INTRODUCTION

Infant oral health (IOH) is the foundation upon, which preventive education and dental care must be built to enhance the opportunity for life-time freedom from preventable oral diseases.[1] Parents are the decision makers in matters of health-care for children; thus, they play an important role in achieving the best oral health outcomes for their young children.[2] It is therefore expected that preventive oral health behavior of parents for children would influence their children’s behavior in adapting preventive oral health practices as they grow along.[3]

Early childhood caries (ECC) is an infectious and preventable disease that is transmitted vertically from mothers or other intimate caregivers to infants. Modification of the mother’s oral hygiene, diet, and the use of topical fluorides can have a significant impact on the child’s caries rate.[1]

Since parents/guardians are responsible for almost all health issues related to their children, their role in modeling their children toward practicing preventive oral health throughout life is crucial.[4] Thus, parents/guardians should be educated about oral health-care for their children from inception through the existing setup.[3]

Studies eliciting parental knowledge, attitudes, and preventive behaviors on oral health of children are scanty.[4-6] Considering, parent’s important role in the...
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Well-being of young children, it is essential to explore their knowledge, attitude, and practices (KAP) as it affects the dental care that children receive at home and their access to professional dental services. Furthermore, their assumptions and beliefs may be an important consideration in attempts made to improve IOH. Thus, this study was undertaken to assess the IOH-related KAP of parents having children aged 6 months to 3 years in Udaipur city, Rajasthan, India.

**MATERIALS AND METHODS**

**Study design and study setting**
A cross-sectional descriptive study was conducted in the Department of Pediatrics, Rabindranath Tagore (RNT) Medical College and Hospital, Udaipur, during the month of August 2011 after obtaining the ethical approval from the Institutional Review Board of Pacific Dental College and Hospital (Reference No. PDC/134/2011-12 Dated 23.07.2011). Official permission was taken from the Head of the Department of Pediatrics.

This is the only Government Medical College present at Udaipur city, which comes under Udaipur Metropolitan Region and is governed by Municipal Corporation. Udaipur city is located in Rajasthan state of India. As per provisional reports of Census India, population of Udaipur in 2011 is 451,735; of which male and female are 234,681 and 217,054 respectively. Average literacy rate of Udaipur city is 90.66% of which male and female literacy was 95.56 and 85.39%.[7]

**Inclusion criteria**
Parents having children aged 6 months to 3 years; who were willing to participate and also signed the informed consent.

**Exclusion criteria**
Parents who could not read and write.

**Pilot study**
A pilot survey was conducted among 45 eligible parents to assess the reliability of the questionnaire, feasibility of conducting the survey and for sample size calculation. Based on the 50% prevalence, 95% confidence level and 10% precision of IOH knowledge (our main outcome) among Udaipur parents and the minimum sample size was estimated as 384.

$$\text{Sample size} = Z^2 \times p \times q/d^2$$
$$Z = \text{Standard normal deviate (1.96)}$$
$$p = \text{Prevalence (0.50)}$$
$$q = 1 - p = (0.50)$$
$$d = \text{Allowable error (10)}.$$

**Sampling and sample size**
All the parents of children aged 6 months to 3 years, who visited the Department of Pediatrics, of RNT Medical College and Hospital, Udaipur, during 1st to 31st August 2011 were informed about the purpose of the survey and were invited to participate. Those who fulfilled the above mentioned eligibility criteria were included in the survey. Based on convenience sampling, a total sample size of 470 was obtained.

**Methodology**
A self-administered structured questionnaire written in English was translated in local language (Hindi) and was validated through pre-tested survey. Face validity indicates whether the instrument appears to be assessing the desired qualities. When face validity was assessed, it was observed that 95% of the participants found the questionnaire to be easy. Assessment of content validity reflects a judgment whether the instrument samples all the relevant or important domains. Mean content validity ratio was calculated as 0.87 based on the opinions expressed by a panel of total six academicians. Test of reliability comprised two components: Question-question reliability, which was assessed by the percentage of agreement (90%) and internal reliability for the responses to questions, which was assessed using the Cronbach’s alpha (0.82).

