

# Knowledge and Attitude about Infant Oral Health: A Paradox among Pregnant Women

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## ABSTRACT

**Aim:** To assess the knowledge and attitude of pregnant women about infant oral healthcare.

**Study design:** A cross-sectional questionnaire study.

**Method:** A cross-sectional survey was conducted among 350 primigravida women aged between 20 and 40 years visiting the DY Patil Medical Hospital for their antenatal examination. A multiple-choice questionnaire with 12 questions in addition to demographic information and socioeconomic status was designed in three languages.

**Results:** Based on the level of education of the pregnant women, there was a statistically significant difference in knowledge and attitude toward infant oral healthcare ( $p = 0.001$ ). The occupational status resounded significant differences between employed vs housewives and unemployed women ( $p = 0.000$ ). Socioeconomic status also showed significant differences between the upper strata and lower strata groups ( $p = 0.000$ ).

**Statistics:** Data normality was tested using the Kolmogorov-Smirnov test and Shapiro-Wilk test. Since the data were not normally distributed, we used nonparametric tests for analysis. The total scores for different domains were compared between the different subgroups based on age, occupation, education, trimester, and socioeconomic status using nonparametric one-way ANOVA (Kruskal-Wallis test). *Post-hoc* pairwise comparisons were done using Bonferroni's method. All testing was done using two-sided tests with  $\alpha = 0.05$  (95% confidence level).

**Conclusion:** This study gives us an insight into the inadequacies existing in our society amongst expectant women in relation to oral health-promoting factors for infants.

**Clinical significance:** Educating pregnant women about maintaining their own oral health and care for their offspring will potentially help to curb early childhood dental diseases in future generations.

**Keywords:** Infant, Oral health awareness, Oral health education, Pregnancy.

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## INTRODUCTION

Oral health is a key indicator of overall health, well-being, and quality of life<sup>1,2</sup> and hence good oral health is an integral component of good general health.<sup>3,4</sup>

The term "infant" is typically applied to children under 1 year of age.<sup>5</sup> The American Academy of Pediatric Dentistry (AAPD) acknowledges infant oral health (IOH) as one of the foundations upon which preventive education and dental care must be built to boost the chances for an oral disease-free life as a child continuing into adulthood.<sup>6</sup> The Indian Society of Pediatric and Preventive Dentistry (ISPPD) also strives to achieve this goal with the motto that every child has the fundamental right to his/her total oral health.<sup>7</sup>

The timing of beginning a preventive oral health program among infants is crucial. It must begin early, i.e., the first year of infancy. The purpose of an IOH program is to improve access to oral healthcare and provide counseling and anticipatory guidance.<sup>8</sup> The earliest opportunity to provide education about IOH is during pregnancy. Mothers play an important role to determine many of the behaviors the child will develop in the future.<sup>9</sup> Education on the prevention of the oral diseases imparted to pregnant women is fundamental to the introduction of good oral habits in their child.<sup>10</sup> However, especially in underprivileged communities, majority of the pregnant women get no instructions during pregnancy regarding infant oral healthcare, although this is a phase for increased acceptance of instructions.<sup>11</sup> Eighty percent of India's population lives in rural areas and the physicians knowledge about IOH and level of imparting preventive dental counseling is inadequate.<sup>12</sup>

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An infant's oral environment is complex due to the beliefs and practices of the primary caregiver of the the infant.<sup>13</sup> Risk assessments at regular intervals, preventive therapies against early childhood caries, parental education regarding oral hygiene maintenance, and establishment of dental home and anticipatory guidance are concepts that need to be embedded into parents to move away from a historical perspective of surgical approach of oral diseases. Considering the role of mothers in the well-being of the

child, it is imperative to explore the knowledge of pregnant women regarding infant oral healthcare. Additionally, their assumptions and beliefs may be important in considerations made toward IOH programs in India. Thus, the objective of this study was to assess the knowledge and attitude of pregnant women regarding IOH.

