



# Assessment of Knowledge, Perception, Attitude, and Practices of Expectant and Lactating Mothers regarding their own as well as their Infants' Oral Health in Qassim Province, Kingdom of Saudi Arabia

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## ABSTRACT

**Objectives:** Assessing knowledge, perception, attitude, and practices of pregnant/lactating mothers concerning their own and their infants' oral health in relation to their oral health status and educational level.

**Materials and methods:** Anonymous self-administered questionnaire, 317 completed it, response rate=90.57%. It constituted sections for demography, evaluating oral health knowledge during pregnancy/postpartum, saliva-sharing behavior of mother with baby, infant-feeding practices, and perception of oral health knowledge and attitudes. Oral health condition was measured using decayed, missing, and filling, papillary, marginal, and attached gingiva, and simplified oral hygiene indices. Four scores were constructed from participants' responses to interpret results.

**Results:** Fair oral hygiene, moderate gingivitis, and caries index was the oral health status, with negative correlation with educational level. About 66.88% had poor perception and practices toward their oral health during pregnancy, with significant difference and negative correlation with oral health status. Significant difference ( $P<0.001$ ) & positive correlation was detected regarding knowledge about causes of oral/dental problems and oral health attitude in relation to level of education with 58.68% poor knowledge and negative attitude. Above three quarters had poor knowledge and practices and negative attitude for their infants' oral health, with significant result and positive correlation with educational level. Poor perception (54.26%) was recorded regarding causes of oral/dental diseases, methods of tooth cleaning, and types and benefits of using toothpaste in relation to oral health status with a significant difference and negative correlation.

**Conclusion:** Data revealed that expectant and lactating mothers had poor knowledge, perception and practices, and negative attitude toward their oral health during pregnancy and postpartum as well as their children's oral health.

**Keywords:** Attitude, DMFT index, Expectant and lactating mothers, Knowledge, Perception, Practices, OHI-S index, Oral health, PMA index.

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## INTRODUCTION

Oral health care is an essential feature of general health care that has an influence on the quality of life and health consequences in infants and children.<sup>1</sup> In children, it is an essential aspect in the prevention of dental caries, which is the most prevalent childhood dental problem.<sup>2</sup>

Mothers are an essential source of early learning in children concerning good hygiene and healthy nutritional procedures.<sup>1</sup> So, pediatric oral health care should commence perfectly with prenatal oral health advising for parents, particularly mothers who commonly spend extra time with their children. The first oral examination is recommended at the time of the eruption of the first tooth and not delayed than 12 months of age.<sup>3</sup> There is growing proof signifying that to be successful in preventing dental disease, preventive interferences must commence within the first year of life.<sup>4,5</sup>

These interferences foster healthy dietary habits, enable proper monitoring of the developing dentition and occlusion, prevent dento-facial accidental injuries, and determine oral habits that may be harmful to occlusal development and general health of the oral tissues.<sup>3,6</sup> Thus, the level of knowledge of pediatric oral health care of mothers will pinpoint their competence to impose and improve such behaviors in their children.<sup>7</sup>

The perinatal stage is explained as the period around the time of birth, starting with the accomplishment of the 20th throughout 28th week of pregnancy and ending 1 to 4 weeks following birth.<sup>8</sup> Perinatal oral health plays a vital role in the general health and prosperity of pregnant women.<sup>9</sup> Many women do not request dental care during their pregnancy, and those that do regularly encounter reluctance of dentists to provide care.<sup>10-13</sup> Many expectant mothers are unacquainted of the consequences of poor oral health for themselves, their pregnancy, and/or their unborn child.<sup>13-15</sup>

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The extreme inflammatory reaction of the gums to bacterial plaque identified as pregnancy gingivitis has been referred to the increased secretion of gestational hormones particularly estrogen and progesterone during pregnancy.<sup>16,17</sup> Bacterial plaque formation can be prohibited by consistent tooth brushing, the usage of dentifrices as well as dental education. Moreover, appropriate diet and healthy lifestyle play an imperative role in the overall wealth of the mother to be.<sup>17</sup> The necessity to eat a balanced diet with plenty of fruits cannot be stressed enough. Unfortunately, the pregnant condition may predispose to unhealthy behaviors such as licking sweets to reduce nausea that will afford an appropriate substrate for cariogenic bacteria and may predispose to increased tooth decay in some individuals.<sup>18</sup>

In addition, mothers with poor oral health and high levels of cariogenic oral bacteria are at superior risk for infecting their children with the bacteria and intensifying their children's caries risk at an early age.<sup>19</sup> Dental caries in infants is a disease that commonly is preventable. Defining those mothers at highest risk for transmitting cariogenic bacteria to their children enhances chances for preventive interference.<sup>20</sup>

The essential goal of perinatal oral health care, concerning the transmission of caries, is to reduce the numbers of cariogenic bacteria in pregnant women's mouth so that mutans streptococci (MS) colonization of the infant can be postponed as long as feasible.<sup>21</sup> Appropriate delivery of educational information and preventive therapies to these parents can diminish the incidence of early childhood caries (ECC), restrain the necessity for dental rehabilitation, and enhance the oral health of their children.<sup>22-24</sup> Physicians, nurses, and other health care professionals are most probably to see expectant or new mothers and their infants than are dentists. Consequently, it is fundamental that these providers be perceptive of the infectious etiology and concomitant risk factors of dental caries and ECC, make proper decisions with regard to appropriate and efficient interferences for pregnant women, and enable the foundation of a dental home.<sup>25-27</sup>

However, no qualitative researches have investigated the oral health experiences of pregnant and parenting adolescent women in the Saudi society, that is, the purpose of the present study that used to assess the knowledge, perception, attitude, and practices concerning pregnant and lactating women's oral health and their infants' oral health receiving pre- and postnatal care at Buraidah Maternity and Pediatric hospital in relation to their oral health status and level of education. The results obtained would serve as baseline data for planning an oral health education program aimed at improving the oral health of expectant and lactating mothers.

Specifically, it would identify areas of deficiency in the women's knowledge, perception, attitude, and practices, and this would be beneficial in creating the content of the oral health education messages.