The final questionnaire consisted of 32 questions under following sections:

- **Section I:** Incorporated five questions to gather information related to parent’s demographic characteristics including gender, age, employment, educational level, and monthly income.
- **Section II:** Integrated 10 multiple choice questions to assess the IOH care knowledge among parents.
- **Section III:** Comprised of nine questions, which aimed to assess the attitude of parents toward IOH care. The answers were scored on a three point Likert scale as “agree,” “disagree” and “don’t know.”
- **Section IV:** Is made of eight questions aimed to investigate the practices of parents regarding IOH care. The responses were recorded on a four point Likert scale as “always,” “frequent” “sometimes,” and “never.”

Data were collected by a single investigator who distributed the questionnaires to the parents, gave...
sufficient time to fill it and collected on the spot after they had completed.

**Statistical analysis**

Data were analyzed using the SPSS software version 11.5 (SPSS Inc., Chicago, IL, USA). Descriptive statistics was used to summarize the sample and responses of the questionnaire. Student’s *t*-test and one-way analysis of variance was used to assess the relationship between the KAP score and the demographic characteristics. A significant relationship was assumed to exist between the groups if the *P* value was found to be lesser than 5% (*P* ≤ 0.05).

**Scoring criteria**

Every item pertaining to the attitude questionnaire was coded from 1 to 3 (disagree to agree). Attitude items were re-coded to ensure that, for all items, a high score indicated a positive attitude toward IOH care, and a low score indicated a negative attitude. Regarding behavior and practice items, the right answer was coded as 1 and the wrong answer as 0. The individual scores were then summed up to yield a total score.

For the purpose of analysis, age of the participants was categorized as: 20-24 years, 25-29 year, and 30-34 years and >35 years. Education was classified as primary school, secondary school, high school certificate, and intermediate/post-high school certificate and graduate/post-graduate degree. Occupation of the participants was stratified as unemployed, unskilled worker, skilled worker, clerical/shop owner/farmer, and professional. Income of the individuals was recorded on the basis of the Prasad’s classification of socio-economic status scale.[8] The income categories were grouped under high (upper high and high), middle (upper middle and lower middle) and poor (lower) socio-economic status groups.

**RESULTS**

The analysis of the demographic data showed that the majority of the participants were in the age group of 20-24 and 25-29 years (34% each), females (63.6%) and unemployed (49.8%). Almost half of the study population had high school education (47.4%) and the bulk of income group belonged to the middle socio-economic class (63.7%) [Table 1].

Most of the parents had good knowledge of child’s tooth eruption stages. However, they had poor knowledge of cleaning, brushing of baby’s teeth, caries development, and teething signs and symptoms. More than half of the parents (58.7%) believed that cleaning of baby’s mouth after each feeding should begin only after the teeth erupt. Nearly, half of the parents (48.5%) believed that caries occurs after 2 years of age. Many of them wrongly attributed symptoms such as fever, diarrhea, sleep disturbance, and vomiting to teething.

Table 2 shows parent’s attitude toward IOH care. Almost half of the parents disagreed to the statement that tooth decay is caused by bacteria transmitted by sharing feeding utensils while 56.2% and 45.1% thought that night time and frequent breast/bottle feeding did not cause tooth decay respectively. About 42% agreed to the fact that swallowing of toothpaste can be harmful to a child’s health and 33.6% of the parents disagreed of visiting a dentist before the child is 2 years old.

As regard to oral health practices, 30% of the parents agreed to have bitten the food into small pieces before giving it to the children. Almost 40% of the parents acknowledged of giving sweet food to the child.

| Table 1: Demographic profile of the study population | N=470 | % |
| --- | --- | --- |
| **Demographic characteristics** |  |  |
| Age (in years) |  |  |
| 20-24 | 160 | 34 |
| 25-29 | 160 | 34 |
| 30-34 | 129 | 27 |
| >35 | 21 | 4.5 |
| Sex |  |  |
| Male | 177 | 36.4 |
| Females | 293 | 63.6 |
| Education |  |  |
| Postgraduate or graduate | 123 | 26.2 |
| Intermediate or post high school diploma | 96 | 20.4 |
| High school certificate | 223 | 47.4 |
| Middle school certificate | 16 | 3.4 |
| Primary school certificate | 12 | 2.5 |
| Occupation |  |  |
| Profession/semi profession | 50 | 10.6 |
| Clerical, shop owner, farmer | 93 | 19.8 |
| Skilled/semi-skilled worker | 36 | 7.7 |
| Unskilled | 57 | 12.1 |
| Unemployed | 234 | 49.8 |
| Income |  |  |
| I | 15 | 3.2 |
| II | 59 | 12.6 |
| III | 106 | 22.6 |
| IV | 193 | 41.1 |
| V | 97 | 22.6 |
Furthermore, 29.1% of the parents used full brush length toothpaste to brush their children’s teeth [Table 3].