## MATERIALS AND METHODS

A cross-sectional survey was conducted at the DY Patil Medical Hospital, Navi Mumbai, during January–July 2021, to assess the knowledge and attitude of pregnant women regarding infant oral healthcare. The study was approved by the Institutional Ethical Committee of DY Patil University—School of Dentistry, Navi Mumbai (IREB/2021/PEDO/04). The procedures followed were in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

### Sample Size Calculation

The formula used for sample size calculation was:

$$N = Z^2 * (\hat{p} - P_o) / P_o(1 - P_o)$$

( $\hat{p}$  is the observed proportion,  $P_o$  is the hypothesized probability,  $N$  is required sample size,  $Z$  is test statistic).

With significance level set at 5%, beta error of 20%, and power of 80%, a sample size of 350 pregnant women was obtained.

### Study Participants

A convenient sampling method was adopted for the study. An attempt was made to involve subjects from a wide range of ethical, religious, and socioeconomic background. Four hundred questionnaires were distributed of which 370 pregnant women agreed to participate. Informed consent was obtained from all participants before conducting the study.

### Inclusion Criteria

Primigravida pregnant women aged between 20 and 40 years who conceived naturally visiting the DY Patil Medical Hospital for their antenatal examination.

### Exclusion Criteria

Pregnant women who suffered from any systemic illness/on medication for the same.

### Procedure

A multiple choice close-ended questionnaire in English, Marathi, and Hindi languages was designed. The validity and reliability of the questionnaire were tested by conducting a pilot study and necessary changes were made. The Cohen's Kappa coefficient score was 0.80, which suggests good inter-rater reliability. The final questionnaire consisted of 12 questions, regarding knowledge and attitude among pregnant women regarding IOH, in addition to demographic information and socioeconomic status (Table 1). Pregnant women requiring help to fill in the questionnaires were explained and assisted in the regional language to fill in the questionnaire by a trained pediatric dentist. Care was taken not to guide the subjects to any specific answer.

### Statistical Analysis

All data were entered into Microsoft Office Excel (Office version 365) in a spreadsheet and checked for errors and discrepancies. Data analysis was done using windows-based "MedCalc Statistical Software" (Version 20.0.1). Data normality was tested using the

Kolmogorov-Smirnov test and Shapiro-Wilk test. Since the data were not normally distributed, we used nonparametric tests for analysis. The total scores for different domains were compared between the different subgroups based on age, occupation, education, trimester, and socioeconomic status using nonparametric one-way ANOVA (Kruskal-Wallis test). *Post-hoc* pairwise comparisons were done using the Bonferroni's method. All testing was done using two-sided tests with  $\alpha = 0.05$  (95% confidence level).

## RESULTS

A total of 400 questionnaires were distributed among primigravida women visiting the hospital for their antenatal check-up. Three hundred and seventy participants responded of which 20 were excluded due to incomplete responses. Thus, a total of 350 responses were considered, with a response rate of 92.5%.

Sociodemographic and trimester-wise distribution of participants is shown in Table 2. Data were obtained from samples comprising subjects of different socioeconomic status. On applying the Kruskal-Wallis test, significant differences were noted in relation to the following variables: education, occupation, and socioeconomic status (Table 3). Based on the level of education of the pregnant women, there was a statistically significant difference in relation to knowledge and attitude toward infant oral healthcare between diploma holders and illiterate women ( $p$ -value = 0.02), between professional degree holders and illiterate women ( $p$ -value = 0.009), and between pregnant women with a professional degree vs those who completed middle school ( $p$ -value = 0.045) (Table 4).

The occupational status resounded significant differences between employed pregnant women vs pregnant housewives ( $p$ -value = 0.002) and unemployed pregnant women ( $p$ -value = 0.000) (Table 4). Socioeconomic status also showed significant differences between the upper strata and lower strata groups ( $p$ -value = 0.003) as depicted in Table 4.

On comparing age and trimesters in the participating pregnant women, no statistically significant differences were observed. Below mentioned are the various aspects of infant oral healthcare that was investigated during our survey (Table 4).

