

Original Research Article

Association between knowledge, attitude, practice and early childhood caries among parent-child dyad in Bangalore city: a cross sectional study

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ABSTRACT

Background: The knowledge, attitude and practice of parents have an impact on their children's general and oral health. Hence this study was conducted to determine the association between knowledge, attitude, practices and early childhood caries among parent-child dyad.

Methods: A cross sectional study was conducted among 432 parent-child dyad in Bangalore city. Children were selected from different government, private and aided schools across Bangalore city. A structured proforma was used to collect data regarding socio-demographic factors. Parental knowledge, attitude and practice regarding ECC were assessed using a pre-validated KAP questionnaire. Oral health was assessed using World Health Organization Oral Health Assessment Form for Children, 2013. Chi square test, Pearson's correlation coefficient and multivariate linear regression analyses were performed and $p < 0.05$ was considered statistically significant.

Results: The mean age of the children was 4.0 ± 0.82 years. Majority of the parents had fair knowledge (58%), positive attitude (61%) and good practice (38%). The prevalence of ECC experience among the study participants was 59.8%. The mean dmft was 3.10 ± 3.73 . There was a statistically significant association between parental knowledge, attitude, practices and early childhood caries ($p < 0.001$). There was moderate negative correlation between parental KAP and ECC experience in children. Multivariate linear regression analyses revealed statistically significant association of knowledge, attitude and practices with ECC experience as a dependent variable ($p < 0.001$).

Conclusions: There was a significant association between parental knowledge, attitude and practice with ECC experience among preschool children. Hence, measures to improve parental KAP should be considered for better oral health outcomes in children.

Keywords: Attitude, Children, Early childhood caries, Knowledge, Parents, Practice

INTRODUCTION

Parental knowledge and their attitudes play a crucial role in preventing oral diseases and promoting their children's oral health.¹ In young children, parents and caregivers are essential in maintaining their oral health. Since children spend majority of their time with their parents, parental influence is a primary factor in shaping good oral health habits in young children.² Parents bear sole responsibility

for their child's oral health. Numerous studies have explored their knowledge, attitudes, and practices (KAP) across various populations, recognizing these factors as crucial social determinants of oral health.³⁻⁷

Dental caries is among the most prevalent non-communicable diseases in children and continues to be a significant global public health concern.⁸ The American Academy of Pediatric Dentistry (AAPD) defines early

childhood caries (ECC) as the presence of at least one decayed (cavitated or non-cavitated), missing (due to caries), or filled tooth surface in any primary tooth of a child aged 71 months or younger.⁹ According to the Global Burden of Disease, over 530 million children worldwide suffer from dental caries in their primary teeth.¹⁰ That's an enormous number accounting to nearly one in every four children globally dealing with a preventable disease that can cause pain, infections and long-term health consequences.

ECC advances rapidly, and if left untreated, it can result in chronic pain, speech impairments, changes in appetite, difficulty chewing, weight loss, malnutrition, and sleep disturbances. These issues may negatively affect a child's overall growth and development. These issues can adversely affect growth and development. Further progression without treatment can lead to tooth loss, which will compromise the future of permanent dentition eruption and occlusion.¹¹ The consequences of untreated dental caries are multidimensional, affecting not only overall health but also the children's quality of life, with significant social, psychological, and biological implications.¹²

Since young children rely on their parents, it is essential for parents to have sufficient knowledge about the factors influencing their child's oral health, including proper dental care, healthy dietary habits, and beneficial behaviours.¹³ Knowledge of the parents regarding infant's oral health care will be beneficial in reducing the burden of ECC in children.⁶ Therefore, exploring their KAP regarding ECC prevention are important considerations in an attempt to improve children's well-being. Although previous studies have assessed for the parental KAP regarding ECC, there is a paucity of information regarding the association between KAP and ECC in parent-child dyad. Hence this study aimed to determine the association between knowledge, attitude, practices and ECC among parent-child dyad in Bangalore city. It was hypothesized that there is an association between parental KAP and ECC status in their children.

