

Baby oral health promotion centre at a tertiary care hospital in India: A successful model for prevention of early childhood caries

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Abstract

Background: Dental caries is the most common chronic disease of the oral cavity. Early childhood caries (ECC) occurs in children less than 71 months of age and can affect the teeth as soon as they erupt. In both developed and developing countries, ECC is a serious public health problem especially for a low socioeconomic group of population. To prevent ECC, children with high risk for caries must be identified at an early age and aggressive strategies must be adopted. In an attempt to achieve a caries-free generation, 'Baby oral health promotion clinic' was established.

Objective: To evaluate the effectiveness of establishing a baby oral health promotion clinic in reducing the burden of ECC.

Method: A longitudinal cohort design was adopted. The children visiting the paediatric outpatient department (OPD) for immunization were screened and 150 children were recruited for this study by simple random sampling. All parents in the study were given oral health education through a one to one counselling. To reinforce oral health education, oral health pamphlets were also provided. Intraoral examination was conducted at birth and at 3 monthly intervals for a period of five years. On completion of one year, each child was assessed for caries risk using baby oral health promotion centre (BOHPC) caries risk evaluation form.

Results: Among the 150 recruited subjects, 45 were lost to follow up. A total of 105 children were followed up from birth to five years. Out of 105 subjects who were followed up 37% had a risk of

developing caries and 1.9% actually developed ECC suggesting that 98% of children were caries-free at the end of 5 year follow-up.

Conclusions: The baby oral health promotion clinic appears to be practical, cost-effective, evidence-based, population-specific, and is successful for the prevention of ECC.

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(Key words: Baby oral health promotion, early childhood caries, infant oral health care)

Introduction

Dental caries is the most common chronic disease of the oral cavity¹. Early childhood caries (ECC) occurs in children less than 71 months of age, and can affect the teeth as soon as they erupt. ECC rapidly destroys the deciduous dentition of the child, and when left untreated, leads to pain, acute infection, nutritional insufficiencies, and learning and speech problems².

In both developed and developing countries ECC is a serious public health problem especially for the low socioeconomic group of population³. ECC is prevalent across the globe, with around 1-12% in developed countries. However, in the socially backward groups, prevalence increases to 70% in developing countries⁴. Prevalence of ECC varied from 2.1% to 85% in Sweden and rural Chinese children respectively. According to the literature, highest prevalence of ECC is among 3-4 year old children with low socioeconomic backgrounds. A systematic review on the prevalence of ECC in India reported an overall prevalence of 49.6%; with Sikkim having the lowest prevalence rate of 41.9% and Andhra Pradesh, the highest prevalence rate of 63%. In Karnataka ECC prevalence varied from 15% to 81.3%⁷.

Better knowledge about ECC and adoption of preventive measures can reduce the burden of ECC in terms of complications of the disease, its treatment, and quality of life⁸. The responsibility is on child health care professionals, which can be achieved through baby oral health education to caregivers. Most of the oral diseases affecting children are preventable. Prevention can be achieved by early intervention through awareness programmes and oral health examination.

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Preventive oral health educative programmes have shown an increase in parental knowledge⁹.

Since the children from birth to 5 years are seen more by a paediatrician than a paediatric dentist, introducing oral screening and oral health education as a part of healthy baby check-up right from infancy will have a positive impact on the parents¹⁰. Children with high risk for caries can be identified at an early age and aggressive strategies can be adopted like anticipatory guidance, behaviour modifications concerning oral hygiene and feeding practices and establishment of a dental home by the time the first tooth erupts. In an attempt to achieve this, 'Baby oral health promotion clinic' was established at the Department of Paediatrics. There are no studies documented in India about the availability of baby oral health promotion centre in the paediatric set up at a tertiary care hospital.

Objective

To evaluate the effectiveness of establishing the baby oral health promotion centre (BOHPC) in reducing the burden of ECC.