## MATERIAL AND METHODS

A cross-sectional study was conducted at Buraidah Maternity and Pediatric hospital, a Governmental Hospital in Qassim Province, KSA, which is frequented by pregnant women and lactating mothers from all regions of the central region, between January and March 2015, after obtaining a prior permission from the concerned authorities as well as the approval of the Dental Ethical Committee for the study protocol. The study sample was randomly selected from pregnant women and mothers of children up to 1 year of age. The pregnant females were selected from the antenatal department and the mothers were chosen when they use to come for immunization or pediatric visit at the hospital. After being disclosed the nature of the study, a total of 350 ladies signed the approval to participate in the study through an informed consent form and participated in the study by completing an anonymous self-administered structured questionnaire. Subjects who were not willing to contribute in the study and mothers of children with congenital anomalies and twins were excluded. Three hundred seventeen participants properly completed the questionnaires, while 33 questionnaires had several uncompleted sections and were thus rejected with a response rate = 90.57%.

The questionnaire was translated into Arabic language and filled by the investigator to prevent bias, then it was pre-tested on randomly selected 35 expectant and lactating mothers (10%) to allow for refinement of the questions in order to facilitate answering and to ensure its comprehension, practicability, validity, interpretation of responses, and reliability (Cronbach's alpha  $\alpha=0.875$ ).

The questionnaire used a simple tick-box format, with sections for demographic items (such as age, level of education, occupation, number of children, and current situation). There were 14 questions in the 2nd section evaluating the oral health knowledge of the respondents during pregnancy and three questions postpartum. The third section constituted four questions with regard to saliva-sharing behavior of the mother with the baby, the oral cleansing methods for the infant and the mothers' knowledge about the age of eruption of first tooth. The fourth section enquired about infant-feeding practices (eight questions). The last section asked about the perception of oral health knowledge and attitudes of the contributors.

Finally, the oral health condition of the participants was measured using decayed, missing, and filling (DMFT) index for caries measurement,<sup>28</sup> as well as papillary, marginal, and attached gingiva (PMA) index for periodontal status,<sup>29</sup> and lastly the simplified oral hygiene (OHI-S) index for oral hygiene status.<sup>30</sup>

In order to simply interpret the results, four scores were constructed from the participants' responses. The first one was "perception & practices of oral health during pregnancy"; this score was created by counting the total number of the correct answers given by the contributors. Consequently, the perception and practices score was in an interval scale and ranged from 0 to 6, the maximum attainable score was 5, with a higher perception and practices score signifying better dental knowledge. The perception and practices scores were regrouped into two categories: those with good perception and practices and those with poor perception and practices. Thus, a score of 3 and above was graded as good perception, while 2 and below was graded as poor perception. The second score was "knowledge about causes of oral & dental problems and attitude toward oral health"; this score was constructed similarly as the previous score. The knowledge and attitude score ranged from 0 to 9, with a mean score of 4.5. Based on the mean score, the knowledge and attitude scores were aggregated into two categories: those with good knowledge and positive attitude (score of 6 and above) in addition to those with poor knowledge and negative attitude (score of 5 and below). Similarly, the 3rd and 4th scores were calculated where the third one was related to "knowledge, attitude & practices about infants' oral health" with a range from 0 to 12, the maximum achievable score was 9. Regrouping of the knowledge, attitude, and practices scores resulted in two categories: 6 and above was graded as high knowledge, positive attitude, and practices, while 5 and below was graded as low knowledge, negative attitude, and practices. The fourth score was "perceived causes of oral & dental diseases, methods of tooth cleaning, types and benefits of using toothpaste" that ranged from 0 to 18, with a maximum of 16. So, 9 and above was graded as high perception, and 8 and below was graded as low perception.

In addition, for the point of analysis, the level of education was classified as low (illiterate), middle (middle and secondary education), and high (university and graduated). Moreover, caries measurement (DMFT Score) was also categorized as low (DMT 1-7), moderate (DMT 8-15), and high (DMT 16-32). Whereas the OHI-S was scored as followed<sup>30</sup> 0=excellent oral hygiene, 0.1-1.2=good oral hygiene, 1.3-3.0=fair oral hygiene, and 3.1-6.0=poor oral hygiene. Finally, the modified PMA Index was scored as<sup>29</sup> 0=No gingivitis, 0.1-1=Mild gingivitis, 1.1-2=Moderate gingivitis, and 2.1-3=Severe gingivitis.

## Statistical Analysis

Statistical analysis was conducted using the SPSS program (SPSS 19.0 for windows; SPSS Inc., Chicago, USA). All statistical analyses were carried out at a significance level less than 0.05 and 0.01. The data were analyzed for frequency distributions. Data were subjected to descriptive statistics such as frequencies, percentages, and cross-tabulation. The Chi-square test for association between studied variables and oral health status as well as level of education was performed, and finally, Pearson's correlation coefficient was used to investigate associations between variables.

## RESULTS

Three hundred seventeen contributors have accurately fulfilled the questionnaires. The mean age of respondents was 29.77 years, SD  $\pm$  6.13 years; range 17 to 41 years. Regarding the level of education of the participants, 19.24% were illiterate, 41.96% were middle and secondary school educated, and 38.80% were university educated and graduated. Moreover, 69.40% were housewives, 25.87% employees, 1.89% professionals, and 2.84% were students.