METHODS

This analytical cross-sectional study is reported according to STROBE guidelines for observational studies¹⁴ and the study protocol was approved by the Institutional Review Board and Ethics Committee. Necessary permissions were obtained from Deputy Director of Public Instructions, Block Education Officers of 4 zones of Bangalore city (For preschools) and the Department of Women and Child Welfare (For Anganwadis). The investigator was trained and calibrated before commencement of the study. The Kappa coefficient value (*k*) for intra-examiner reliability for the study tools was 0.90 reflecting a high degree of conformity in observation.

The study participants included 3-5-year-old preschool children and their parents. This study was done between November 2023-24. The participants were recruited from government schools/Anganwadis, aided and private schools in Bangalore city. The study protocol was explained to school authorities and permission were obtained. Written informed consent was obtained from the parents.

According to a previous study, the prevalence of early childhood caries was 48%.⁶ Sample size was calculated using the formula

$$N = \frac{Z_{\alpha/2}^2 \cdot p(1-p)}{E^2}$$

p= prevalence or proportion (57%); $Z_{\alpha/2}$ =1.96 at 95% confidence interval; E=margin of error-10%; Statistical power =80%. By substituting the values, sample size estimated to be 416, which was rounded off to 432 parent-child pairs.

List of schools, under the streams of Government, Aided and Private sectors was obtained from DDPI. These schools were plotted in Bangalore map, divided into four zones (North, East, South, and West) and from each zone one Government/Anganwadi, Aided and Private school was selected making up a total of 12 schools. Stratified cluster random sampling was employed to select 108 parent-child dyad from each zone with equal representation for males and females corresponding to the age (3-5 years) and type of school. Parents and their preschool children aged 3-5 years were included in the study. Parents with vision or hearing or speech impairment or obvious signs of cognitive impairment and children with any systemic disease or hard and soft tissue pathologies which make intraoral examination difficult were excluded.

A pre-validated KAP questionnaire¹ was used which comprised questions on parental knowledge (17), attitude (6) and practices (6) related to ECC. Cross cultural validation of questionnaire used to assess parent's KAP regarding ECC was performed by means of forward and back translation (English to Kannada and Kannada to English) with the help of linguistic experts. ECC was assessed among children using World Health Organization (WHO) Oral Health Assessment Form for Children, Proforma 2013.¹⁵

Parental responses to the questionnaire was recorded through interview by an investigator during school working hours which took about 10-15 minutes for each parent. This was followed by the oral health examination of the child. The children were seated on a comfortable chair and examined under natural light. Clinical assessment for dental caries was performed using WHO proforma 2013 and recorded by a single calibrated investigator.

Statistical analysis

All statistical analyses were done using SPSS version 26 software package trial version (IBM, Corporation. SPSS Inc., Chicago, IL, USA). The normality of data was checked using the Kolmogorov-Smirnov test. Descriptive analysis with mean and standard deviation and percentage (proportion) was done for continuous and ordinal data, respectively. Based on the responses from parents to the KAP questionnaire regarding ECC, scores were computed. Correct response to knowledge questions were scored 1 point each, with scores ranging from 0 to 17, categorized as poor (0-7), fair (8-14), and good (15-17). The attitude section, comprising six questions on a five-point Likert scale, assigned a score of 1 for responses of "strongly agree" or "agree." Attitude scores were classified as negative (0-4) or positive (5-6). Practice-related questions, with a total score range of 0 to 6, were categorized as poor (0-2), fair (3-4), and good (5-6) based on correct responses. Bivariate associations between KAP

and ECC experience in parent-child dyad were analysed using chi-square tests. Variables with $p < 0.20$ were considered for multivariate analyses. Pearson's correlation was used to find out the correlation between these variables. Multivariate models adopted hierarchical linear regression analyses, which tested for the linear effect of one or more variables after controlling for all other variables. A $p < 0.05$ was considered as statistically significant.

