Knowledge and practices regarding oral health and hygiene and its correlation with periodontal health in pregnant women, visiting hospitals of prime foundation: Cross-sectional study

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Abstract---Objectives: To determine the periodontal health of pregnant women by using Community periodontal index of treatment needs (CPITN). To determine the oral health knowledge of pregnant women during pregnancy. To determine the correlation of knowledge and oral hygiene practices with periodontal health in pregnant women. To compare periodontal health, oral health knowledge and practices in different social classes during pregnancy. Methods and materials: A Cross-sectional study was carried out on 384 pregnant patients visiting gynea OPDs of Mercy, Kuwait, prime teaching hospitals and dental OPD of Peshawar dental hospital following inclusion and exclusion criteria and written consent was taken.

Closed ended questionnaire was used consisting of 5 parts i-e age, trimester, oral health assessment (CPITN), oral health knowledge, oral hygiene practices and socioeconomic status. Results: Out of 384 patients 222 (57.8%) had healthy Periodontal status, followed by 75 (19.5%) having pocket depth between 3.5 to 5.5, calculus having 66 (17.2%), bleeding on probing were only 21 (5.5%) patients, whereas no patients were having pocket more than 5.5. 22(5.7%) had good oral health knowledge, 350 (91.1%) had satisfactory and 12 (3.1%) had poor oral health knowledge. The correlation between the CPITN score and oral hygiene practice is -0.064, which indicated a very weak correlation because there was a defined scoring limit. When Social class was compared with periodontal health, upper middle class had found the most healthy periodontal health state 74 (61.7%) followed by the lower middle class with 112 (59%). Bleeding status was mostly found in the lower middle class 13 (7%). While calculus and pocket depth between 3.5 to 5.5 was more common in upper middle class 22(18.3%) and upper lower class 22 (33.3%) respectively. When Social class was compared with the oral hygiene practice of pregnant patients upper middle class had good oral hygiene practice as compared to others 108 (90%) followed by the lower middle class with 161 (84.7%). Satisfactory oral hygiene practice was mostly found in upper-lower class 8 (12.1%). While poor oral hygiene practice was majority found in the lower middle class with 10 (15.2%). Conclusion: A large number of pregnant women had not visited a dentist during their pregnancy and most had not received instructions concerning oral health care either for themselves or their children. There is an urgent need to institute early oral health education and encourage the use of dental services during pregnancy to prevent oral health problems.

Keywords---oral health, oral hygiene, CPITN, periodontal health, periodontitis, pregnancy, pregnant women, socioeconomic status.

Introduction

According to (WHO 2012), oral health is defined as "A state of being free of mouth and facial pain, oral infections and sores, and other diseases that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial well-being". WHO has documented that oral health is part of preventive procedures in health care for expecting women & infants.[1] In the prenatal period many physiological and lifestyle changes occur.[2] During pregnancy dental caries, benign gingival lesions, gingivitis, tooth erosions, tooth mobility and periodontitis are common oral problems that women experience.[3] The oral alterations during pregnancy have the potential to affect pregnancy outcomes.[4] Oral health in the course of pregnancy is significant for the general health of the infant &mother.[1] Insufficient oral health care in the prenatal period can have an undesirable impact on mothers and their infants.[2] During the prenatal period mother's oral well-being behavior for instance intake of sweets, oral cleanliness and dental visits can have a momentous effect on the mother and their child's oral health in

the future.[3] Oral problems during pregnancy are highly prevalent and have economical, physical, psychological and social consequences. These oral diseases are considered a "silent epidemic".[5] Studies show that their poor oral hygiene is related to poor pregnancy consequences, such as preeclampsia, preterm labour and LBW.[6]

According to the literature, available factors responsible for poor oral health during pregnancy are failure of prioritizing oral care, low oral health knowledge, the stress in pregnancy, high cost of dental treatments and poor socioeconomic status along with generally lower educational levels, pregnant women have a poor understanding of oral health-related information contributing to poor oral health practices.[7] According to a study conducted in 2015, there was not much impact of the socio-demographic aspects on gingival health in pregnancy, but the hormonal effect that occurs during pregnancy plays a role. [8] Social conditions have a significant impact not merely on the habits and behaviours of folks, but also their awareness, insight and their capability to self-manage health.[9] Most of the oral ill effects can be eluded by good oral care practices.[10] Although awareness of pregnant women related to oral health problems has increased it's still not up to the expected level.[11] Research has shown that in developed countries 80% of oral diseases are preventable via education.[2]