Table 1 reveals the current status and oral health situation of the participants, and the majority of the contributors (62.78%) had one to three children. Concerning the current situation of the studied subjects, 73.82% were pregnant and 26.18% were lactating. Among the pregnant females, 65.38% were in the 3rd semester, 20.51% in the 2nd semester, and only 14.10% in the 1st semester. With regard to the oral health status, the mean value of OHI-S index was found to be 1.35; PMA index was 1.39 indicating fair oral hygiene and moderate gingivitis respectively, while mean DMFT was 10.37 representing moderate caries index. Moreover, caries prevalence among the studied group was found to be 100% with the decayed component contributed maximum (90.85%) followed by

**Table 1:** Current situation and oral health status of the participants

Variable		Frequency	Percent
Number of children (N=317)	No children	6	1.89
	One – Three	118	62.78
	More than three	112	35.33
Current situation (N=317)	Lactating	83	26.18
	Pregnant	234	73.82
Trimester (N=234)	1 <sup>st</sup> trimester	33	14.10
	2 <sup>nd</sup> trimester	48	20.51
	3 <sup>rd</sup> trimester	153	65.38
			<i>Mean</i>
Oral health status (N=317)	DMFT Index		10.37
	OHI-S Index		1.35
	PMA Index		1.39

**Table 2:** Dental and oral health status of the participating women in relation to their level of education

Level of Education		DMFT Index				$\chi^2$ (p)
		Low	Moderate	High	Total	
Low	Count	12	46	3	61	27.741* (0.000)
	% within level of education	19.67	75.41	4.92	19.24	
Middle	Count	52	55	26	133	41.96
	% within level of education	39.10	41.35	19.55	41.96	
High	Count	52	63	8	123	38.80
	% within level of education	42.28	51.22	6.50	38.80	
Total	Count	116	164	37	317	100
	% within level of education	36.59	51.74	11.67	100	

Level of Education		OHI-S Index				$\chi^2$ (p)	
		Excellent oral hygiene	Good oral hygiene	Fair oral hygiene	Poor oral hygiene		Total
Low	Count	0	23	27	11	61	67.451* (0.000)
	% within level of education	0.00	37.70	44.26	18.03	19.24	
Middle	Count	9	51	70	3	133	41.96
	% within level of education	6.77	38.35	52.63	2.26	41.96	
High	Count	17	78	28	0	123	38.80
	% within level of education	13.82	63.41	22.76	0.00	38.80	
Total	Count	26	152	125	14	317	100
	% within level of education	8.20	47.95	39.43	4.42	100	

Level of Education		PMA Index				$\chi^2$ (p)	
		No gingivitis	Mild gingivitis	Moderate gingivitis	Severe gingivitis		Total
Low	Count	3	8	24	26	61	59.522* (0.000)
	% within level of education	4.92	13.11	39.34	42.62	19.24	
Middle	Count	15	39	23	56	133	41.96
	% within level of education	11.28	29.32	17.29	42.11	41.96	
High	Count	18	58	38	9	123	38.80
	% within level of education	14.63	47.15	30.89	7.32	38.80	
Total	Count	36	105	85	91	317	100
	% within level of education	11.36	33.12	26.81	28.71	100	

\*p&lt;0.001

filled component (73.50%) and lastly missing component (72.56%).

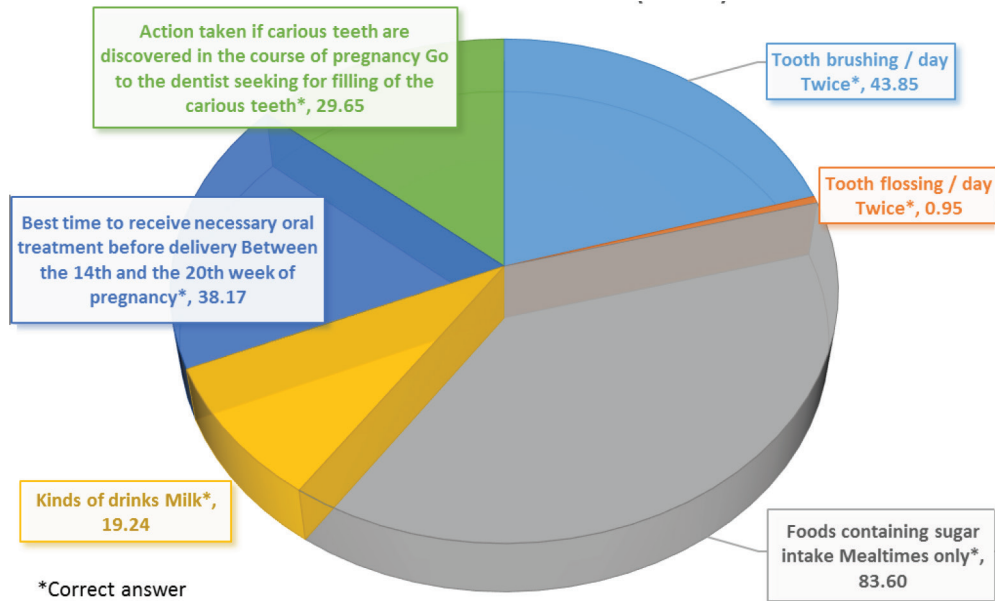
Data in Table 2 represent the relation between the level of education of the contributing mothers and their dental and oral health status. A statistical significant difference was found between the level of education and the participants' dental and oral health in the form of DMFT index ( $\chi^2=27.741^*$ ,  $p=0.000$ ), OHI-S index ( $\chi^2=67.451^*$ ,  $p=0.000$ ), and PMA index ( $\chi^2=59.522^*$ ,  $p=0.000$ ) with the higher the level of education the better the condition either dental or oral.

Pie Chart 1 displays the mothers' perception and practices of oral health during pregnancy. It was found that only 0.95% of the participants practicing tooth flossing/day (twice) correctly, and 43.85% replied that they performing tooth brushing twice/day. Moreover, merely 19.24% perceived that milk is the kind of drinks they have to receive during pregnancy. Regarding the best time to receive necessary oral treatment before delivery, just 38.17% of the contributors answered correctly and

for the action that has to be taken if carious teeth are discovered in the course of pregnancy, only 29.65% registered that they have to go to the dentist for filling of the carious teeth. Finally, the majority of the studied subjects (83.60%) perceived that foods containing sugar intake should be mealtimes only.