RESULTS

A total of 432 parent-child dyads were included in the study. The mean age of parents and children was 30.4 ± 3.64 and 4.0 ± 0.82 years, respectively. There was almost equal representation of the respondents (Mothers: 53%; Fathers: 47%). More than half of the parents had an education level of intermediate/ diploma or higher (53%) with an occupation of skilled worker or above (65%) and belonged to middle class or above (68%).

Table 1: Socio-demographic distribution of study participants.

Variable	N (%)
Age group of parents (in years)	
18-24	44 (10)
25-34	270 (63)
35-44	118 (27)
Age of children (in years)	
3	144 (33)
4	143 (33)
5	145 (34)
Gender of parents	
Male	205 (47)
Female	227 (53)
Gender of children	
Male	221 (51)
Female	211 (49)
Type of school	
Government/Anganwadis	147 (34)
Government - Aided	138 (32)
Private - Unaided	147 (34)
Socioeconomic status according to Modified Kuppuswamy scale	
Upper	59 (14)
Upper middle	68 (16)
Lower middle	166 (38)
Upper lower	139 (32)
Lower	0 (0)

Categorization of parents with respect to KAP is shown in Table 1. There was no significant difference between boys and girls with respect to ECC experience (Table 2). Children of those parents who had good knowledge/practice and a positive attitude showed no ECC experience ($\text{dmft}=0$) when compared to those who had poor knowledge/practice and negative attitude (Figure 1-

3). Correlation analysis showed a moderate negative correlation between parental KAP and ECC experience (Figure 4). Multivariate linear regression analysis revealed parental KAP to be significant predictors of ECC, while occupation of Head of the family was found to be a significant predictor of ECC in model 1 and 2 with ECC being kept as dependent variable (Table 3).

Table 2: Distribution of the study participants (parents) according to KAP on ECC.

KAP	Male (n=205;47.4) N (%)	Female (n=227; 52.6) N (%)	Total (n=432; 100) N (%)	p value
Knowledge				
Good	43 (10)	28 (6)	71 (16)	0.045*
Fair	116 (27)	136 (31)	252 (58)	
Poor	46 (11)	63 (15)	109 (26)	
Attitude				
Positive	135 (31)	128 (30)	263 (61)	0.085
Negative	70 (16)	99 (23)	169 (39)	
Practice				
Good	81 (19)	80 (19)	161 (38)	0.076
Fair	68 (16)	69 (16)	137 (32)	
Poor	56 (12)	78 (18)	134 (30)	

* - Significant

Table 3: Number and percentage of the study participants (children) with decayed, missing and filled tooth due to ECC.

Study participants	dmft=0	dmft≥1	Mean dt	Mean mt	Mean ft	Mean dmft
Male (n=221)	95 (21.9)	126 (29.1)	3.04±3.83	0.01±0.11	0.15±0.56	3.19±3.80
Female (n=211)	78 (18.1)	133 (30.7)	2.76±3.58	0	0.31±0.87	3.01±3.65
Total (n=432)	173 (40.2)	259 (59.8)	2.90±3.71	0.01±0.11	0.22±0.71	3.10±3.73