Method

A longitudinal cohort design was adopted, with the subject being recruited through simple random sampling. The study was conducted at baby oral health promotion clinic in the Department of Paediatrics, tertiary care hospital, Mysore. In a single day, more than 200 children visit the OPD of the Department of Paediatrics, for vaccination. All the children visiting the paediatric OPD for immunization at birth were screened for a period of 6 months and 150 children were recruited for this study based on inclusion criteria by a simple random sampling method. Inclusion criteria were as follows:

- Children born at term (≥ 37 weeks of gestation) and children born preterm (born before 37 completed weeks of gestation).
- Parents of Indian origin and residing in Mysore for at least three generations;
- Subjects belonging to rural population with class II and class III (upper middle and lower middle) socio economic status (Kuppuswamy SES scale 2014).

Ethical issues: Ethical approval for the study was obtained from the Institutional Ethics Committee of JSS Academy of Higher Education and Research, Mysore, Karnataka, India (No. JSS/ ACP/ Ethical/

2012-13). Written informed consent was obtained from parents willing to participate in the study.

All the parents in the study were given oral health education by the paediatric dentist through a one to one counselling. To reinforce the oral health education, oral health pamphlets with information written in the local language were also provided. Intraoral examination was conducted by the paediatric dentist at birth and at 3 monthly intervals for a period of five years. At each visit, oral health education was reinforced and eruption status was evaluated. Caries risk was evaluated using BOHPC caries risk evaluation (BOHPC-CRE) form every year coinciding with the child's birthday up to 5 years (Figure 1).

BOHPC-CRE form adopted from CAMBRA is one of the best caries risk indicator for children. Here caries risk is evaluated by three parameters viz. risk of developing caries, protective factors available to prevent development of caries, and oral examination to evaluate the presence or absence of caries. Caries risk indicators in children <6 years old are assessed by parental interview. If the mother has active caries, siblings have caries or a history of caries, the child is born premature, there is a practice of nocturnal bottle feeding or breast feeding after the teeth erupts, if there is in between meal snacking or if there is >3 times sugar exposure, such children are categorised as high risk for caries development.

Child with problems like cleft lip/palate, Down syndrome etc. and children who are medically compromised like haematological diseases, respiratory distress etc. are on continuous medication which exposes them to caries risk as medicated syrups have a high sugar content in order to make them palatable to the child. If the child is not exposed to protective factors such as fluoridation, brushing and regular dental visit, this pushes the child towards the high risk category. On examination, if there is non-cavitated or cavitated ECC, then also the child falls into high risk category.

The total risk is quantified based on the balance between caries risk factors and protective factors along with oral examination. If shaded boxes are more than the unshaded boxes then the child is quantified as high risk for caries development and followed up every 3 months giving them health education handouts and self-management goals.



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BOHPC - Caries Risk Evaluation (0- 6 years)

OP number:

Name:

Age/Sex:

Place:

Ph no:

Education:

Occupation:

Income:

SES:

Questionnaire

Reason for referral:			
<input type="checkbox"/> Initial visit <input type="checkbox"/> Follow up visit			
Parent interview: Caries Risk Indicators	Y	N	Remarks
i. Mother / active primary caregiver has an active decay in the past 12 months			
ii. Siblings with history of decay			
iii. Pre-term delivery			
iv. Bottle use for > 15months content in bottle (plain water/milk)			
v. Mother nurses on demand /child sleeps with bottle			
vi. Sugar frequency (>3x/day) in between meal snaking			
vii. Medical issues:			
a. Developmental problems			
b. Medically compromised			
c. Use of syrups			
Parent interview: Protective Factors	Y	N	Remarks
i. Child lives in fluoridated community			
ii. Child cleans/ brushes with fluoridated toothpaste (wipes/cloth/ pea size/smear layer)			
iii. Topical fluoride applied on child's teeth in last 6 month			
iv. Regular Dental visit			
Oral examination: LIFT THE LIP			
i. White spot lesions(decalcification)/obvious decay present on child's teeth			
Early childhood caries (ECC) diagnosis	Y	N	
a. No visible ECC			
b. Non-cavitated ECC			
c. Cavitated ECC			
ii. Plaque is obvious on teeth/ gum bleed s easily			
ASSESSMENT :			
The balance between the area shaded in red (risk indicators) and unshaded areas (protective factors) provides the risk status of child as : Low High			
PLAN:		Self management goals:	
Referral of high risk patients		• Regular dental visit	
Health Education Handouts		• Parents receiving dental care	
Self management goals		• Less snaking between meals	