Table 3 demonstrates the relation between the respondents' oral health perception and practices during pregnancy and their oral health status. It was found that about two-thirds (66.88%) of the contributing mothers had poor perception and practices toward their oral health during pregnancy, while one-third of the participants (33.12%) recorded good perception and practices. A statistically significant difference was detected between oral health perception and practices in relation to dental and oral health status in the form of DMFT index ( $\chi^2=8.856^*$ ,  $p=0.012$ ), OHI-S index ( $\chi^2=11.784^{**}$ ,  $p=0.008$ ) as well as PMA index ( $\chi^2=13.927^{**}$ ,  $p=0.003$ ). Considering caries measurement, high DMFT score constituted the highest percentage for the participating women whether

**Pie Chart 1: Mothers' perception and practices of oral health during pregnancy (N=317)**



they disclosed poor perception and practices (52.83%) or good perception and practices (40.95%) for their oral health during pregnancy. Furthermore, related to oral hygiene status of the contributors, “good” as well as “fair” oral hygiene categories were the most prominent conditions of the sharing women either with poor (42.92%

and 45.28% respectively) or good (58.10% and 27.62% respectively) perception and practices. With regard to the PMA index, the highest percentage of the involved women had mild gingivitis either with poor perception and practices (33.02%) or with good perception and practices (33.33%).

**Table 3: Scoring of mothers' perception & practices of oral health during pregnancy in relation to their oral health status**

Scoring of perception & practices of oral health during pregnancy		DMFT Index				Total	$\chi^2$ (p)
		Low	Moderate	High	Total		
Poor perception and practices	Count	23	77	112	212	8.856* (0.012)	
	% within Scoring	10.85	36.32	52.83	66.88		
Good perception and practices	Count	24	38	43	105	33.12	
	% within Scoring	22.86	36.19	40.95	33.12		
Total	Count	47	115	155	317	100	
	% within Scoring	14.83	36.28	48.90	100		

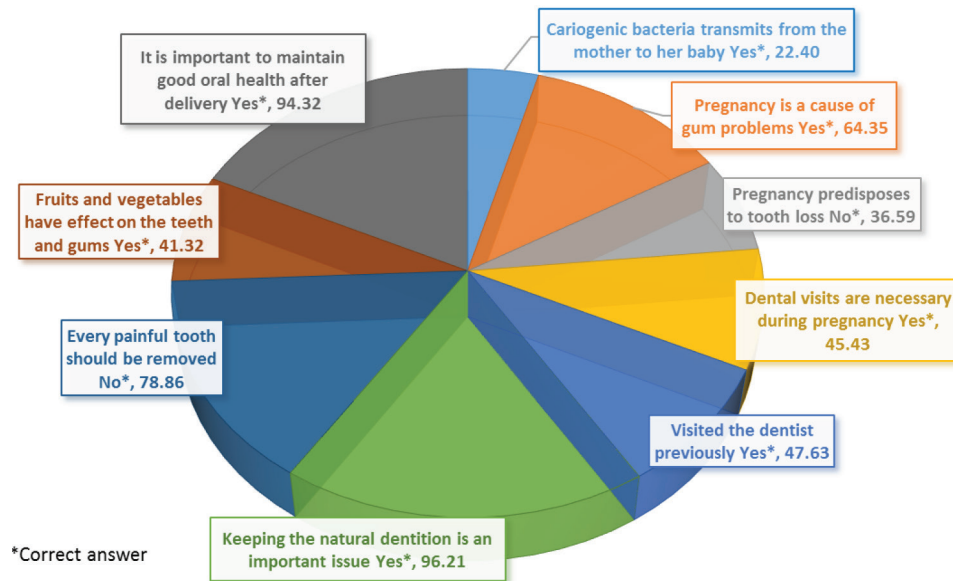
Scoring of perception & practices of oral health during pregnancy		OHI-S Index				Total	$\chi^2$ (p)
		Excellent oral hygiene	Good oral hygiene	Fair oral hygiene	Poor oral hygiene		
Poor perception & practices	Count	14	91	96	11	212	11.784** (0.008)
	% within Scoring	6.60	42.92	45.28	5.19	66.88	
Good perception & practices	Count	12	61	29	3	105	33.12
	% within Scoring	11.43	58.10	27.62	2.86	33.12	
Total	Count	26	152	125	14	317	100
	% within Scoring	8.20	47.95	39.43	4.42	100	

Scoring of perception & practices of oral health during pregnancy		PMA Index				Total	$\chi^2$ (p)
		No gingivitis	Mild gingivitis	Moderate gingivitis	Severe gingivitis		
Poor perception & practices	Count	15	70	65	62	212	13.927** (0.003)
	% within Scoring	7.08	33.02	30.66	29.25	66.88	
Good perception & practices	Count	21	35	20	29	105	33.12
	% within Scoring	20.00	33.33	19.05	27.62	33.12	
Total	Count	36	105	85	91	317	100
	% within Scoring	11.36	33.12	26.81	28.71	100	

\*p<0.05; \*\*p<0.001

**Pie Chart 2:** Knowledge of participants about causes of oral & dental problems as well as their attitude toward oral health



Pie Chart 2 depicts the knowledge of the participants about causes of oral and dental problems as well as their attitude toward oral health. The results revealed that only 22.40% of women knew that cariogenic bacteria transmit from the mother to her baby through intimate contact and just 36.59% recognized that pregnancy does not predispose to tooth loss. Moreover, the majority of the sharing women had positive attitude toward oral health in the form of keeping the natural dentition is an important issue (96.21%), the importance of maintaining good oral health after delivery (94.32%) and that it is not necessary to remove every painful tooth (78.86%). On the contrary, negative attitude was represented through dental visits, as only 45.43% of mothers stated that dental visits are necessary during pregnancy and 47.63% reported that they visited the dentist previously.

Considering the relationship between the respondents' knowledge about causes of oral and dental problems as well as their attitude toward oral health in relation to their level of education, 58.68% were found to have poor knowledge and negative attitude, while 41.32% of mothers held good knowledge and positive attitude

with a statistically significant difference between groups ( $\chi^2=20.039^*$ ,  $p=0.000$ ). Referring to the results, it was found that 40.32% of sharing mothers had poor knowledge and negative attitude, though they had high level of education, Table 4.