There has long been curiosity in how oral and systemic health interacts. It has been demonstrated that pregnant women have gingival inflammation more frequently than non-pregnant women. Nonetheless, maintaining good dental hygiene helps reduce gingival disease during pregnancy. [9] After controlling for a number of established risk variables, two case-control studies[3,5] and cohort studies[7,10,11] proposed that periodontal disease might be an independent risk factor for preterm delivery and LBW. The health of the mother and child is seriously impacted by LBW. Public health repercussions include infant morbidity, perinatal and infant mortality, mental retardation, & the high cost of the special care these children require. [11]

As oral health during pregnancy is a vital problem to be taken care of because during pregnancy women are prone to periodontal diseases therefore the purpose of the current study was to determine the periodontal health of pregnant women visiting hospitals of Prime Foundation Peshawar by using the Community periodontal index of treatment needs (CPITN) and to determine the oral health knowledge and practices of pregnant women during pregnancy.

Methodology

This was a Descriptive Cross-Sectional Study conducted at the OPDs of four hospitals of Peshawar,

1. Gynea OPDs of Mercy Hospital,
2. Kuwait Teaching Hospital,
3. Prime Teaching Hospital
4. Dental OPD of Peshawar Dental Hospital.

It was carried out within a period of six month from may, 2022 till October 2022

after approval from Institutional Review Board (IRB) of Peshawar Medical and Dental College vide number 2021-389. Sample size was calculated by using open-epi software, our total calculated sample size was; 384.

Inclusion Criteria

- Pregnant patients visiting Gynea OPD of Mercy Teaching Hospital, Kuwait Teaching Hospital, Prime teaching Hospital and Dental OPD of Peshawar Dental Hospital.
- 18 to 40 years of pregnant patients.

Exclusion Criteria

Pregnant patients in labor pain

After fulfilling the inclusion criteria and the willingness of participants, each participant was asked questions mentioned in the questionnaire. The questionnaire consists of 5 parts i-e age, trimester, oral health assessment, oral health knowledge, oral hygiene practices and socioeconomic status. Oral health assessment included CPTIN index, in which a total of 6 teeth were examined using a CPITN probe (figure.3), 1 tooth in each sextant i-e 17/16 (upper right 1st or 2nd molar), 11 (upper right 1st incisor), 26/27(upper left 1st or 2nd molar), 36/37 (lower left 1st or 2nd molar), 31 (lower left 1st incisor) and 46/47 (lower right 1st or 2nd molar) (figure.4). Six sides of each tooth were examined and Codes were recorded. The modified Kuppuswamy socioeconomic scale by Saleem at el (2021) was used to determine the social class of pregnant patients. Pregnant patients were examined in sitting position slightly reclined for oral health assessment using CPITN probe.

Data Analysis

After the collection of data, it was entered and analyzed by using IBM-SPSS statistic version 23.0. Mean statistics and Standard deviation were calculated for age. Frequency and percentages were calculated for CPITN, Oral hygiene practices and oral health knowledge score. Pearson correlation was used to determine the correlation of oral hygiene practices and oral health knowledge with periodontal health (CPITN). Chi-square test was carried out to compare periodontal health, oral hygiene practices and oral health knowledge in different social classes during pregnancy.

Results

A total of 384 pregnant patients were included in this study following the inclusion criteria. Written Consent was taken from each pregnant patient before asking questions that were included in the questionnaire. Out of 384 majority of patients 314 (8.1.8%) fall in the category of 29-40 years of age group, followed by 70 (18.2%) in 18-28 years age group as shown in (Table 1). Out Of 384 pregnant patients, 264 (68.8%) were in 1st trimester, 64 (16.7%) in the 2nd trimester and 56 (14%) in 3rd trimester of their pregnancy (Table 2). To determine the periodontal health status of pregnant patients CPITN Index was used, carried out by CPTIN

probe. Out of 384 pregnant patients, 222 (57.8%) were having Code 0 (healthy periodontal status), followed by 75 (19.5%) having Code 3 (pocket depth 3.5 to 5.5), 66 (17.2%) pregnant patients having Code 2 (calculus), 21(5.5%) pregnant patients having Code 1(bleeding) and none of the pregnant patient was having Code 4 (pocket depth more than 5.5) (Table 3).