Figure 1: BOHPC caries risk evaluation form

Results

This was a longitudinal cohort study conducted over a span of 5 years. Among the 150 recruited subjects, 45 were lost to follow up. A total of 105 children were followed up from birth to five years. The mean age of the mothers of the recruited

subjects was 26.1 years. The maternal characteristics are described in Table 1. Mean birth weight, birth length and head circumference were 2.43±0.34kg, 49.96±4.66cm and 32.32±2.21cm respectively. The child characteristics are described in Table 2.

Table 1: Maternal characteristics (n=105)

Characteristic	n (%)
<i>Mode of delivery</i>	
Vaginal	48 (45.7)
Caesarean	57 (54.3)
<i>Term of delivery</i>	
Preterm	51 (48.5)
Full term	54 (51.5)
<i>Parity</i>	
First	63 (60.0)
Second	42 (40.0)
<i>Socio-economic class</i>	
Upper middle	73 (69.5)
Lower middle	32 (30.5)

The mean age of eruption of the first primary tooth (mandibular central incisor) was 10.44±1.89 months and all the primary teeth erupted by 27.59±3.38 months in term children and the mean age of eruption of the first primary tooth (mandibular central incisor) was 11.46±1.25 months and all the primary teeth erupted by 30.49±2.69 months in pre term children. The

corrected age was considered for preterm children. Birth weight and birth length that was below 25th percentile and above 75th percentile showed a delayed eruption of first primary teeth. Complementary feeding introduced after 9 months also showed a delayed eruption of first primary tooth. However socioeconomic status, parity, gender and mode of delivery did not affect the eruption timing (Table 3).

Table 2: Child characteristics (n=105)

Characteristic	n (%)
<i>Gender</i>	
Male	64 (60.9)
Female	41 (39.1)
<i>Feeding practice</i>	
Exclusively breastfed	82 (78.1)
Mixed feeding	23 (21.9)
<i>Introduction of complementary feeding</i>	
6-9 months	55 (52.4)
10-12 months	50 (47.6)

Table 3: Multivariate analysis of factors affecting eruption timing of first primary tooth

Factor	Mean (SD)	B (SE)	p-value
<i>Mode of delivery</i>			
Caesarean	11.16 (1.31)	-0.398 (0.450)	0.382
Vaginal*	11.77 (1.13)		
<i>Term of delivery</i>			
Preterm	11.16 (1.31)	1.340 (0.619)	0.036
Full term*	10.55 (1.87)		
<i>Socio-economic status (SES)</i>			
Upper class	11.46 (1.25)	-0.379 (0.444)	0.398
Lower class*	11.62 (1.13)		
<i>Parity</i>			
Second	11.27 (1.26)	0.155 (0.457)	0.317
First*	11.60 (1.24)		
<i>Gender</i>			
Male	11.42 (1.22)	-0.434 (0.424)	0.312
Female*	11.51 (1.33)		
<i>Birth weight</i>			
Extreme	12.50 (1.36)	0.140 (0.547)	0.029
Normal*	11.26 (0.66)		
<i>Birth length</i>			
Extreme	11.47 (1.14)	0.263 (0.721)	0.034
Normal*	10.45 (1.29)		
<i>Birth head circumference</i>			
Extreme	11.68 (1.26)	0.668 (0.708)	0.351
Normal*	11.39 (1.26)		
<i>Weight for gestational age (GA)</i>			
Small for GA	12.33 (1.06)	0.328 (0.461)	0.050
Appropriate for GA*	11.50 (1.33)		
<i>Feeding Practice</i>			
Combination	11.40 (1.28)	-0.107 (0.523)	0.838
Breastfed*	11.45 (1.25)		
<i>Complementary feeding</i>			
> 9 months	11.56 (1.33)	0.575 (0.540)	0.029
≤ 9 months	10.12 (0.89)		