Enquiry about knowledge, attitude, and practices of participant mothers about their infants' oral health, Table 5 revealed that the majority of women (71.29%) knew that their babies' first teeth erupted at age of 6 months. On the contrary, merely 5.99% stated that they cleaned the dropped pacifier or toy by washing with water, and only 32.18% said that they did not share the spoons or other utensils with the baby. Moreover, just 38.30% of the mothers recognized that the infants' gum pads should be cleaned with wet gauze. Interpreting the infant feeding practices, the majority (82.33%) registered that they did not use sweetened pacifier, while more than half of the participants (58.99%) did not practice sugar contains milk/fluid, and only about one-third of mothers (33.75%) did not apply nocturnal bottle feeding. In addition, asking about dental visits, just 12.30% of mothers recorded that the first visit of the child to dentist

**Table 4:** Scoring of knowledge of mothers' about causes of oral and dental problems as well as their attitude toward oral health in relation to their level of education

Scoring of knowledge about causes of oral and dental problems as well as attitude of mothers' toward oral health		Level of education				$\chi^2$ (p)
		Low	Middle	High	Total	
Poor knowledge and negative attitude	Count	49	62	75	186	20.039* (0.000)
	% within Scoring	26.34	33.33	40.32	58.68	
Good knowledge and positive attitude	Count	12	71	48	131	
	% within Scoring	9.16	54.20	36.64	41.32	
Total	Count	61	133	123	317	
	% within Scoring	19.24	41.96	38.80	100	

\*p<0.001

**Table 5:** Knowledge, attitude, and practices of participants about their infants' oral health (N= 317)

Variable			Frequency	Percent
The age of eruption of first tooth		At 6 months*	226	71.29
Saliva-sharing behavior of mother with baby	Spoons or other Utensils	Not shared with the baby*	102	32.18
	Dropped Pacifier or Toy	Cleaning by washing with water*	19	5.99
Methods of cleaning gum pads for infants		With wet gauze*	123	38.80
Infant feeding practices	Use of sweetened pacifier	No*	261	82.33
	Sugar contains milk/fluid	No*	187	58.99
	Nocturnal bottle feeding	No*	107	33.75
Dental visits	Child's first visit to the dentist	When the first (milk) tooth erupts*	39	12.30
	Reason for child's visit to dentist	For routine check-up twice a year*	74	23.34
Oral Cleansing Methods for the child	When should you start cleaning your child's teeth?	When one (milk) tooth erupts*	57	17.98
	What should be used in cleaning a baby's teeth?	Small soft round nylon wet brush without toothpaste*	54	17.03
	When should children start brushing by themselves?	8 years*	35	11.10

\*The correct answer

should be when the first (milk) tooth erupted, and 23.34% stated that the reason for child's visit to dentist is for routine check-up and it should be twice a year, indicating poor knowledge and negative attitude toward their infants' oral health. With regard to oral cleansing methods of the child, only 17.98% registered that they started cleaning their child's teeth when one (milk) tooth erupted and 17.03% cleaned the bay's tooth with small soft round nylon wet brush without toothpaste, again signaling poor knowledge and practices, while 11.10% recorded that children should start brushing by themselves at 8 years old.

The relationship between scoring of knowledge, attitude, and practices of mothers' about their infants' oral health and their level of education is demonstrated in Table 6. It was found that more than three quarters of the participants (79.18%) possessed poor knowledge and practices as well as negative attitude toward their infants' oral health, while merely 20.82% of them had good knowledge and practices as well as positive attitude, with a statistically significant results between groups ( $\chi^2=31.959^*$ ,  $p=0.000$ ). Concerning level of education, it was detected that less than one quarter (24.30%) of the participants with low education level had poor knowledge and practices in addition to negative attitude

meaning that though the participating women had high and middle levels of education they owned poor knowledge and practices and negative attitude toward their infants' oral health.

Perceived causes of oral and dental diseases as well as methods of tooth-cleaning types and benefits of using toothpaste are presented in Table 7. Results revealed that just 5.99% of women perceived that dental caries is caused as a result of presence of bacterial plaque and also 28.08% registered that plaque causes gum diseases. On the contrary, dental floss and other interdental cleaning aids was perceived by merely 13.56% of the sharing women as one of the appropriate methods used daily for tooth cleaning to prevent dental caries. With regard to the types of toothpastes usually used, a low perception was recorded among the study group concerning the anti-plaque (7.89%), the anti-calculus (11.04%), the whitening (14.83%) and the desensitizing (37.54%) types of toothpastes, while the situation for fluoridated toothpastes was not much better as only 50.79% of the contributors distinguished this type of toothpastes. Moreover, the involved women realized the benefits of using toothpaste, where 81.70% registered that they prevented dental decay, 76.34% recorded that they make the mouth clean and fresh, and 50.79% disclosed that they prevent gum diseases.

**Table 6:** Scoring of knowledge, attitude, and practices of participants about their infants' oral health in relation to their level of education

Scoring of knowledge, attitude, and practices of participants about their infants' oral health		Level of education				$\chi^2$ (p)
		Low	Middle	High	Total	
Poor knowledge, negative attitude, and practices	Count	61	110	80	251	31.959* (0.000)
	% within Scoring	24.30	43.82	31.87	79.18	
Good knowledge, positive attitude, and practices	Count	0	23	43	66	
	% within Scoring	0.00	34.85	65.15	20.82	
Total	Count	61	133	123	317	
	% within Scoring	19.24	41.96	38.80	100	

\* $p < 0.001$



**Table 7:** Perceived causes of oral and dental diseases as well as methods of tooth cleaning, types, and benefits of using toothpaste

