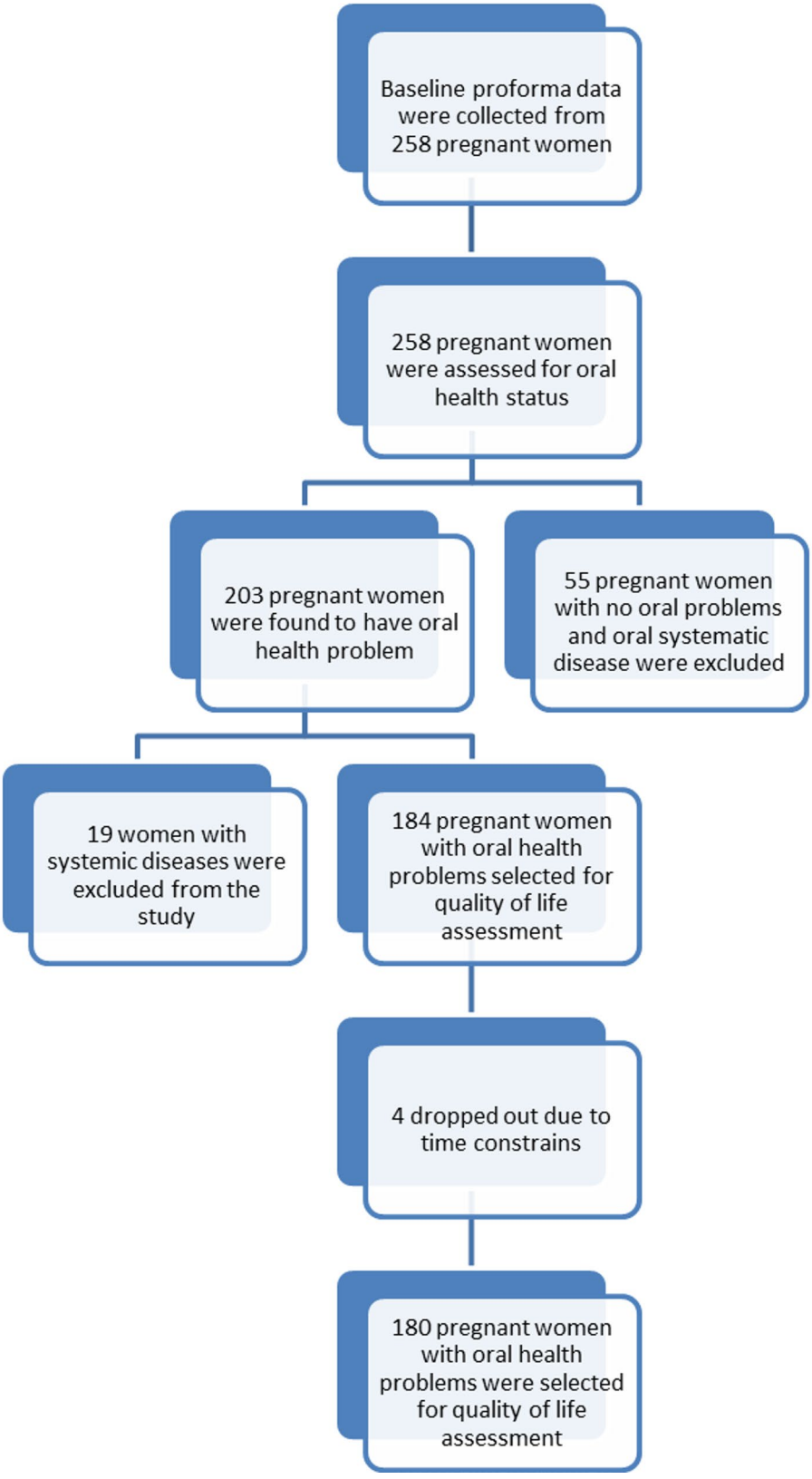

Fig. 1 Schematic representation of data collection

Table 1 Baseline proforma of pregnant women. *n*=258

Sr. no	Demographic variables	Category	f (%)
1	Age in years	21–25	67 (26.0)
		26–30	63 (24.4)
		31–35	91 (35.3)
		36–40	37 (14.3)
2	Educational status	Primary	46 (17.8)
		High school	106 (41.1)
		PUC	53 (20.5)
		Diploma	17 (6.6)
		Degree and above	36 (14.0)
3	Occupation	Housewife/unemployed	130 (50.4)
		Private employee	62 (24.0)
		Self-employed	66 (25.6)
4	Type of family	Nuclear	162 (62.8)
		Joint Extended	96 (37.2)
5	Religion	Hindu	170 (65.9)
		Muslim	22 (8.5)
		Christian	66 (25.6)
6	Number of deliveries	One	106 (41.1)
		Two	136 (52.7)
		Three	14 (5.4)
		More than three	2 (0.8)
7	History of abortion	Yes	20 (7.8)
		No	238 (92.2)
8	History of systemic Disease conditions	Yes	19 (7.4)
		No	239 (92.6)
9	Monthly income of the family	≪ ₹10,000	67 (26.0)
		Low-income threshold.	123 (47.7)
		₹10,000- ₹15,000	48 (18.6)
		Lower-middle income threshold	20 (7.8)
		₹15,001- ₹19,000	
		Middle-income threshold.	
		₹19,001 and above	
		Higher-income threshold	
10	Previous information regarding oral health	Yes	63 (24.4)
		No	195 (75.6)

Table 3 Oral health status of pregnant women based on OHAT summary scores. *n* = 258

Oral health status	Category	f (%)
0–3	Healthy	55 (21.3)
4–8	Mild to moderate	193 (74.8)
9–16	Severe	10 (3.9)

OHAT = Oral Health Assessment Tool, Scores ranges from 0 to 16, with higher scores indicating poorer oral health. Categories are defined as: 0–3 = Healthy, 4–8 = Mild to moderate Issues, 9–16 = Severe Issues

