

# Assessment Of Infant's Cooperation and Mother's Preferences During the Removal of Biofilm Using Tooth Wipes and Wet Gauze - A Cross Over Trial

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## ABSTRACT

**Aim of the study:** To assess the effectiveness of tooth wipes wet gauze piece in removal of biofilm from anterior teeth of children aged between 8 to 24 months. To evaluate the babies cooperation level and mothers' acceptance rate during biofilm removal.

**Materials and methods:** A cross over (within subjects) study was conducted among 30 children aged between 8 to 24 months. The participants were randomly divided into two groups. The mothers' in both the groups used two different biofilm removal methods (tooth wipes and wet gauze piece) one in each intervention phase.

**Results:** Tooth wipes and wet gauze both significantly reduced the biofilm ( $p < 0.05$ ). Babies had better behavior using tooth wipes, and mothers accepted tooth wipes compared to wet gauze ( $p < 0.05$ ).

**Conclusion:** Tooth wipes are more effective in removing dental biofilm and are well accepted by mothers as well as babies.

**Keywords:** Dental biofilm, Early Childhood Caries, Infants, Oral Hygiene Methods

## INTRODUCTION

Dental caries in infants and toddlers has distinctive pattern, most commonly known as Early Childhood caries (ECC). ECC has been considered to be an epidemic disease in the developing countries.<sup>1</sup> ECC is one of the major public health problems in India as it not only affect teeth, but it also has significant impact on growth and development of young children. The prevalence of ECC in India is considered to be 44% among 8 to 48 months old.<sup>2</sup> It is frequently associated with improper bottle feeding practices and poor oral hygiene measures. Poor oral hygiene is a foundation for formation of dental biofilm, which is a highly structured surface attached microbial community.<sup>3</sup> If the oral biofilm is left uncleaned, then microorganisms will use this opportunity to cause common infectious diseases such as dental caries and periodontitis. One of the effective aims in managing ECC is to prevent biofilm/

dental plaque formation, which involves education and training of parents/caregivers on removal of dental biofilm. Ideally dental plaque removal aids should be easy to use, safe, and acceptable to both child and parent. No pediatric oral hygiene aid available in market is considered as an ideal. Although published studies have shown that wet clothes, tooth brushes and finger mounted tooth brushes are effective in removing biofilm in infants, but none of the studies have tested for their safety, easiness and acceptability.<sup>3,4,5,6</sup>

To our best knowledge only one study has been published on acceptability of mechanical plaque aids by babies and their parents/caregivers.<sup>7</sup> Result of this study cannot be considered as absolute even though tooth wipes was best accepted method by parents/ caregivers. It is due to constant supervision of investigators during oral hygiene performance by parents/caregivers. However to the best of our knowledge no study has been conducted in India, to understand the cooperation and acceptance of babies as well as parents while removing dental biofilm. Hence our null hypotheses would be: no difference in cooperation level of infants' and mothers' preferences in removing dental biofilm using tooth wipes and wet gauge.

## **MATERIALS AND METHODS**

The present study is designed, analyzed and interpreted according to the CONSORT guidelines.

### **Study design and study population:**

A Cross-over examiner blinded trial was conducted among infants' aged between 8 to 24 months attending OPD section of Pedodontia department of Bapuji Dental College and Hospital, Davangere. The study protocol was approved by Institutional Review Board of Bapuji Dental College and Hospital. Written voluntary informed consent was obtained from parents or care givers after explaining the purpose and procedures of the study.

Infant's aged between 8 to 24 months with good general health, having any four caries free primary incisors with at least half of the crown is exposed to oral environment, and babies who consume bottled milk with no oral hygiene practice by parents were included in the study.

### **Sample size:**

We assumed a priori that 20% of our study participants' would drop out to by 14 days. Power of the study was fixed at 80%. A sample of 30 infants was enrolled in the study. Each group consisted of 15 infants.

### **Experimental procedure:**

Professional oral prophylaxis and baseline biofilm assessment –

All the selected 30 infants' underwent professional oral prophylaxis. It was performed by using rubber cup with pumice paste. This was done to standardize the oral hygiene status of the babies. After the prophylaxis mothers were instructed to perform routine oral hygiene measures for four days followed by no oral hygiene for two days. Thus formed initial biofilm or plaque (baseline biofilm) was assessed using Quigley Hein plaque index modified by Turesky. The children were randomly divided into two cross over groups, two experimental periods of seven days. Random allocation of groups was done by the person who was not involved in the study, using computer randomized technique. Group A: Gauge 10X10 cm dipped in filtered water, Group B: Spiffies tooth wipes.