Variable		Frequency	Percent
Causes of dental caries (Multiple Response)	Sugar/sweet foods*	282	88.96
	Poor oral hygiene*	251	79.18
	Bacterial Plaque*	19	5.99
Causes of gum diseases (Multiple Response)	Bacterial Plaque*	89	28.08
	Calculus/tartar*	146	46.06
	Poor oral hygiene*	181	57.10
The appropriate methods used daily for tooth cleaning to prevent dental diseases (Multiple Response)	Miswak*	135	42.59
	Toothbrush and toothpaste*	276	87.07
	Dental floss and other interdental cleaning aids*	43	13.56
	Mouthrinses*	90	28.39
Types of toothpastes usually used (Multiple Response)	Fluoridated*	161	50.79
	Desensitizing*	119	37.54
	Anti-calculus*	35	11.04
	Anti-plaque*	25	7.89
	Whitening*	47	14.83
Benefits of using toothpaste (Multiple Response)	Makes the mouth clean and fresh*	242	76.34
	Prevents Dental decay*	259	81.70
	Prevents gum disease*	161	50.79

\*The correct answer

Table 8 summarizes scoring of perceived causes of oral and dental diseases, methods of tooth cleaning, and types and benefits of using toothpaste in relation to respondents' oral health status. Results revealed that 54.26% of the mothers had poor perception, while good perception constituted 45.74% of the participants with a statistically significant difference between groups regarding mothers' oral health status measured through

**Table 8:** Scoring of perceived causes of oral and dental diseases, methods of tooth cleaning, types, and benefits of using toothpaste in relation to respondents' oral health status

Scoring of perceived causes of oral and dental diseases, methods of tooth cleaning, types, and benefits of using toothpaste		DMFT Index				$\chi^2$ (p)
		Low	Moderate	High	Total	
Poor perception	Count	26	55	91	172	3.176 (0.204)
	% within Scoring	15.12	31.98	52.91	54.26	
Good perception	Count	21	60	64	145	
	% within Scoring	14.48	41.38	44.14	45.74	
Total	Count	47	115	155	317	
	% within Scoring	14.83	36.28	48.90	100	
Scoring of perceived causes of oral and dental diseases, methods of tooth cleaning, types, and benefits of using toothpaste		OHI-S Index				$\chi^2$ (p)
		Excellent oral hygiene	Good oral hygiene	Fair oral hygiene	Poor oral hygiene	
Poor perception	Count	14	65	84	9	17.097* (0.001)
	% within Scoring	8.14	37.79	48.84	5.23	
Good perception	Count	12	87	41	5	
	% within Scoring	8.28	60.00	28.28	3.45	
Total	Count	26	152	125	14	
	% within Scoring	8.20	47.95	39.43	4.42	
Scoring of perceived causes of oral and dental diseases, methods of tooth cleaning, types, and benefits of using toothpaste		PMA Index				$\chi^2$ (p)
		No gingivitis	Mild gingivitis	Moderate gingivitis	Severe gingivitis	
Poor perception	Count	15	43	57	57	17.976* (0.000)
	% within Scoring	8.72	25.00	33.14	33.14	
Good perception	Count	21	62	28	34	
	% within Scoring	14.48	42.76	19.31	23.45	
Total	Count	36	105	85	91	
	% within Scoring	11.36	33.12	26.81	28.71	

\*P<0.001



OHI-S ( $\chi^2 = 17.097^*$ ,  $p = 0.001$ ) and PMA Index ( $\chi^2 = 17.976^*$ ,  $p = 0.000$ ), while no statistical difference was recorded pertaining to dental caries ( $\chi^2 = 3.176$ ,  $p = 0.204$ ). Results disclosed that 48.84% of mothers with fair oral hygiene had poor perception. In addition, the sharing women with poor perception suffered from moderate and severe gingivitis (33.14%, both).

Table 9 represents Pearson's correlation coefficient between different studied variables. The results revealed strong negative correlation between the level of education of the contributing women and their oral health condition in the form of caries measurement (DMFT index), oral hygiene (OHI-S index), and gingival status (PMA index), as the high educated participants had better oral health status (low OHI-S and PMA indices scores) and low caries index. In addition, a strong correlation was detected between level of education and "Scoring of knowledge of mothers' about causes of oral & dental problems as well as their attitude toward oral health" and "Scoring of knowledge, attitude & practices of participants about their infants' oral health." Furthermore, regarding the oral health status of the participants evaluated through the OHI-S and PMA indices, a negative correlation was obtained with "Scoring of mothers' perception and practices of oral health during pregnancy" and "Scoring of Perceived causes of oral & dental diseases, methods of tooth cleaning, types and benefits of using toothpaste."

## DISCUSSION

Pregnancy and pregnant women create an exceptional challenge to dentists, not only for the reason of some oral alterations as consequences of the physiological alterations that arise during pregnancy but also the general as well as the oral health of their fetus in the stages of growth do become a matter of interest.<sup>31</sup> Emerging evidence has revealed that periodontal disease may be related with pre-term low birth weight,<sup>32</sup> growth retardation,<sup>33</sup> and preeclampsia.<sup>34</sup> It is important to evaluate the knowledge and attitudes of expectant and lactating mothers regarding different items concerned with infant oral health.<sup>35</sup> As mothers are the child's primary caregiver, they should be sufficiently subjected to oral health care issues that will be eventually conveyed to the child.<sup>36</sup> Parental behavioral aspects govern the oral health condition of their children and consequently they should be sufficiently well-informed on prevention of oral diseases.<sup>37</sup> This should be achieved during the first 2 years of the child's life, which is the most influential period.<sup>38</sup> Outcome from this study revealed that the participating women had fair oral hygiene (mean OHI-S index = 1.35), moderate gingivitis (mean PMA index = 1.39) as well as moderate caries index (mean DMFT index = 10.37)

with a negative correlation between the level of education and the oral health status of the participants, as the higher the level of education of mothers, the better the oral conditions and low caries index. The decayed component contributed maximum in the DMFT index meaning that they have unmet restorative treatment needs. These results are not in accord with that of a previous study carried out among Saudi pregnant women<sup>39</sup> in which dental restorations were the most repeatedly registered treatment received by these antenatal ladies.