When the patients were asked about oral hygiene practices through a structured questionnaire, all 384 (100%) answered the questions. To the question asked about the frequency of tooth brushing majority of the patients 209 (54.4%) selected the option twice or more in a day. When asked about any aid used for cleaning majority of 321 (83.6%) selected toothbrush and paste alone. Further, when they were asked about the nature of toothbrushes either soft or hard, the majority of the patients 334 (87%) opted for soft brushes. When asked about changing their toothbrush majority 320 (83.3%) agreed they changed their brush within 3 months. When asked about the Interdental cleaning aid they mostly used, the majority of 325 (84.6%) selected none of the options given to them. (Table 4) . 3 point Likert scale was applied to oral hygiene practice questions and based on descriptive studies scoring less than 10 was considered poor oral hygiene practice, scoring from 10 to 12 was considered satisfactory and scoring more than 12 to 15 was considered good oral hygiene practice. The majority of the pregnant patients 325 (84.6) were having good oral hygiene practices, followed by 35 (9.1) having satisfactory and 24(6.3) were having poor oral hygiene practices (Table 5).

Oral health knowledge of pregnant women was evaluated by a structured questionnaire, in which 9 questions were asked by each patient. When asked if they were being aware of developing pregnancy gingivitis during pregnancy, 294 (76.6%) answered negatively followed by yes I am fully aware 70 (18.2%). When asked if they are "getting the dental checkup done during or before pregnancy", 54 (14.1%) answered, yes due to dental condition followed by No 30(7.8%). When they were inquired about having any signs of pregnancy gingivitis, 283 (73.7%) selected none of the options given followed by gum bleeding 49 (12.8%). When asked about what might be the cause of gingivitis during pregnancy? The most selected option was poor oral hygiene 130 (33.9%) followed by Hormonal changes 87 (22.7%). Furthermore, when they were asked what measure "they think can prevent Pregnancy gingivitis", daily tooth brushing along with flossing was the pick of the most by 256 (66.7%) followed by dental checkups during 2nd trimester 44 (11.5%). When the same patients were asked as per your knowledge, what is the treatment dentists provide for pregnancy gingivitis? Surprisingly 119 (31) selected the "No treatment need" option followed by medications 110 (28.6%). When asked about the effect of gingivitis on your oral health, 167 (43.5%) said tooth sensitivity followed by do not know 128 (33.3%). When asked about pregnancy gingivitis affecting the oral health of a newborn, 226 (58.9%) were undecided followed by no. it won't 92 (24%). When they were asked about "the adverse pregnancy outcome of pregnancy gingivitis", 270 (70.3%) were unaware of the effect followed by no effect 90 (23.4%) (Table 6).

According to the 5-point Likert scale applied, scoring was recorded as poor knowledge, satisfactory knowledge and good knowledge. On basis of descriptive studies 20 or less was considered poor, more than 20 to 35 was considered

satisfactory and more than 35 to 45 was considered to have good knowledge. Analyzing the results, out of 384 pregnant patients 22(5.7%) had good oral health knowledge, the majority 350 (91.1%) had satisfactory and 12 (3.1%) had poor oral health knowledge (Table 7).

The modified Kuppuswamy socioeconomic scale by Saleem, at el, & Jan, S. S. (2021) was used to determine the social class of pregnant patients included in the study. Out of 384 pregnant patients, 6 were from the upper social class, 120 were from an upper middle class, 190 were from the lower middle class, 66 were from the upper lower class and 2 were from the lower class (Table 8). Comparison of periodontal health, oral health knowledge and oral hygiene practices in different social classes during pregnancy. When Social class was compared with periodontal health, lower middle class had found the most healthy periodontal health state 112 (50.2%) followed by the upper middle class with 74 (33.2%). Bleeding status was mostly found in the lower middle class 29 (45.3%). While calculus and pocket depth amongst 3.5 to 5.5 was more common in lower middle class 36 (46.7%) and upper lower class 22 (28.6%) respectively (Table 9).