### Knowledge Regarding Tooth Formation

Proper diet and nutrition as a requirement for adequate jaw growth and orofacial development was an aspect oblivious to around 56% (194) of the pregnant women. Only 33% (115) women were aware of the benefits of adequate diet and nutrition. Regarding supplements taken during pregnancy that affect tooth formation, only 26.4% (92) women identified calcium as the correct option. Knowledge regarding the trimester during which tooth formation begins is discussed in Figure 1A.

### Knowledge Regarding Tooth Decay and Feeding Practices

When asked if a child less than 18 months is prone to dental decay, an equal number of participants (160) responded affirmatively and another 160 skeptically. Sixty seven percent (232) pregnant women were aware of the risk of decay in cases of night time bottle feeding and in between meal consumption of sugar containing snacks, with a meagre 7% (25) stating that these factors do not increase the risk of caries.

**Table 1: Questionnaire for the study**

- Q.1. When do you think the process of tooth formation in the baby begins?
- A. First trimester of pregnancy
  - B. Second trimester of pregnancy
  - C. After birth only
  - D. Don't know
- Q.2. What supplements taken during pregnancy can affect tooth formation?
- A. Calcium
  - B. Folic acid
  - C. Manganese
  - D. Don't know
- Q.3. Do you believe that proper diet and nutrition is essential for your child's jaw growth and orofacial development?
- A. Yes
  - B. No
  - C. Don't know
- Q.4. Do you think a child less than 18 months is prone to dental decay?
- A. Yes
  - B. No
  - C. Don't know
- Q.5. Do you think frequent night time bottle feeding with milk or in between meal consumption of sugar-containing snacks can increase the risk of decay in children?
- A. Yes
  - B. No
  - C. Don't know
- Q.6. Do you think there is a need to care for the milk teeth since they will be replaced with permanent teeth later in life?
- A. Yes, milk teeth need the same care as permanent teeth
  - B. No, milk teeth are temporary and do not need much care
  - C. Don't know
- Q.7. When do you think you should start cleaning an infant's mouth?
- A. As soon as the first tooth erupts
  - B. After eruption of all the baby teeth
  - C. Gum needs to be cleaned regularly after birth
  - D. Don't know
- Q.8. How often should an infant's mouth be cleaned?
- A. Once daily
  - B. Regularly after every feed
  - C. Cleansing is not required before teeth erupt
  - D. Don't know
- Q.9. Correct oral cleaning aid for children younger than 18 months would be?
- A. Toothbrush and paste
  - B. Soft moist towel
  - C. Mouthwash
  - D. Saline

(Contd...)

**Table 1: (Contd...)**

- Q.10. What amount of tooth paste should be given to the children aged 18 months to 5 years for cleaning their teeth?
- A. The same amount as used by an adult
  - B. A pea sized amount only
  - C. No toothpaste should be used till permanent teeth erupt
  - D. Don't know
- Q.11. Do you think sucking habits can affect the development of teeth?
- A. Yes, habits can affect teeth
  - B. No, habits don't affect the teeth
  - C. Don't know
- Q.12. Do you think there is a need to see a dentist in case a child's milk tooth falls out due to an accident?
- A. Yes, because permanent teeth can also be affected
  - B. No, since they are temporary teeth
  - C. Don't know

**Table 2: Distribution of study participants-based on sociodemographic data and trimester**

	<i>Number of participants</i>	<i>Percentage (%)</i>
<b>Based on age (in years)</b>		
20–25	131	37.4
26–30	152	43.4
31–35	59	16.9
36–40	8	2.3
<b>Based on education</b>		
Illiterate	13	3.7
Primary school	32	9.1
Middle school	52	15
High school	65	20.6
Diploma	122	38
Professional degree	66	20.7
<b>Occupation</b>		
Unemployed	57	16.3
Employed	129	36.9
Housewife	164	46.9
<b>Socioeconomic status</b>		
Class-I	32	9.1
Class-II	179	51.1
Class-III	126	36
Class-IV	13	3.7
<b>Trimester</b>		
First	59	16.9
Second	162	46.3
Third	129	36.3

## Knowledge Regarding Oral Hygiene Measures

Only 50% (175) of the respondents believed that care for the primary teeth is also essential with 36% (128) of women unaware of the need to care. An almost equal percentage of pregnant women, 38% (134) and 39% (136) specifically, knew about cleaning an infant's mouth during the gum pad stage and brushing as soon as the first tooth erupts, respectively. Frequency of cleaning is elaborated in Figure 1B. Correct method of cleansing was identified by less than 40% (132) of the respondents. In spite of this, 51% (181) pregnant women identified that the amount of toothpaste to be used for a child should be pea sized as opposed to 17% (60) women who thought the same amount as of an adult can be used.