With regard to the oral health perception and practices, the participants in the current study displayed poor perception and practices on the subject of their oral health throughout pregnancy. Flossing was not regularly performed by the participants; most of them declared that they never flossing, this may be due to insufficient knowledge, absence of motivation, little time, and deficiency of skill. These results are in accord with that previously reported by Fadavi et al,<sup>15</sup> where they found that the pregnant African American and Hispanic women had restricted knowledge of oral health practices as tooth brushing and flossing. Moreover, in the current study, tooth flossing (0.95%) is found to be less often than brushing (43.85%), which is consistent with earlier studies.<sup>15,40</sup> Nearly half of the participants practicing tooth brushing twice per day; the results are to somewhat more than that was reported by Abiola et al.<sup>18</sup> These findings explain the prominence of "good" or "fair" oral hygiene of the mothers. On the contrary, the contributors suffered from mild gingivitis that may be as a result of ignoring flossing. A negative correlation was registered between the oral health status of the participants evaluated through the OHI-S and PMA indices and oral health perception and practices score. Results of the present study showed that the contributing females possessed high DMFT score whether they revealed poor or good perception and practices for their oral health during pregnancy, meaning ignorance of proper methods of dental care, though some of them had the necessary information, they did not correctly apply it and consequently caries occur. Also, the minority of the expectant mothers (29.65%) did not take action if they discover carious teeth in the course of pregnancy and hence the problem is intensified.

It is essential to maintain good oral health throughout pregnancy, as the mother's oral health has an influence on her baby's oral health. High levels of the cariogenic bacteria specifically MS, overt carious lesions, and inadequate oral hygiene in mothers are all documented as risk factors in the transmission of MS from the mother to her infant<sup>41</sup>; this early colonization of the baby's oral cavity by cariogenic bacteria can initiate early caries. In the current study, the majority of the studied women

**Table 9:** Pearson correlation coefficient in study groups according to different studied variables (N = 317)

		Level of Education	Caries Measurement (DMFT Score)	OHI_S Index	PMA Index	Scoring of perception and practices of oral health during pregnancy	Scoring of knowledge about causes of oral & dental problems as well as attitude toward oral health	Scoring knowledge, attitude, and practices about infants' oral health	Scoring of Perceived causes of oral and dental diseases, methods of tooth cleaning, types, and benefits of using toothpaste
Level of Education	r								
	p								
Caries Measurement (DMFT Score)	r	-0.141*							
	p	0.012							
OHI_S Index	r	-0.478**	0.395**						
	p	0.000	0.000						
PMA Index	r	-0.378**	0.348**	0.529**					
	p	0.000	0.000	0.000					
Scoring of perception and practices of oral health during pregnancy	r	0.252**	-0.034	-0.160**	-0.129*				
	p	0.000	0.549	0.004	0.022				
Scoring of knowledge about causes of oral and dental problems as well as attitude toward oral health	r	0.186**	-0.047	-0.074	-0.138*	0.320**			
	p	0.001	0.403	0.186	0.014	0.000			
Scoring knowledge, attitude, and practices about infants' oral health	r	0.423**	-0.046	-0.321**	-0.170**	0.101	0.215**		
	p	0.000	0.412	0.000	0.002	0.072	0.000		
Scoring of Perceived causes of oral and dental diseases, methods of tooth cleaning, types, and benefits of using toothpaste	r	0.328**	0.008	-0.194**	-0.195**	0.264**	0.072	0.243**	
	p	0.000	0.890	0.001	0.000	0.000	0.204	0.000	

\*Correlation is significant at the 0.05 level (2-tailed); \*\*Correlation is significant at the 0.01 level (2-tailed)

had a poor knowledge about the transmission of cariogenic bacteria from the mother to her baby through intimate contact. Results of this study are in accord with that reported by Kumari et al,<sup>42</sup> Sakai et al,<sup>43</sup> Suresh et al,<sup>44</sup> and Chacko et al.<sup>45</sup> The study verified that the pregnant females realized that pregnancy is a cause of gum problems (64.35%), while the minority of mothers recognized that pregnancy predisposes to tooth loss (36.59%). These findings are better than that registered in a previous study carried out by Abiola et al.<sup>18</sup> Moreover, less than half of the participants registered that dental visits are necessary during pregnancy that is less than found in a previous study.<sup>18</sup> In addition, less than half of the contributors revealed that they had visited the dentist previously, these results are in accord with the findings of Oredugba et al.<sup>36</sup> The respondents in the current study expressed positive attitude toward their oral health, where the vast majority of them (96.21%) agreed that keeping the natural dentition is an important issue, and more than three quarters of them did not agree that every painful tooth should be removed, while less than half of mothers reported that fruits and vegetable have an effect on the teeth and gums. These opinions are opposite to that found by Abiola et al<sup>18</sup> in their previous study. In the current study, it was discovered that a significant number of the participants with poor knowledge about causes of their oral and dental problems and negative attitude toward oral health being from the higher educational level than those from the lower educational level reflecting the need to increase dental awareness among various segments of the society, including the high-educational category.

It was encouraging that the majority of mothers (71.29%) could recall the time of eruption of their child's first tooth into the mouth. The findings were in accord with that of Mani et al,<sup>46</sup> yet contradictory to results discovered by Nagaraj et al.<sup>35</sup> When the mothers were inquired about saliva-sharing behavior with their babies, their knowledge was poor and consequently their practices were faulty concerning sharing with the baby spoons or other utensils and method of cleaning of dropped pacifier or toy. In addition, only 38.80% of women be certain that the gum pads of their children should be cleaned using wet gauze. This finding is in agreement with previous studies carried out by Nagaraj et al<sup>35</sup> and Chan et al.<sup>47</sup> With regard to infant-feeding practices, it was optimistic to discover that the vast majority of mothers (82.33%) did not use sweetened pacifier. The low prevalence of using sweetened pacifier was an encouraging finding because the use of sweetened pacifier is an ascertained factor in etiology of nursing caries. This result is higher than that reported previously.<sup>35</sup> The terrifying finding pertaining to the presence of the burden of nocturnal bottle feeding, as only 33.75% of mothers stated that they did not follow