Table 1: Frequency of the participants in different age groups

Age Groups	N	%
18-28	70	18.2
29-40	314	81.8
Total	384	100.0

Table 2: Trimester Details

Trimester	n	%
First	56	14.6
Second	64	16.7
Third	264	68.8
Total	384	100.0

Table 3: CPITN Scoring

CPTIN CODES	N (%)
Healthy (x)	223 (58.1)
Bleeding (1)	20 (5.2)
Calculus (2)	66 (17.2)
pocket depth 3.5 to 5.5 (3)	75 (19.5)
Pocket more than 5.5 (4)	0
Total	384 (100)

Table 4: Oral Hygiene Practices

Practices:	N (%)
1.Frequency of cleaning teeth:	
1.Twice or more a day	209 (54.4)
2.Once or less a day	168 (43.8)
3.None	7 (1.8)
2.Tooth cleaning aid used:	
1. Toothbrush/paste with chewing stick	32 (8.3)
2.Toothbrush and paste alone	321 (83.6)
3.Chewing stick	31 (8.1)
3.Types of toothbrush used:	
1.Soft/medium	334 (87)
2.Hard	21 (5.5)
3.Didn't know	29 (7.6)
4.Frequency of changing toothbrush:	
1. 1-3 months	320 (83.3)
2. 4months or more	23 (6.0)
3. Not applicable	41 (10.7)
5.Interdental cleaning aid most often used:	
1.Dental floss	14 (3.6)
2.Toothpick/pin/ broomstick/fingernails	45 (11.7)
3.None	325 (84.6)

Table 6: Assessment of oral health knowledge in pregnant women

1. "Being aware about developing pregnancy gingivitis during pregnancy"	
1.Yes I am fully aware	70 (18.2)
2.Not fully aware, but heard it	20 (5.2)
3.No, I am not aware	294 (76.6)
2. "Getting the dental checkup done during or before pregnancy"	
1.Yes I did	6 (1.6)
2.Yes I planned to but did not go	2 (0.5)
3.Yes, due to dental condition	54 (14.1)
4.No, I didn't	30 (7.8)
5. None	20 (5.2)
3. "Do you have any following signs of pregnancy gingivitis"	
1.swollen & reddened gums	19 (4.9)
2.gum bleeding	49 (12.8)
3.bad breath	22 (5.7)

4.red spot over oral lining	11 (2.9)
5.none	283 (73.7)

4. "What may be the cause of gingivitis during pregnancy"

1.Hormonal changes	87 (22.7)
2.poor oral hygiene	130 (33.9)
3.malnutrition	23 (6.0)
4.traumatic tooth brushing	4 (1.0)
5.do not know	140 (36.5)

5. "Measures that you think can prevent Pregnancy gingivitis"

1.daily tooth brushing and flossing	256 (66.7)
2.dental checkup during 2nd trimester	44 (11.5)
3.balanced diet	30 (7.8)
4.monthly scaling	1 (0.3)
5.do not know	53 (13.8)

6. "What as per your knowledge, is the treatment dentists provide for pregnancy gingivitis"

1.professional scaling	80 (20.8)
2.medications	110 (28.6)
3.no TX needed	119 (31)
4. surgical removal of swollen gums	0
5.do not know	75 (19.5)

7. "What affect can pregnancy gingivitis have on your oral health"

1.periodontal diseases	39 (10.2)
2.tooth sensitivity	167 (43.5)
3.loose tooth	0
4.tooth decay	50 (13)
5.do not know	128 (33.3)

8. "Will pregnancy gingivitis affect the oral health of new born"

1.yes, it will	66 (17.2)
2.undecided	226 (58.9)
3.no. it won't	92 (24)

9. "What can be the adverse pregnancy outcome of pregnancy gingivitis"

1.preterm birth	2 (0.5)
2.don't know	270 (70.3)
3.cleft lip /cleft palate	3 (0.8)

4. malformation of bones	19 (4.9)
5.no effect	90 (23.4)

Table 5: Oral health Knowledge of pregnant women during pregnancy.