Parents in the age group of 25-29 years showed significantly higher mean knowledge (25.90 ± 3.93) ($P = 0.042$), attitude (15.71 ± 2.63) ($P = 0.032$), and practice (20.09 ± 3.15) (0.013) scores than the other age groups [Table 4].

Furthermore, mothers showed a statistically significant higher mean knowledge (21.45 ± 4.27) and attitude scores (19.13 ± 2.97) and mothers (18.80 ± 2.69) was not statistically significant [Table 5].

Parents of higher socio-economic status showed statistically significant higher mean knowledge (21.52 ± 4.16), attitude (15.01 ± 2.34), and practices scores (19.30 ± 2.90) than those of middle socio-economic status (21.03 ± 3.37, 14.44 ± 2.29, 19.24 ± 2.84 respectively) and lower socio-economic status groups (19.38 ± 2.48, 14.17 ± 1.61, 18.68 ± 1.94 respectively) [Table 6].

**DISCUSSION**

Oral health of the children is associated with oral health knowledge of their parents/guardians as oral health related habits (such as those related to oral hygiene and diet) are established during infancy and maintained throughout early childhood.\(^6\)

Parents function as role models for their children. This study provides data about the KAP about relative risk and protective factors that are likely to have influence on oral health of infants and also the influence of socio-demographic factors on parent’s oral health KAP scores.

### Table 2: Percentage distribution of questions regarding attitude to infant oral health-care

| Questions                                                                 | Agree | Disagree | Don’t know |
|---------------------------------------------------------------------------|-------|----------|------------|
| Tooth decay is caused by bacteria that are transmitted by sharing feeding utensils | 30.9  | 48.5     | 20.6       |
| A balanced diet is essential for the healthy growth of the baby’s diet    | 69.8  | 25.7     | 4.5        |
| Night time bottle/breast feeding can cause tooth decay                    | 36.4  | 56.2     | 7.4        |
| Frequent and prolonged breast/bottle feeding can cause tooth decay        | 43.0  | 45.1     | 11.9       |
| A child’s teeth should be brushed/cleaned                                 | 69.5  | 24.5     | 6.0        |
| Effective cleaning of teeth brushing can be achieved by the child him/herself | 30.2  | 62.1     | 7.7        |
| Swallowing of toothpaste can be harmful to a child’s teeth                | 42.1  | 27.7     | 30.2       |
| It is important for a child to visit the dentist before 2 years old       | 44.7  | 33.6     | 21.7       |
| Prolonged use of pacifier can affect the normal development of child’s teeth | 61.1  | 18.5     | 20.4       |