## Preventive Goals

As far as preventive goals are concerned, we evaluated the knowledge regarding effects of sucking habits on development of teeth (Fig. 1C) and attitude of parents regarding trauma to the primary teeth (Fig. 1D).

## DISCUSSION

Infancy is a critical time to establish habits that have the potential to affect the overall health and particularly future oral health, into adolescence and beyond. Infant oral healthcare should be given prime importance as it determines the future oral healthcare status of the child. Maintaining oral hygiene is essential for proper growth and nutrition during infancy, which when neglected can lead to adverse effects on the overall quality of life.<sup>14</sup> Prevention is the preliminary step for infant oral healthcare and prevention of dental diseases needs to be initiated in infancy. Evidence suggests that early in life risk factors play a major role as predictors of future dental caries in children. A major causative factor of poor infant oral

health is lack of proper knowledge, attitude, and practices (KAP) related to infant oral care.<sup>15</sup>

Thus the perinatal period is an opportune time to educate the expectant mothers regarding preventive strategies and bring about a change in their health behavior. This in turn creates a ripple effect of knowledge and awareness to other expectant mothers and possibly a vertical effect to their child as well. This could practically create an effective paradigm shift in developing countries like India where infant oral healthcare takes a backseat.

Lower socioeconomic (SE) status has been directly correlated to a low dental KAP.<sup>15</sup> The same pattern was observed in our study where the lower middle class group (according to Kuppuswamy scale) were less aware regarding infant oral health compared to higher SE groups. This could be due to the lower strata of our society who do not give prime importance to preventive strategies. The higher the level of education of the expectant mother, better was the awareness and the employed women seemed to be having better knowledge regarding Infant oral health. This could partially be explained by the ripple effect where information was being passed on in the society.

A majority of expectant mothers who participated in our study were aware of the risk factors associated with dental decay which is in accordance with a study by Mani et al.<sup>16</sup> Proper instructions and guidance will bridge the gap leading to establishing better feeding practices. Nagaraj et al.<sup>13</sup> reported that nocturnal feeding habits are established contributors toward caries. This could be used as a comforter, creating a habit difficult to break. Parental counseling about providing noncariogenic food in between meals like water/plain milk/fresh fruits must be done to reduce the incidence of caries.<sup>17</sup> The primary teeth were not considered to be as important as permanent teeth by majority of the pregnant women in our study, similar to a study by Davenport et al.<sup>18</sup> But, Saudi Arabian parents believed that primary teeth and permanent teeth are equally important which suggests lack of knowledge in our country regarding the importance of primary teeth.

Our survey shows that the overall awareness regarding oral hygiene measures in infants is only satisfactory. This is in accordance with a study done by Alsheri et al.<sup>19</sup> in Saudi Arabia where a similar percentage of parents were aware about preventive strategies. Bhat et al.<sup>20</sup> noted much higher levels of awareness in Bangalore city, whereas Shivprakash et al.<sup>21</sup> and Kumari et al.<sup>22</sup> in their studies reported much lower levels of awareness.