*Reference group; R square =0.144

On completion of one year, each child was assessed for caries risk using BOHPC caries risk evaluation form. 37% (n= 39) of the subjects showed risk of developing caries. These subjects were more frequently interviewed and oral health education was reinforced. At 3 year follow up each child was reassessed for caries risk. Risk of developing caries reduced to 12% (n=13). At the end of 5 years, 98% of children were caries free and 1.9% actually developed ECC.

Discussion

ECC has a significant oral health burden on the child population. Hence it requires a strategically planned preventive programme. Infant/baby oral health care is one such programme which targets on the prevention of development of oral diseases in children. For a successful infant oral health programme, early intervention is necessary^{11,12}. It helps to provide access to oral care, provide anticipatory guidance and prevent ECC. The best opportunity to provide infant oral health care in India is during the child's vaccination schedule.

A child visits the paediatrician more frequently in the first two years for vaccination purposes. Though they are in a better place to introduce infant oral health care, it's the primary responsibility of a paediatric dentist to provide oral health education and anticipatory guidance to the parents/ caregivers. On an informal interview with mothers it was noted that >80% of mothers did not initiate tooth brushing in their wards up to 2 years of age, although the guidelines recommend cleaning of the tooth on eruption of first tooth. In a survey conducted on paediatricians of Mysore city, only 26% of the paediatrician recommend to clean the tooth as soon as the first tooth erupts and only 48% referred to the paediatric dentist when they noticed ECC¹³.

In an attempt to provide comprehensive health care and promote oral health to all the children visiting the hospital, paediatrician and paediatric dentists collaboratively introduced 'Baby oral health promotion clinic' in the Department of Pediatrics, JSS Hospital (tertiary care hospital). In 5 years span 5329 children aged less than 5 years were evaluated for oral health. The goal of this clinic was to provide preventive and interceptive oral health care for infants and young children, implementation of oral hygiene measures right from infancy, assess risk factors for early childhood caries, dietary assessment and provide age appropriate guidance for oro-facial injury prevention

In order to know the effectiveness of this special clinic, 150 children were recruited and followed up for 5 years. More than 98% of the subjects were

caries free at the end of 5 years. Our study cannot be directly compared to other studies as this study has been done in a tertiary hospital where the children belong to mixed group in terms of their socioeconomic status. However, the outcome of oral health education on development of ECC may be compared. Braun *et al* reported similar finding stating that children less than 3 years old who received oral health promotion programme had reduced ECC¹⁴.

Plutzer K, *et al*¹⁵ in their study stated that oral health promotion programme with repeated reinforcement of anticipatory guidance reduced the incidence of S-ECC. However, in this study follow up was done only till 18 months of age; at this age the disease process is at its early stage and many of the subjects who might progress to develop caries were not recorded. In the present study each child was frequently evaluated and oral hygiene methods were reinforced at each visit and followed up to 5 years.

As stated by Lemos LV, *et al*¹⁶ it is absolutely necessary to enrol children below one year of age in oral health programmes in order to promote lifetime good oral health. In this clinic all the parents were trained on feeding practices, introduction of toothpaste and tooth brush, importance of fluoride treatment and injury prevention. The advantage of establishing such a clinic in the paediatric set up is that the child is examined frequently for oral health and the parents are reinforced repeatedly about the importance of primary teeth and maintenance of oral health in children. Also the reinforcement of oral health through paediatricians had a positive impact. Such clinics can be set up in the primary health care centres and anganwadi workers can be trained in this regard so that even the rural population will be benefited from baby oral health promotion.

One limitation of this study is that only a small cohort has been followed up. Further multi centric studies with larger cohorts will be helpful in reducing the burden of ECC.

Conclusions

The baby oral health promotion clinic appears to be practical, cost-effective, evidence-based, population-specific, and is successful for the prevention of ECC.

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