### Table 3: Percentage distribution of responses regarding the practices of infant oral health-care

| Questions                                                                 | Always | Frequent | Sometimes | Never |
|---------------------------------------------------------------------------|--------|----------|-----------|-------|
| Do you bite the food into small pieces before giving to the child?         | 28.9   | 6.0      | 18.5      | 46.6  |
| How often do you give sweet food to the child (liquid/solid)?             | 19.6   | 12.1     | 62.1      | 6.2   |
| When did you start semisolid food to child?                               | 57.8   | 28.5     | 7.7       | 6.0   |
| 6 months (A)                                                             |        |          |           |       |
| 1 year (F)                                                                |        |          |           |       |
| 11/2 years (S)                                                            |        |          |           |       |
| 2 years (N)                                                               |        |          |           |       |
| How often do you supervise your child’s tooth brushing?                   | 52.6   | 13.8     | 28.7      | 4.9   |
| How much toothpaste do you use to brush a child’s teeth?                  | 34.3   | 24.3     | 29.1      | 12.3  |
| Smear (A)                                                                 |        |          |           |       |
| Pea size (F)                                                              |        |          |           |       |
| Full brush length (S)                                                     |        |          |           |       |
| Not at all (N)                                                            |        |          |           |       |
| Do you use pacifier dipped into sweet liquid for the child?               | 18.1   | 13.4     | 24.7      | 43.8  |
| What do you do to relieve pain of teething problems?                      | 13.8   | 21.5     | 36.8      | 27.9  |
| Allow child to bite on a chilled object (A)                               |        |          |           |       |
| Apply topical analgesics to rub gums (F)                                   |        |          |           |       |
| Use systemic analgesics (S)                                                |        |          |           |       |
| Allow bottle feeding at night (N)                                          |        |          |           |       |
| Do you take effort to improve your dental health knowledge?               | 40.9   | 16.5     | 30.5      | 12.1  |
A total of 470 parents were surveyed among, which majority of them were females 299 (62.4%). This is not surprising since in this community, mothers are the parents commonly in contact with children in this age group. American Academy of Pediatric Dentistry recommends that the child should be seen by a dentist within 6 months of eruption of the first primary tooth and no later than 12 months of age.\cite{1} Traditionally, the
developmental age for initial dental visit was thought to be 3 years. The rationale for this was children are more manageable at this age and treatment will be more efficient. Early interventions are needed to educate parents on oral hygiene, prevention of dental injuries and ECC. Hence at age one, dental visit is recommended.

The concept of dental caries as an infectious and transmittable disease was demonstrated by Keyes (1960). Majority of the parents in the present study had good knowledge regarding the role of diet in oral health; they believed that sweet snacks contribute to caries.

An important aspect of oral hygiene practices is brushing. In the present study, a major proportion of the parents (58.7%) believed that their child’s mouth should not be cleaned before the primary teeth erupts, which was lower in comparison to the findings obtained by Shivaprakash et al. (70%). Similar findings were observed in the study by Suresh et al. where most of the parents felt that they should brush their child’s teeth when all the primary teeth have erupted.

In accordance with most of the studies, the present study showed that desire to bite; gum irritation and increased salivation were correctly attributed to teething by most of the parents. However, majority of the parents have also attributed signs and symptoms such as fever (70%), diarrhea (87%), runny nose (32%), vomiting (37.8%), and ear problems (23.8%) incorrectly. The proportion of parents (70%) who believed that fever was associated with teething was in accordance with the study conducted by Wake et al. (70-85%). The findings of the present study were higher when compared to study conducted by Feldens et al. (38.9%), but were lower when compared to study by Owais et al. (84.9%).

In agreement with the findings of the previous studies by Shivaprakash et al. and Suresh et al., a consistent weak knowledge regarding the role of fluoride in caries prevention was observed among the parents in our study.

Vertical transmission of Mutans Streptococci (MS) from mother to infant is well documented. The higher the levels of maternal salivary MS, the greater the risk of the infant being colonized. Along with salivary levels of MS, mother’s oral hygiene, periodontal disease, snack frequency, and socio-economic status also are associated with infant colonization.

Almost 41% of the parents agreed that tooth decay is caused by bacteria transmitted by sharing feeding utensils. This percentage was lower (55%) in comparison to the findings of Shivaprakash et al. and higher (27.2%) to the findings by Suresh et al. The findings were also in accordance with a study by Sakai et al. where most interviewed adults reported the habit of blowing and tasting food, sharing utensils, and kissing the children on their mouth.

In accordance to the results of a previous study by Rwakatema and Ng’ang’a present study results also showed that 52% of the parents disagreed on night time bottle/breast feeding as a cause of tooth decay because of the unawareness of detrimental oral habits that can cause oral diseases.

Parents in the age group of 25-29 years presented a better KAP score, which was in contrast to the results obtained by Williams et al. in which age group of parent was not significant for either dental knowledge or dental attitude.

A significant association was observed in this study between outcome and socio-economic status. Studies by Suresh et al. and Williams et al. have also shown that parents with lower education had poor dental knowledge and attitude level. It is possible that parents with higher education level are more likely to have positive health attitudes and render greater attention to the health of the child.

Conditions established in pre-school years provide a foundation for oral health and patterns for use of dental services later and in adulthood. Parents, especially mothers, need to realize that they are role models for their children and to be encouraged to improve the child’s dental health habit.

The results of this study cannot be extrapolated as the sample size was small and the study was localized to one particular hospital. Hence, studies exploring the same issue need to be conducted on larger samples covering different populations so as to evaluate, which strategies will be effective and efficient in bringing about a behavior change in parents regarding IOH care.