Oral hygiene measures should be implemented immediately after birth. Cleansing gum pad with a wet cotton and initiating

**Table 3:** Kruskal-Wallis test (nonparametric ANOVA) for demographic and socioeconomic variables in relation to knowledge and attitude regarding infant oral healthcare

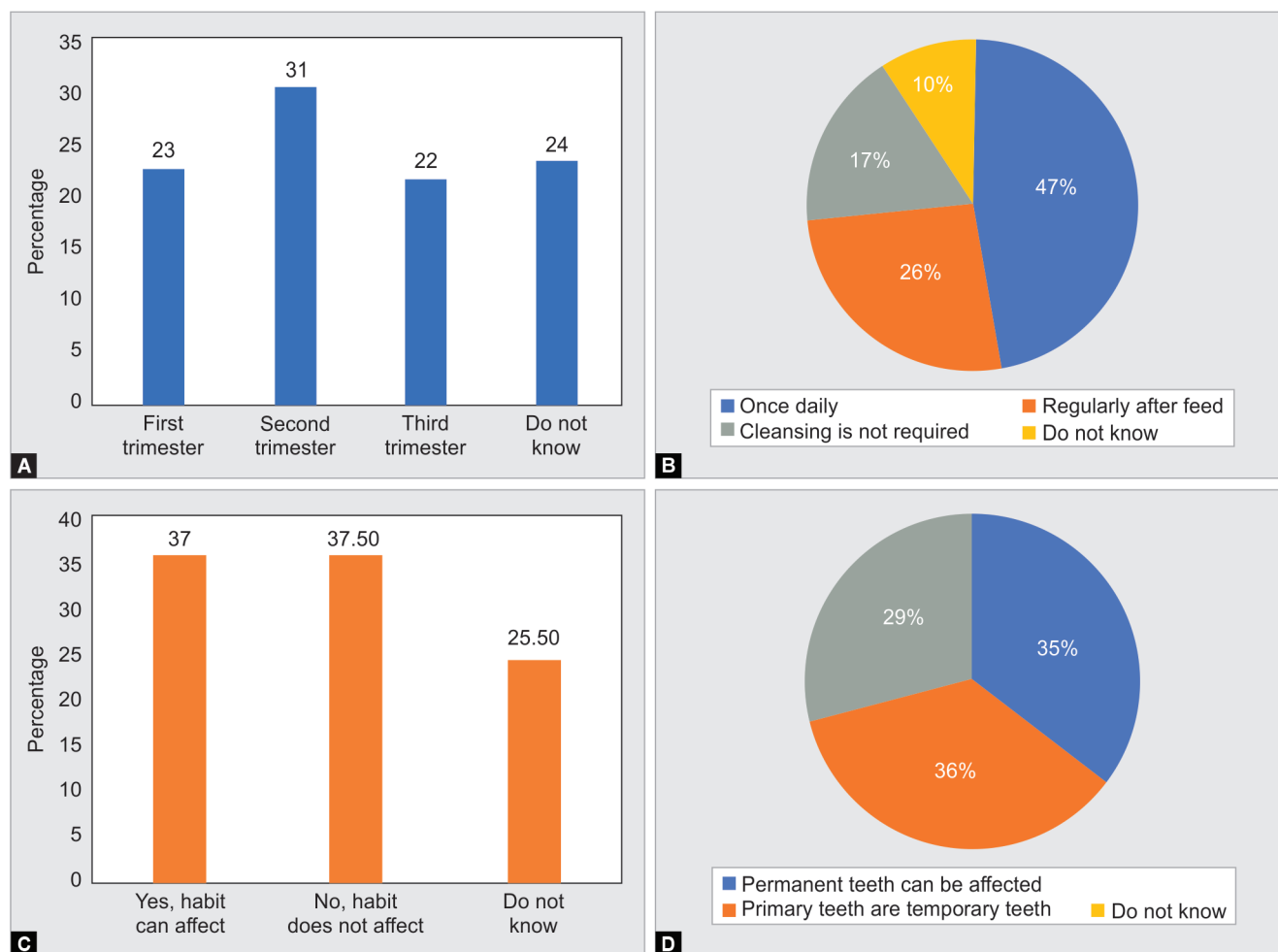
Grouping variable	Kruskal-Wallis test	df	Sig.
Age	1.021	3	0.796
Education	21.751	5	0.001*
Occupation	19.101	2	0.000*
Socioeconomic status	25.146	3	0.000*
Trimester	2.605	2	0.272

df, degree of freedom; Sig.,  $p < 0.05$ , \* $p < 0.05$

**Table 4:** Post-hoc test (Bonferroni's pairwise comparison) between different education, occupation, socioeconomic status, levels of pregnant women