Knowledge score	n	%
Good	22	5.7
Satisfactory	350	91.1
Poor	12	3.1
Total	384	100.0

Table 8: Frequency of pregnant patients in different social classes

Social class	n	%
upper class	6	1.6
upper middle class	120	31.3
lower middle class	190	49.5
upper lower class	66	17.2
lower class	2	.5
Total	384	100.0

Table 9: Comparison of Periodontal health and social class

Social class		CPITN				Total N (%)
		Healthy N (%)	Bleeding N (%)	Calculus N (%)	Pocket depth 3.5 to 5.5 N (%)	
	upper class	2 (0.9)	0 (0)	2 (3.1)	2 (2.6)	6 (1.6)
	upper middle class	74 (33.2)	7 (35)	22 (34.4)	17 (22.1)	120 (31.3)
	lower middle class	112 (50.2)	13 (0.65)	29 (45.3)	36 (46.7)	190 (49.5)
	upper lower class	33 (14.8)	0 (0)	11 (17.2)	22 (28.6)	66 (17.2)
	lower class	2 (0.9)	0 (0)	0 (0)	0 (0)	2 (0.52)
Total		223 (100)	20 (100)	64 (100)	77 (100)	384 (100)

Discussion

As far as the researcher is aware, this is the first study to look at oral hygiene behaviours, knowledge, and status among pregnant women in Peshawar. The sample can be seen as representative of the target community because women from all socioeconomic levels and areas of Peshawar visit these hospitals for periodic checks, and the bulk of births take place there. It was encouraging to learn that the research participants washed their teeth on a daily basis & at the suggested frequency (twice or more). The majority of the participants informed brushing twice daily, which was greater than the results of a related research

among 'Tanzanian mothers35' but lower than those of a study that was piloted in Australia. [36] Three-quarters of people said they clean their teeth before going to bed and nearly all said they do so in the morning.

To achieve optimal dental health during pregnancy, plaque management methods including brushing, flossing, and expert prophylaxis like root planing would be helpful. The most often mentioned oral hygiene routine was brushing with toothpaste and chewing on Misswak chewing sticks. This could be due to the low cost of toothbrushes and Misswak as well as the fact that Sudanese people clean their teeth as part of their daily ritual of purification. In addition, using a toothbrush is less complicated than using other contemporary oral hygiene techniques like flossing.[1]

The key to lowering dental disease is encouraging & educating women to practice proper oral hygiene and offering accessible dental treatment. To inform women about the potential hazards & significance of maintaining excellent oral health, it may be necessary to make improving dental education a priority in prenatal care. The lack of severe periodontal disease and the low rate of bleeding were comparable to studies conducted in Uganda[37], the United Kingdom[38], and Sudan[39]. This study's primary periodontal issue was a pocket depth of 3.5 to 5.5, and the majority of cases required scaling and oral hygiene guidelines comparable to those in Iran, India, and Australia. About half of respondents said they had never seen a dentist before. This result is lower than that of studies done in Germany[41] and Denmark[42], but it is in agreement with one done in the United States of America[40]. Even though the majority of them said a visit to the dentist should occur every six months, the primary cause of the appointment was discomfort. The results of this study raise questions about dental care-seeking behaviours over the course of nine months, mainly as women may require additional periodontal treatment.

The study's most concerning conclusion was that the maximum of the individuals did not visit the dentists during pregnancy. Studies from Germany[41] and the United Kingdom[38] came to similar conclusions. Most people said they learned about dental health via family members, radio, TV and periodicals. This result was consistent with a survey of Kuwaiti mothers of first-graders[43], who stated that they mostly learned about dental health via TV and radio, with only 1/3rd claiming to have gotten instruction from a dentist.

As a result of the higher amounts of oestrogen and progesterone during pregnancy, which can cause oedema, hyperemia & bleeding of periodontal tissues, pregnant women may be more vulnerable to periodontal disease. [41] Although all pregnant women experience hormonal changes, not all of them also experience dental problems. As a result, other reasons, such as pre and prenatal oral health information and behaviours, might also be at play. [38] Although the majority of the evaluated sextants were fit and had essentially no shallow or deep pockets, the oral hygiene in the current investigation was satisfactory. These results were much better than those from Tanzani[35], Japan[44], and the UK[38]. One can surmise that because the expecting women in this study had generally good oral hygiene, they were at low risk of giving birth to LBW babies since poor periodontal health between pregnant women has been found to be a potential risk

factor for pre-term low birth weight babies. [45-48]

The relationship amongst socioeconomic status (SES) and dental health is widely documented[30–34], and several research have demonstrated the gradient of health improvement with increasing SES. Income, education, and employment have been utilized as conventional SES markers. Due to the hospitals' cheap fees, most of the participants in the current research were from the lower middle class, making up half of the participants (49.5%).