Table 2 Oral health status of pregnant women. *n* =258

Area	Category	Frequency (%)
Lips	Healthy	61 (23.6)
	Changes	197 (76.4)
	Unhealthy	0
Tongue	Healthy	36 (13.9)
	Changes	222 (86.1)
	Unhealthy	0
Gums and tissue	Healthy	46 (17.8)
	Changes	193 (74.8)
	Unhealthy	19 (7.4)
Saliva	Healthy	209 (81.3)
	Changes	48 (18.7)
	Unhealthy	0
Natural Teeth	Healthy	88 (34.1)
	Changes	161 (62.4)
	Unhealthy	0
Oral cleanliness	Healthy	124 (48.1)
	Changes	117 (45.3)
	Unhealthy	17 (6.6)
Dental pain	Healthy	126 (48.8)
	Changes	116 (45.0)
	Unhealthy	16 (6.2)

Table 4 Domain-wise distribution of oral Health-Related quality of life scores among pregnant women. *n* = 180

Domains	Maximum	Mean ± SD	Median
Functional limitation	4	2.06 ±0.274	2.00
Physical pain	8	5.42 ±1.103	5.00
Psychological discomfort	5	2.46 ± 0.757	2.00
Physical disability	5	3.17 ± 1.072	3.00
Psychological disability:	4	2.24 ± 0.456	2.00
Social disability	4	2.59 ± 0.632	3.00
Handicap	4	2.23 ± 0.497	2.00

Data are based on scores from the OHIP-14. Higher scores indicate greater impact on oral health related quality of life in the respective domain

Table 5 Distribution of quality of life pregnant women with oral health problems based on the severity classification. *n* = 180

Quality of life score	Category	Frequency (%)
0–7	Minimal impact	0
8–20	Mild impact	104 (57.8%)
21–30	Moderate impact	76 (42.2%)
31–40	Severe impact	0
41–56	Critical impact	0

Minimum score = 16, Maximum score = 25, Total score = 56

of systemic diseases, and four were dropped out from the study. A total of 180 pregnant women were recruited to assess the quality of life with oral health problems.