Dependent variable	Independent variable	Mean difference	SEM	Sig.			
Infant oral healthcare	Education	Illiterate	Diploma	-3.206*	0.989	0.020*	
		Professional degree	-3.570*	1.029	0.009*		
	Occupation	Middle school	Professional degree	-1.878*	0.629	0.045*	
		Unemployed	Employed	-2.126*	0.540	0.000*	
	Socioeconomic status	Employed	Housewife	1.395*	0.399	0.002*	
			Class II (upper middle)	2.076*	0.644	0.008*	
		Class I (upper)	Class III (lower middle)	2.709*	0.665	0.000*	
			Class IV (upper lower)	5.344*	1.104	0.000*	
			Class II (upper middle)	Class IV (upper lower)	3.268*	0.965	0.005*
			Class III (lower middle)	Class IV (upper lower)	2.635*	0.978	0.044*

SEM, standard error of the mean; sig.,  $p < 0.05$ , \* $p < 0.05$



**Figs 1A to D:** Graphs represent knowledge of pregnant women regarding infant oral healthcare. (A) Knowledge regarding tooth formation; (B) Knowledge regarding oral hygiene practices; (C) Knowledge regarding effects of sucking habits on development of teeth; (D) Knowledge regarding trauma to the primary teeth

brushing as soon as the first tooth erupts should be initiated by the parent. Flossing should be initiated when adjacent tooth surface cannot be cleansed with a toothbrush. The results from our survey state that less than 40% women were aware of these facts, which is similar to studies done by Khurshid et al.,<sup>23</sup> Chan et al.,<sup>24</sup> and Viridi et al.<sup>25</sup> Contradictory to our study, Nagaraj and Pareek<sup>13</sup> reported better oral hygiene knowledge and practices by women. Nevertheless it was encouraging to see in our study that majority of the women knew about the age-specific use of toothpaste for children. The role of fluoride in caries prevention must be stressed upon as optimal levels are essential for all dentate infants and children.

Non-nutritive oral habits such as digit or pacifier sucking, bruxism, and abnormal tongue thrust may apply forces to teeth and dentoalveolar structures.<sup>15</sup> Thus, it is important to discuss and wean infants from these habits before any malocclusion occurs. Infants are prone to traumatic injuries and age appropriate injury prevention counseling and emergency care must be initiated.

Literature shows evidence regarding children at a higher risk of developing early childhood caries can benefit from IOH care.<sup>7</sup> Thus targeting pregnant women and increasing awareness among them on risk factors can help the future generations. Motivational approaches with the help of primary healthcare centers and

Anganwadi branches can help reach out to the underprivileged population. With social media usage, penetration into majority of the households is feasible today. Printed booklets with instructions and oral health education videos can further highlight the importance of IOH.

### Limitations of Our Study

This was a cross-sectional study with a small sample size, hence generalization of results to all expectant mothers cannot be done. Comparisons were not done between primigravida women and women pregnant for second or third time.

### CONCLUSION

Although this cross-sectional study has its limitations, it gives us an insight into the inadequacies existing in our society among expectant women in relation to oral health-promoting factors for infants. This also enables us to modify wrong beliefs and eradicate misconceptions through interventions to promote oral health among infants and children till adolescence and adulthood. The primary focus must be on prevention and promoting oral health during this crucial stage called infancy. "Your future is created by what you do today, not tomorrow."

## Clinical Significance

This study showcases the lacunae among pregnant women regarding oral hygiene knowledge and practices for themselves and their soon-to-arrive offspring. Early interventions to educate mothers on oral hygiene measures, identifying risk factors of caries for their child, first dental visit by age of one, establishment of dental home and prevention of dental injuries can go a long way to reduce the burden of early childhood caries in future generations. Thus, focusing on penetrating at a grass-root level to educate pregnant women and Anganwadi workers about the importance of preventive measures regarding oral diseases is the need of the hour.

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