Conclusion

The majority of the participants used a toothbrush, toothpaste, and other oral hygiene products including toothpicks, dental floss, and mouthwash to clean their teeth twice a day. Many expectant mothers had not seen a dentist while they were expecting, and the majority had not been given advice on how to care for their own or their children's dental health. The most frequent treatment requirements included oral hygiene recommendations, filling, scaling, extraction of decaying teeth, & bridge and crown abutments. The implementation of early oral health education & health promotion of dental care usage through pregnancy are urgently needed.

Yet, there is still a difference between their degree of knowledge and behaviours. The majorities of the pregnant women in our research were having satisfactory knowledge and had good oral hygiene habits. For the management of excellent oral health throughout pregnancy, oral health education is crucial. Pregnant women must be the focus of oral health education because, in addition to the advantages to their own health, they play a significant role in teaching their children good habits and serving as role models for them. Two frequent oral health issues, dental caries and gum disease, should be addressed with targeted messages. It's crucial to emphasize how dental issues might affect a woman's pregnancy and the oral health of her unborn child.

References

1. Ali MH, mostafa Nurelhuda N. Oral health status and its determinants in children with leukaemia at the Radiation and Isotope Center Khartoum, Khartoum State, Sudan. Sudanese Journal of Paediatrics. 2019;19(2):93.
2. Andersson NW, Skov L, Andersen JT. Evaluation of topical corticosteroid use in pregnancy and risk of newborns being small for gestational age and having low birth weight. JAMA dermatology. 2021 Jul 1;157(7):788-95.
3. Annan BD, Nuamah K. Oral pathologies seen in pregnant and non-pregnant women. Ghana medical journal. 2005;39(1):24-7.
4. AYUB MA, QURESHI R. Periodontal conditions in pregnant and non-pregnant women in Karachi. Biomedica. 2017 May 18;26(1):20-4.
5. Bakhtiar K, Gharouni K, Gharouni B, Alavijeh FZ, Almasian M, Bakhtiar M, Bastami F. The effect of training interventions on the psychological factors of oral health in pregnant women. Electronic physician. 2017 Oct;9(10):5506.
6. Balan P, He HG, Cao F, Wong ML, Chong YS, Lopez V, Soh SE, Seneviratne CJ. Oral health in pregnant Chinese women in Singapore: a call to go beyond

the traditional clinical care. InHealthcare 2018 Jul 9 (Vol. 6, No. 3, p. 77). MDPI.

7. Batwala B, Mulogo EM, Arubaku W. Oral health status of school children in Mbarara, Uganda. African health sciences. 2007;7(4).

8. Bekkar B, Pacheco S, Basu R, DeNicola N. Association of air pollution and heat exposure with preterm birth, low birth weight, and stillbirth in the US: a systematic review. JAMA network open. 2020 Jun 1;3(6):e208243-.

9. Carneiro L, Kabulwa M, Makyao M, Mrosso G, Choum R. Oral health knowledge and practices of secondary school students, Tanga, Tanzania. International journal of dentistry. 2011 Oct;2011.

10. Davenport ES, Williams CE, Sterne JA, Murad S, Sivapathasundram V, Curtis MA. Maternal periodontal disease and preterm low birthweight: case-control study. Journal of dental research. 2002 May;81(5):313-8.

11. Deghatipour M, Ghorbani Z, Ghanbari S, Arshi S, Ehdayivand F, Namdari M, Pakkhesal M. Oral health status in relation to socioeconomic and behavioral factors among pregnant women: a community-based cross-sectional study. BMC Oral Health. 2019 Dec;19(1):1-0.

12. Ebrahimipour S, Ebrahimipoiur H, Alibakhshian F, Mohamadzadeh M. Effect of education based on the theory of planned behavior on adoption of oral health behaviors of pregnant women referred to health centers of Birjand in 2016. Journal of International Society of Preventive & Community Dentistry. 2016 Nov;6(6):584.