p=0.133

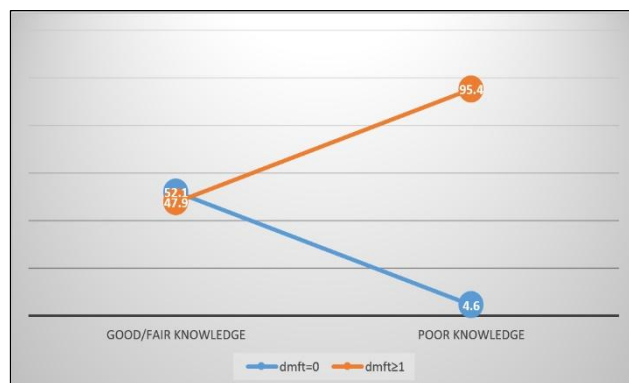
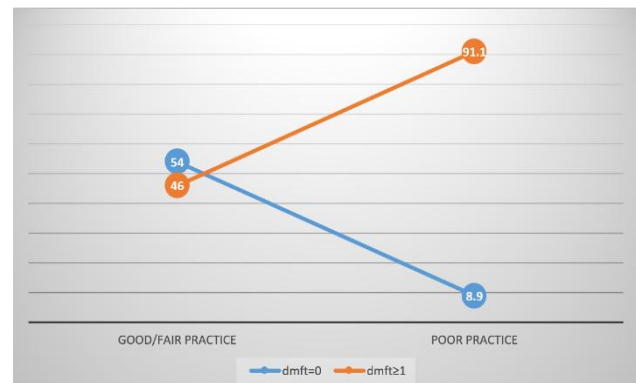
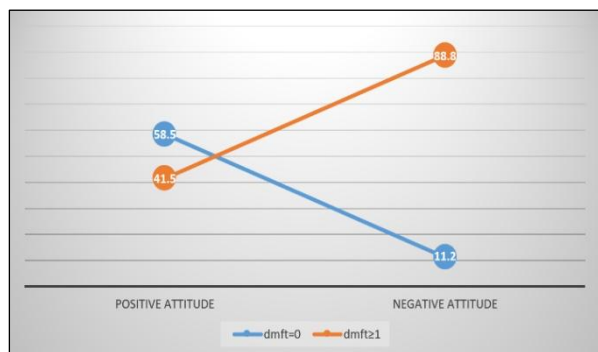
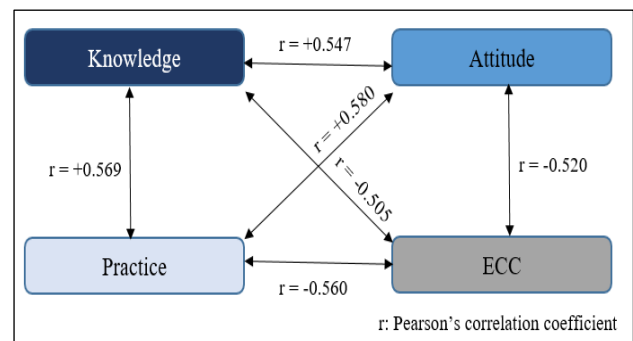
**Figure 1: Association between parental knowledge and ECC (dmft) in children.****Figure 3: Association between parental practice and ECC (dmft) in children.****Figure 2: Association between parental attitude and ECC (dmft) in children.****Figure 4: Correlation between parental KAP and ECC in children.**

Table 4: Multivariate regression model with ECC as dependent variable.

Models	Unstandardized B	Standardized Coefficients β	P value	95% CI for B	
				Lower Bound	Upper Bound
Model 1					
(Constant)	6.817	-	<0.001	4.895	8.790
Education of head of the family	-0.035	-0.014	0.762	-0.259	0.190
Occupation of head of the family	-0.292	-0.194	<0.001	-0.450	-0.133
Socioeconomic status	-0.334	-0.091	0.089	-0.718	0.051
Model 2					
(Constant)	9.985	-	<0.001	8.148	11.823
Education of head of the family	-0.045	-0.018	0.657	-0.244	0.154
Occupation of head of the family	-0.157	-0.104	0.031	-0.299	-0.014
Socioeconomic status	-0.084	-0.023	0.629	-0.427	0.259
Parental knowledge	-2.744	-0.472	<0.001	-3.238	-2.250
Model 3					
(Constant)	9.990	-	<0.001	8.251	11.729
Education of head of the family	-0.019	-0.008	0.845	-0.207	0.170
Occupation of head of the family	-0.128	-0.085	0.064	-0.263	0.007
Socioeconomic status	0.044	0.012	0.791	-0.283	0.371
Parental knowledge	-1.745	-0.300	<0.001	-2.288	-1.202
Parental attitude	-1.291	-0.338	<0.001	-1.647	-0.934
Model 4					
(Constant)	10.117	-	<0.001	8.447	11.786
Education of head of the family	-0.027	-0.011	0.773	-0.208	0.154
Occupation of head of the family	-0.086	-0.057	0.196	-0.216	0.045
Socioeconomic status	0.106	0.029	0.506	-0.208	0.421
Parental knowledge	-1.148	-0.198	<0.001	-1.704	-0.593
Parental attitude	-0.866	-0.227	<0.001	-1.234	-0.498
Parental practice	-1.357	-0.307	<0.001	-1.793	-0.920