**CONCLUSION**

Parent’s knowledge on IOH care was inadequate. Health professionals, who are the first to come into contact with expectant and new mothers, need to disseminate appropriate and accurate information
about oral health-care for infants, especially the use of nursing bottle at night, the value of tooth brushing, and regular dental visits. A matter of high priority is the development and implementation of wide-scale, long-term programs of health education, and promotion for expectant new mothers.

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REFERENCES

1. American Academy of Pediatric Dentistry. Clinical guideline on infant oral health care. Pediatr Dent 2004;26 (Suppl 7):67-70.
2. Talekar BS, Rozier RG, Slade GD, Ennett ST. Parental perceptions of their preschool-aged children’s oral health. J Am Dent Assoc 2005;136:364-72.
3. Sheiham A, Watt RG. The common risk factor approach: A rational basis for promoting oral health. Community Dent Oral Epidemiol 2000;28:399-406.
4. Shivaprakash PK, Elango I, Baweja DK, Noorani IH. The state of infant oral healthcare knowledge and awareness: Disparity among parents and healthcare professionals. J Indian Soc Pedod Prev Dent 2009;27:39-43.
5. Rwakatema DS, Ng’ang’a PM. Oral health knowledge, attitudes and practices of parents/guardians of pre-school children in Moshi, Tanzania. East Afr Med J 2009;86:520-5.
6. Suresh BS, Ravishankar TL, Chaitra TR, Mohapatra AK, Gupta V. Mother’s knowledge about pre-school child’s oral health. J Indian Soc Pedod Prev Dent 2010;28:282-7.
7. Udaipur City Census 2011 data. Available from: http://www.census2011.co.in/census/city/92-udaipur.html. [Last cited 2011 Oct 15].
8. Agarwal A. Social classification: The need to update in the present scenario. Indian J Community Med 2008;33:50-1.
9. Sánchez OM, Childers NK, Fox L, Bradley E. Physicians’ views on pediatric preventive dental care. Pediatr Dent 1997;19:377-83.
10. Keyes PH. The infectious and transmissible nature of experimental dental caries. Findings and implications. Arch Oral Biol 1960;1:304-20.
11. McIntyre GT, McIntyre GM. Teething troubles? Br Dent J 2002;192:251-5.
12. Owais AI, Zawaideh F, Bataineh O. Challenging parents’ myths regarding their children’s teething. Int J Dent Hyg 2010;8:28-34.
13. Macknin ML, Piedmonte M, Jacobs J, Skibinski C. Symptoms associated with infant teething: A prospective study. Pediatrics 2000;105:747-52.
14. Wake M, Hesketh K, Allen M. Parent beliefs about infant teething: A survey of Australian parents. J Paediatr Child Health 1999;35:446-9.
15. Cunha RF, Pugliesi DM, Garcia LD, Murata SS. Systemic and local teething disturbances: Prevalence in a clinic for infants. J Dent Child (Chic) 2004;71:24-6.
16. Feldens CA, Faraco IM, Ottoni AB, Feldens EG, Vitolo MR. Teething symptoms in the first year of life and associated factors: A cohort study. J Clin Pediatr Dent 2010;34:201-6.
17. Douglas JM, Li Y, Tinnonoff N. Association of *Mutans Streptococci* between caregivers and their children. Pediatr Dent 2008;30:375-87.
18. van Loveren C, Buiks JF, ten Cate JM. Similarity of bacteriocin activity profiles of *Mutans Streptococci* within the family when the children acquire the strains after the age of 5. Caries Res 2000;34:481-5.
19. Davey AL, Rogers AH. Multiple types of the bacterium *Streptococcus mutans* in the human mouth and their intra-family transmission. Arch Oral Biol 1984;29:453-60.
20. Sakai VT, Oliveira TM, Silva TC, Moretti AB, Geller-Palti D, Biella VA, et al. Knowledge and attitude of parents or caretakers regarding transmissibility of caries disease. J Appl Oral Sci 2008;16:150-4.
21. Williams NJ, Whittle JG, Gattrell AC. The relationship between socio-demographic characteristics and dental health knowledge and attitudes of parents with young children. Br Dent J 2002;193:651-4.

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