13. Fieß A, Schuster AK, Nickels S, Urschitz MS, Elflein HM, Schulz A, Münzel T, Wild PS, Beutel ME, Schmidtmann I, Lackner KJ. Association of low birth weight with altered corneal geometry and axial length in adulthood in the German Gutenberg Health Study. JAMA ophthalmology. 2019 May 1;137(5):507-14.

14. Gharehghani MA, Bayani A, Bayat AH, Hemmat M, Karimy M, Ahounbar E, Armoon B, Fakhri Y, Schroth RJ. Poor oral health-related quality of life among pregnant women: A systematic review and meta-analysis. International Journal of Dental Hygiene. 2021 Feb;19(1):39-49.

15. Ghazal M, Zaidi SJ, Riaz S, Farooqi WA. Influence of socio-cultural variables on periodontal conditions in pregnant Women. Pakistan Oral & Dental Journal. 2017 Jun 30;37(2):294-301.

16. Hakeem FF, Bernabe E, Sabbah W. Association between oral health and frailty: A systematic review of longitudinal studies. Gerodontology. 2019 Sep;36(3):205-15.

17. Kabali TM, Mumghamba EG. Knowledge of periodontal diseases, oral hygiene practices, and self-reported periodontal problems among pregnant women and postnatal mothers attending reproductive and child health clinics in rural Zambia. International journal of dentistry. 2018 Aug 7;2018.

18. Lakshmi SV, Srilatha A, Satyanarayana D, Reddy LS, Chalapathi SB, Meenakshi S. Oral health knowledge among a cohort of pregnant women in south India: A questionnaire survey. Journal of Family Medicine and Primary Care. 2020 Jun;9(6):3015.

19. Llena C, Nakdali T, Sanz JL, Forner L. Oral health knowledge and related factors among pregnant women attending to a primary care center in Spain. International journal of environmental research and public health. 2019 Dec;16(24):5049.

20. Milgrom P, Sutherland M, Shirtcliff RM, Ludwig S, Smolen D. Children's tooth decay in a public health program to encourage low-income pregnant women to utilize dental care. BMC Public Health. 2010 Dec;10(1):1-5.

21. Miyazaki H, Yamashita Y, Shirahama R, Goto-Kimura K, Shimada N, Sogame A, Takehara T. Periodontal condition of pregnant women assessed by CPITN. Journal of clinical periodontology. 1991 Nov;18(10):751-4.

22. Moreira AI, Sousa PR, Sarno F. Low birth weight and its associated factors. Einstein (Sao Paulo). 2018 Nov 8;16.

23. Parveen Z, Parveen S, Wassan IB, Rahoojo A, Surwaich A. Oral Health Status and Practice of Pregnant Women Attending Antenatal Clinics. Journal of The Society of Obstetricians and Gynaecologists of Pakistan. 2020 Aug 13;10(2):125-9.

24. Pattanshetti K, Kothari HP, Tiwari J, Malagi S, Pattanashetty S, Hinge K. Assessment of Knowledge and Attitude of Expectant Mothers Regarding Effect of Their Oral Health and Its Influence on the Infant Oral Health. International journal of clinical pediatric dentistry. 2020 Sep;13(5):471.

25. Penmetsa GS, Meghana K, Bhavana P, Venkatalakshmi M, Bypalli V, Lakshmi B. Awareness, attitude and knowledge regarding oral health among pregnant women: A comparative study. Nigerian medical journal: journal of the Nigeria Medical Association. 2018 Nov;59(6):70.

26. Petersen PE, Hadi R, Al-Zaabi FS, Hussein JM, Behbehani JM, Skougaard MR, Vigild M. Dental knowledge, attitudes and behavior among Kuwaiti mothers and school teachers. The Journal of pedodontics. 1990 Jan 1;14(3):158-64.

27. Petersen PE, Hadi R, Al-Zaabi FS, Hussein JM, Behbehani JM, Skougaard MR, Vigild M. Dental knowledge, attitudes and behavior among Kuwaiti mothers and school teachers. The Journal of pedodontics. 1990 Jan 1;14(3):158-64.