Table 4 depicts that domains -physical pain and physical disability were the most affected. The least affected domain was functional limitation.

Table 5 depicts that 57.8% of pregnant mothers' oral health problems had a mild impact on their quality of life and 42.2% had a moderate impact on quality of life.

Table 6 depicts the results of a Generalized Linear Model (GLM) analysis used to evaluate the association between the quality of life of pregnant women with oral health problems and their baseline characteristics. In this study, quality of life was found to be significantly

Table 6 Association between the quality of life of pregnant women with oral health problems and their baseline variables. *n* = 180

Baseline Proforma	F	d.f	*p*	Partial Eta Squared
Age in years	1.589	3 and160	0.194	0.029
Educational Status	1.439	4 and160	0.223	0.035
Occupation	1.029	2 and160	0.360	0.013
Type of family	0.002	1 and160	0.967	0.000
Religion	0.569	2 and160	0.567	0.007
Number of deliveries	2.715	2 and160	0.069	0.033
History of abortion	0.000	1 and160	0.988	0.000
Monthly income of the family	4.109	3 and160	0.008	0.072
Previous information regarding oral health	5.581	1 and160	0.019	0.034

p-value < 0.05 was considered statistically significant

associated with specific baseline variables, particularly monthly family income (F = 4.109, $p = 0.008$, Partial Eta Squared = 0.072) and prior information regarding oral health (F = 5.581, $p = 0.019$, Partial Eta Squared = 0.034). However, other variables such as age, education, occupation, type of family, religion, number of deliveries, history of abortion, and presence of systemic disease conditions did not show a statistically significant association with quality of life. A Generalized Linear Model (GLM) with multiple independent variables was used to evaluate the association between the quality of life of pregnant women with oral health problems and their baseline variables and in this study quality of life had significant association with the baseline characteristics like monthly income of the family (i.e. F = 4.109, $p = 0.008$, Partial Eta Squared = 0.072) and previous information regarding oral health (i.e. F = 5.581, $p = 0.019$, Partial Eta Squared = 0.034). Variables like age, education, occupation, type of family, religion, number of deliveries, history of abortion, and presence of systemic disease conditions were not associated with quality of life.

Discussion

The presence of dental and gingival disease adversely affects the self-perception of oral health related quality of life in pregnant women, affecting their mental state and ability to achieve proper nutrition [17]. Pregnancy causes numerous changes in a woman's oral and general health, as well as in her habits, which may result in the development of oral lesions. It is, therefore, essential to recognize the oral manifestations that are most prevalent during pregnancy to improve oral health, avoiding the consequent risk that this may entail [22].

Investigators assessed the oral health status of pregnant women in the first and second trimesters visiting the primary health centers of Dakshina Kannada District. The study found that only 3.9% of subjects had severe types of oral health problems, and 21.3% of subjects had comparatively healthy oral health status. The remaining 74.8% of subjects had mild to moderate types of oral health deterioration. But in a transversal study by Sari et al. [23] on 192 pregnant women of 17–42 years age showed 93.2% of caries, 46.9% of moderate type of gingivitis.

In a longitudinal study conducted by Montoya JA Gil et al. [24] showed only 5.3% of periodontitis in the first quarter of pregnancy but increased to 30.9% during 3rd quarter of pregnancy. In a similar type of study done by Montoya JA Gil et al. [25] on 147 pregnant women, they found 17% periodontitis in 1st quarter and 28.6% subjects had periodontitis in 3rd quarter. Similarly, gingivitis was seen in 36.7% in the first quarter and 42.9% in 3rd quarter. In a study done on 2481 pregnant women by Dasilva et al. [26] regarding oral mucosal lesions, they found that 409 women had at least one lesion, The most prevalent lesions were exostosis (80/16.6%), coated tongue (70/14.5%) and benign oral brownish pigmentation (68/14.1%). Other similar studies on pregnant women regarding the oral health status, including Cornejo et al. [27] which showed 93.75% gingivitis, 92% dental caries cases. Other major studies which showed a significant increase in dental & gingival degenerative changes were Wu et al. [28]Chaloupka et al. [29]Onigbinde et al. [30] Katab et al. [31]Xiao et al. [32]Deghatipour et al. [33] and Atrica et al. [34]