CI: Confidence Interval

DISCUSSION

Early childhood caries is the most common chronic disease of childhood globally. Although dental caries' levels have been declining around the world, the problem of early childhood caries has remained unchanged in many areas of the globe, especially the socially deprived.⁷ It therefore becomes essential to address the issue which is considered a major public health problem worldwide.⁸

The present study which was conducted to determine the association between parental KAP and ECC in children revealed a moderate negative correlation between each other. Age group of children in earlier studies ranged from 0-5 years.^{2,4,16,17,19,20} The children's age group in the present study was 3-5 years with a mean age of 4.0 ± 0.82 years. In the previous studies, most of the respondents were mothers which was similar to the current study with mothers comprising around 53%.^{1,2,4,7,17,18,21-23} Gender-wise distribution of the children varied in previous studies with a higher proportion of males (55.4%-66.7%) as compared to females (33.3%-44.6%), while gender wise distribution of children was equal in the current study.^{2,19,24}

Regarding parental responses to knowledge questionnaire in previous studies: participants showed a gap in knowledge regarding early signs of caries (white lines or spots). According to Nassar et al, only 32% knew about bacterial transmission through item-sharing or kissing or its role in caries development.¹ Less than half of the respondents were aware of professionally applied preventive measures, such as pit and fissure sealants/topical fluoride application and their function and the techniques by which they are applied.^{1,2,9,20} Parents had a good knowledge regarding the time of eruption and importance of primary tooth tooth decay affecting children under 2 years of age need for balanced diet to prevent tooth decay importance of fluoride toothpaste^{1,4,18} and the causes of tooth decay.^{1,24,3,4,7,24}

Similar results were found in the current study with a lacuna in parental knowledge regarding first signs of dental caries with only 34% being aware that white spots are the first signs of tooth decay. Only 14% of the participants knew what pit and fissure sealants are. Parents showed good knowledge regarding the time of eruption of primary teeth, importance of primary teeth, importance of fluoride toothpaste and causes of tooth decay in children. The knowledge regarding importance

of fluoride toothpaste could be attributed to dentifrice companies' repeated advertisements which reinforced fluoride importance in their products.¹ Good parental knowledge regarding cariogenicity of sweets and chocolates and preventive effect of fluorides could be explained by concepts that are repeatedly being reinforced in the media and in local health care set-ups.⁴

Mothers showed better knowledge regarding ECC compared to fathers.^{1,17,22} Compared with mothers, fathers were significantly less aware of issues, such as hidden sugar in food and the association between the frequency of breastfeeding or bottle feeding with ECC, especially at night.¹ The fathers disregarded the importance of cleaning babies' mouths even before teeth eruption, and unlike the mothers, they believed that children can achieve effective teeth cleaning without parental assistance.¹ On the contrary, current study revealed that fathers had a better knowledge regarding ECC in the current study. This could be explained by the fact that in some populations, fathers may have had greater access to formal education or health literacy programs, giving them more exposure to information about oral health. Furthermore, modern shifts in parenting roles mean fathers may be more involved in childcare, including learning about and addressing health concerns like ECC.