28. Petersen PE, Ogawa H. Strengthening the prevention of periodontal disease: the WHO approach. Journal of periodontology. 2005 Dec;76(12):2187-93.

29. Radnai M, Gorzo I, Nagy E, Urbán E, Eller J, Novak T, Pal A. The oral health status of postpartum mothers in South-East Hungary. Community dental health. 2007 Jun 1;24(2):111-6.

30. Radnai M, Gorzó I, Urbán E, Eller J, Novák T, Pál A. Possible association between mother's periodontal status and preterm delivery. Journal of clinical periodontology. 2006 Nov;33(11):791-6.

31. Rakchanok N, Amporn D, Yoshida Y, Harun-Or-Rashid MD, Sakamoto J. Dental caries and gingivitis among pregnant and non-pregnant women in Chiang Mai, Thailand. Nagoya J Med Sci. 2010 Feb 1;72(1-2):43-50.

32. Rateitschak KH. Tooth mobility changes in pregnancy. Journal of Periodontal Research. 1967 Jun;2(3):199-206.

33. Ringsdorf WM, Powell BJ, Knight LA, Cheraskin E. Periodontal status and pregnancy. American Journal of Obstetrics & Gynecology. 1962 Jan 15;83(2):258-63.

34. Rogers SN. Dental attendance in a sample of pregnant women in Birmingham, UK. Community dental health. 1991 Dec 1;8(4):361-8.

35. Romero BC, Chiquito CS, Elejalde LE, Bernardoni CB. Relationship between periodontal disease in pregnant women and the nutritional condition of their newborns. Journal of periodontology. 2002 Oct;73(10):1177-83.

36. Russell SL, Mayberry LJ. Pregnancy and oral health: a review and recommendations to reduce gaps in practice and research. MCN: The American Journal of Maternal/Child Nursing. 2008 Jan 1;33(1):32-7.
37. Sabatka S, Bhattacharyya I, Cohen DM, Hunter J. Oral health for the pregnant patient: a review. Access. 2000;14(4):41-4.
38. Saied-Moallemi Z, Virtanen JI, Ghofranipour F, Murtomaa H. Influence of mothers' oral health knowledge and attitudes on their children's dental health. European Archives of Paediatric Dentistry. 2008 Jun;9(2):79-83.
39. Sarifakioglu E, Gunduz C, Gorpelioglu C. Oral mucosa manifestations in 100 pregnant versus non-pregnant patients: an epidemiological observational study. European Journal of Dermatology. 2006 Nov 1;16(6):674-6.
40. Sarnat H, Kagan A, Raviv A. The relation between mothers' attitude toward dentistry and the oral status of their children. Pediatr Dent. 1984 Sep 1;6(3):128-31.
41. Scheutz F, Baelum V, Matee MI, Mwangosi I. Motherhood and dental disease. Community dental health. 2002 Jun 1;19(2):67-72.
42. Scheutz F, Baelum V, Matee MI, Mwangosi I. Motherhood and dental disease. Community dental health. 2002 Jun 1;19(2):67-72.
43. Shub A, Wong C, Jennings B, Swain JR, Newnham JP. Maternal periodontal disease and perinatal mortality. Australian and New Zealand Journal of Obstetrics and Gynaecology. 2009 Apr;49(2):130-6.
44. Sills ES, Zegarelli DJ, Hoschander MM, Strider WE. Clinical diagnosis and management of hormonally responsive oral pregnancy tumor (pyogenic granuloma). The Journal of reproductive medicine. 1996 Jul 1;41(7):467-70.
45. Soderling E, Isokangas P, Pienihäkkinen K, Tenovuo J. Influence of maternal xylitol consumption on acquisition of mutans streptococci by infants. Journal of Dental Research. 2000 Mar;79(3):882-7.
46. Thomas NJ, Middleton PF, Crowther CA. Oral and dental health care practices in pregnant women in Australia: a postnatal survey. BMC pregnancy and childbirth. 2008 Dec;8(1):1-6.
47. Turton M. Oral Health Status and Treatment Needs of Pregnant Women Attending Antenatal Clinics in KwaZulu-Natal, South Africa (2019).
48. World Health Organization. The incidence of low birth weight: an update. Weekly Epidemiological Record= Relevé épidémiologique hebdomadaire. 1984;59(27):205-11.