this habit. The finding is consistent with that of Nagaraj et al.<sup>35</sup> Actually, a need is required to supply mothers with instructions and counseling in feeding practices. These nocturnal feeding habits are well identified to influence caries enhancement in young children. A nursing bottle at night may be used as a form of reliever so, establishing a habit that is consequently hard to disrupt, and the problem is exacerbated when these feeding bottles are containing liquids/milk sweetened with sugar. The outcome of this study illustrated poor knowledge of the participating mothers considering their child's visit to the dentist. In the present study, only 12.30% of the contributors recognized that a child's first visit to the dentist should be when the first (milk) tooth erupts. Rather, just 23.34% of participants considered that the child's dental visit should be for routine check-up twice a year. This perception is comparable to that reported by Eigbobo et al.<sup>7</sup> Good oral hygiene practices are created once the child is born; the oral cavity is regularly cleaned even before tooth eruption. The American Academy of Pediatric Dentistry (AAPD) recommends that parents should commence cleaning the child's teeth as their first tooth erupts.<sup>3,48</sup> A very soft toothbrush may be used to clean teeth.<sup>48,49</sup> Also, it is valuable for mothers/caregivers to help their children in brushing their teeth till the child has the dexterity to remove plaque successfully by themselves and this is as the child reached 8-10 years old.<sup>49,50</sup> Results of this study revealed that although the contributing mothers had high and middle levels of education, they did not have sufficient knowledge of oral health care as represented by their poor oral care practices where just 17.98% of them started cleaning their child's teeth when the first milk tooth erupts, this is much lesser than what was found previously.<sup>7,51</sup> Merely 17.03% reported that they use small soft round nylon wet toothbrush without toothpaste to clean their baby's teeth, which is contrary to previous studies.<sup>7,52</sup> Furthermore, only 11.10% of them indicated the ideal age, 8 years, as the age that children should start brushing by themselves; this is to somewhat near to what was reported by Szalewska et al<sup>51</sup> and Eigbobo et al.<sup>7</sup>

Findings from this work revealed a negative correlation between the oral health status of the participants evaluated through the OHI-S and PMA indices and "Scoring of Perceived causes of oral & dental diseases, methods of tooth cleaning, types and benefits of using toothpaste." The majority of the participants perceived the correct causes of dental caries as sugar/sweet foods (88.96%) as well as poor oral hygiene (79.118%), while a lesser percentage perceived the causes of gum diseases (calculus/tartar 46.06% and poor oral hygiene 57.10%). From the results, it seems that the participating group did not have enough knowledge about bacterial plaque

as one of the causes of dental caries and periodontal diseases. Concerning the causes of dental caries, the current findings are higher than that reported in previous studies,<sup>36,52</sup> whereas for the causes of periodontal diseases, the present results are similar to that of Oredugba et al,<sup>36</sup> yet in contrast to the 20% in the former study by Orenuga and Sofola.<sup>52</sup> Enquiry about the appropriate methods used daily for tooth cleaning to prevent dental diseases; it was encouraging to find that the vast majority of mothers (87.07%) preferred to use toothbrush and toothpaste, which is consistent with Abiola et al<sup>18</sup> where they found that 94.2% of pregnant women use toothbrush. For the types of toothpaste, only half of ladies perceived the fluoridated toothpaste; this is less than what was registered by Al-Turck<sup>39</sup> where 82% used regular fluoride toothpaste. Miswak chewing sticks were chosen to be used by 42.59% of women; this result is in accord with the findings of Al-Turck,<sup>39</sup> and in contrast with that of Abiola et al.<sup>18</sup> On the contrary, the participants registered lack of perception regarding the use of dental floss and other interdental cleaning aids as well as mouth rinses as methods of tooth cleaning. The results are slightly higher than that reported in a previous study<sup>39</sup> where only 18% of the participants stated that they use mouthwash daily. Most of the contributing women (81.70%) believed that toothpastes are beneficial predominantly to prevent dental caries and 76.34% perceived that they make the mouth clean and fresh; this is inconsistent to what was discovered previously.<sup>18</sup>

## CONCLUSION

Based on the findings of the current study, mothers exhibited fair oral hygiene, moderate gingivitis, and moderate caries index with a significant difference and strong negative correlation between the level of education and the oral and dental health as the higher the educational level the better the oral condition. Poor perception and practices were recorded regarding mothers' oral health during pregnancy. Flossing was not habitually implemented. Almost half of the participants performing tooth brushing twice per day. High DMFT score was presented whether women disclosed poor or good perception and practices for their oral health throughout pregnancy. Furthermore, the minority of the ladies did not yield action if they realize carious teeth during pregnancy and consequently the problem is exaggerated. A negative correlation was recorded between OHI-S and PMA indices and oral health perception and practices score. A considerable number of mothers with poor knowledge about causes of their oral and dental problems and negative attitude toward oral health were from the higher level of education revealing the necessity to increase dental awareness among various categories

of the community, comprising the high-educational segment. The vast majority of the contributors owned poor knowledge and practices in addition to negative attitude concerning their infants' oral health. In relation to the level of education, less than one quarter of the mothers with low educational level had poor knowledge and practices along with negative attitude, which means that although the sharing mothers had high and middle levels of education, they maintained poor knowledge and practices and negative attitude about their infants' oral health. With regard to perception about causes of oral and dental diseases, methods of tooth cleaning, as well as types and benefits of using toothpaste, poor perception was detected among the participants with a negative correlation with the OHI-S and PMA indices.

## RECOMMENDATIONS

- Incorporating oral health education programs and pediatric education for oral health as part of pre- and postnatal care may enhance perception and practices regarding the importance of oral health measures among expectant and lactating mothers, thus improving their oral health and consequently that of their infants.
- Dental health care workforces should be incorporated into the pre- and postnatal clinics to provide oral and dental health education with regard to the best time to receive oral treatment during pregnancy, causes of oral and dental diseases, and methods of tooth cleaning, as this is the instance at which women are willing to accept new information.
- Implementation of sensitization programs to raise the mothers' awareness concerning prenatal and pediatric dental counseling to confirm that infants' dental visits should begin with the appearance of a child's first tooth as the recommendations of the American Academy of Pediatric Dentistry (AAPD), and the appropriate methods of saliva-sharing behavior with the baby as well as child's oral cleansing methods.

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