Health-related behaviours are influenced by attitude, with oral health being no exception.⁸ Among the previous studies, one study had categorized parental attitude and it showed that 4.6% had good, 54.3% had medium and 41.2% had poor attitude regarding ECC.²³ In the current study, it was found that 61% of the participants had positive attitude and 39% had negative attitude towards ECC with no statistically significant difference between male and female.

It has been discovered that the practices of parents have an impact on their children's oral health.¹ Mohammad Al-Dahan et al reported that 26.8% had good, 68.6% had moderate practice and 4.6% of the participants had poor knowledge regarding ECC.²³ In another study, the overall mean good practice and bad practice score were 33.5% and 18.5% respectively.⁷ In the current study, 38% had good, 32% had fair and 30% had poor practice regarding ECC which is comparable to previous studies. Parental practice was found to be poor in aspects like taking the child to a dentist only in case of pain or trauma, giving sugary or cariogenic food in between meals, not brushing/wiping child's teeth/gums just before bed.^{1,8,25,7,20} Giving sweetened liquid in bottles was practiced by 53% of the caretakers.³

Good practice observed by the parents were children regularly attending routine dental check-ups or cleanings, not feeding children with same utensils used by parents, brushing twice or more per day and using fluoride toothpaste.^{20,21,24,1,2,23,4,11,25} In the current study, more than three-fourth of the parents reported that they take their child to a dentist rarely or only in case of pain/trauma.

Most of the parents gave sugar or cariogenic food to children in between meals as found in previous studies. Almost half of the participants reported that they brush child's teeth twice or more/day. Around three fourth of the parents said that they did not feed their children with same utensils used by them for eating and their child had never used a sweetened baby bottle.

Children were more likely to have ECC if their caregiver disagreed that primary teeth were important.¹⁸ In addition, significantly more caregivers of children with ECC believed that caries could not affect a child's health (78.3%) than caregivers of children who were caries free (21.7%).¹⁸ Primary caregivers of children with ECC were significantly more likely to disagree that comforting a baby with a bottle while teething was an acceptable practice.¹⁸ Caregivers of children with decay were significantly more likely to disagree that the practice of allowing an infant to nurse in bed all night was safe.¹⁸

Children whose caregivers believed that primary teeth are important had significantly fewer decayed teeth.¹⁸ However, the correlation between these variables were not assessed in previous studies. Current study revealed that there was a robust association between parental knowledge, attitude, practice and ECC experience with parental KAP showing moderate negative correlation with ECC experience. This could probably be due to the fact that parents with greater knowledge are more likely to implement good oral hygiene practices for their children, such as brushing with fluoride toothpaste, limiting sugary snacks, and ensuring regular dental visits. Furthermore, lack of knowledge can lead to delayed recognition of ECC symptoms, allowing the condition to progress. According to the World Health Organization, a comprehensive strategy to prevent ECC in children cannot be carried out independently but must involve the contributions of many stakeholders such as healthcare professionals, educators, healthcare providers, parents and the child.²⁴

To the best of our knowledge, this is the first study to determine the association between knowledge, attitude, practices and early childhood caries in parent-child dyad in India. Performing multivariate linear regression analysis to determine the predictors of ECC adds strength to the study. The study incorporated parents and their children across Bangalore city from government, aided and private schools. Hence the results of the current study may be generalizable to similar population.

However, the limitations of our study includes cross sectional study design and the bias which would be inherent in questionnaire studies. In the future, longitudinal studies are required to establish causal relationships and to ascertain the role of parental knowledge, attitude and practices in early childhood caries experience among their children. Interventional studies are required in the form of targeted education sessions, parenting workshops or mobile health (mHealth)

programs to improve parental KAP regarding ECC and see if it would have an impact on child's oral health.

CONCLUSION

There is robust association between parental KAP and ECC experience in children. The association between parental KAP and ECC underscores the importance of engaging parents in the fight against this preventable condition. Through education, community support and policy initiatives, public health efforts can empower parents to take charge of their children's oral health, paving the way for healthier futures and stronger communities.

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