The second section of this study is about the oral health related quality of life obtained using OHIP – 14 Questionnaires. The present study observed that among 57.8% pregnant women, oral health problems had a mild impact on their quality of life and 42.2% had a moderate impact on quality of life. Overall quality of life of pregnant women in this study shows mild to moderate, indicating a need to address the domains with higher scores.

Study conducted by Kumar S et al. [35] at Indore city showed that nearly one-third of the pregnant women had poor OHRQoL and a study conducted by Kumar S et al. [35] at Jharkhand showed that 40% of the pregnant women had low OHRQOL. In this present study, the quality of life of mothers with oral health problems had significant associations with the baseline characteristics, such as the family's monthly income and previous information regarding oral health. In a similar study conducted by Kumar S et al. [36] pregnant women belonging to lower socio-economic status had poor OHRQoL. Additionally, it has been stated that the primary cause of these disparities is a lack of dental awareness. Another study by Moimaz S.A.S [37] showed that the OHIP14 scores were significantly associated with age and first pregnancy. In this study, baseline characteristics like age, education, occupation, type of family, religion, number of deliveries, history of abortion, and presence of systemic disease conditions are not associated with quality of life.

Limitations of the study

Oral examination in this present study was limited to only visual examination of the oral cavity; a Comprehensive oral examination, including radiographic evaluation, would have given better results. These factors may limit the comprehensiveness and representativeness of the findings. Another limitation of the study is sample selection, where in pregnant women attending only government facilities were included.

Recommendation

Research involving a more extensive and representative sample from both public and private sectors could encompass a population of pregnant women from both high and low-income backgrounds. Also recommend a study including a comprehensive oral examination to elicit underlying oral problems that could be missed by just a visual examination.

Conclusion

Most of the pregnant women who participated in the study group had mild to moderate oral health problems. Oral health problems had a mild to moderate impact on more than half of pregnant mothers' quality of life. This present study found an association of quality of life with the baseline characteristics like monthly income of the family and previous information regarding oral health. The study highlights the need for oral health training of Community Health workers so they can counsel pregnant women about maintaining good oral hygiene.

Abbreviations

OHRQoL	Oral health related quality of life
PHCs	Primary Health Centers
ICC	Intraclass Correlation Coefficient
OHIP-14	Oral Health Impact Profile-14
SPSS	Statistical Package for the Social Sciences
GLM	Generalized Linear Model

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Author contributions

Mrs.Navya, carried out the studies, participated in collecting data, and wrote the first draft of the manuscript. Dr. Leena Kunnath Chacko supervised the result and analysis. Reviewed the manuscript Dr. Rekha P Shenoy supervised the result and analysis. Reviewed the manuscript Dr. Prashanth Kumar Kalladka participated in collecting the data and supervised the result and analysis. Reviewed the manuscript All authors read, revised and approved the final manuscript.

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Data availability

The datasets generated and/or analyzed during the current study are available from the first author, Navya, upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from the Institutional Ethical Committee-1, dated 24/4/2023 (YEC-1/2023/023). Administrative permission was obtained from the District Health Officer and Karnataka State Ethical Committee. Informed consent was obtained from all pregnant mothers. All methods were carried out following relevant guidelines and regulations. The study adhered to the Declaration of Helsinki. Written informed consent was obtained from all individual pregnant women included in the study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Clinical trial number

Not applicable.

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