**Instructions to parents / caregivers –**

Mothers were instructed to wrap allotted material on their index finger. The wrapped index finger should gently rub the baby's teeth and gums. Both the groups were instructed not to use dentifrice to clean the tooth surface and also instructed to perform cleaning in the morning and night hours. The total time for oral hygiene procedure was standardized to 60 -90 seconds. A checklist was provided to each mother to assess compliance. They were instructed to mark a tick after using the assigned biofilm removing material. If they had missed using the assigned material, they were asked to mark a cross and mention the reason for not using it. The usage of assigned material was supervised telephonically by the investigator by contacting the mothers'.

**Post biofilm assessment –**

On seventh day post biofilm assessment was done for both the groups. Compliance was assessed at the end of the experiment.

**Washout period –**

Each experiment group underwent one week assessment plan consisting of baseline, and post intervention plaque/biofilm assessment followed by two days washout period. During washout phase babies underwent professional oral prophylaxis.

Assessment of dental biofilm using Quigley Hein plaque index modified by Turesky<sup>9</sup>-

The oral hygiene status was assessed by placing infant in a knee to knee position. The disclosing solution was applied on the selected anterior teeth and biofilm/plaque was assessed using scoring criteria. The entire procedure was carried out by a blinded and calibrated examiner.

**Assessment of cooperation of babies and parental satisfaction during oral hygiene procedure –**

A structured behavior assessment questionnaire was given to the mothers to rate behavior level of their infants during oral hygiene performance and instructed to comply with the checklist. Questionnaire consists of three closed ended questions.

1. Cooperative – baby is cooperative with the mother till the completion of biofilm removal.
  2. Partially cooperative – mild crying, with some willingness to cooperate during biofilm removal
  3. Non cooperative – refusal, constant crying, trying to escape
- The parental acceptance had 3 categories
1. Non-acceptance – Complete removal of biofilm on selected anterior teeth taking more than 90 sec, even though the baby is cooperative
  2. Partial acceptance – Feeling of remnants of plaque on teeth even after cleaning
  3. Total acceptance – Complete removal of plaque achieved within 90sec.

**Statistical analysis:**

The data was collected in a systematic manner, and subjected to statistical analysis using SPSS 20. In the present study two tailed statistical tests were used as the research hypothesis was non directional. To compare the biofilm methods at baseline and seventh day independent 't' test was applied. To compare the cooperation level of babies and mother's acceptance during biofilm removal between groups was assessed Mann Whitney U test. All the statistical tests were carried out with a significant

value fixed at  $p < 0.05$ .

**RESULTS**

In age wise distribution out of a total of 30 participants, 14 participants (47%) belonged to one year age group and 16 participants (53%) belonged to two year age group. In sex wise distribution, 13 participants (43%) were males and 17 participants (57%) were females.

Table 1 depicts baseline and post biofilm index values of both the groups. Both the methods were able to remove biofilm from baseline to seventh day ( $p < 0.05$ ). Furthermore, tooth wipes showed greater reduction in biofilm on seventh day compared to wet gauze method. ( $p < 0.05$ ).

Table 2 & 3 reflect babies’ behavior and mothers’ acceptance according to different biofilm removal methods. Babies in the tooth wipes group behaved well during biofilm removal ( $p < 0.05$ ). All the mothers’ preferred tooth wipes to clean their babies teeth ( $p < 0.05$ ).

**Table 1 Intergroup comparison of baseline and post biofilm index values**

Groups	Baseline biofilm Mean±SD	post biofilm Mean±SD	Mean difference Mean±SD
Wet Gauze	1.78±0.35	1.25±0.21	0.53± 0.24
Tooth wipes	1.81±0.44	0.71±0.20	1.10± 0.39
p value	<0.05		

**Table 2 Assessment of children’s behaviour in both biofilm removal methods**

Groups	Non cooperative	Partially cooperative	Cooperative
Wet Gauze	1	8	6
Tooth wipes	0	2	13
p value	<0.05		

**Table 3 Assessment of mother’s acceptance in both biofilm removal methods**

Groups	Non acceptance	Partial acceptance	Acceptance
Wet Gauze	0	8	7
Tooth wipes	0	0	15
p value	<0.05		

**DISCUSSION**

The results of this study suggest that tooth wipes are more effective in removal of plaque from anterior teeth in children aged 8 to 24 months. Both tooth wipes and wet gauze significantly reduced biofilm from anterior teeth. This finding is in line with study conducted by Almeida et al.<sup>6</sup> It is interesting to note that, in addition to the primary finding of effective plaque removal, tooth wipes more effectively removed biofilm. This confirms findings of Abanto et al<sup>7</sup> and Almeida et al.<sup>6</sup> This could be due to the texture and thickness of tooth wipes. Wet gauze is thicker and difficult to completely remove plaque from the tooth and surrounding gum area.

According to literature regular use of preventive measures such as tooth brushing, wet gauze

piece, xylitol are effective in reducing microbial load. The appreciable reduction of MS counts could be due to decreased interaction between cariogenic bacteria and acquired pellicle, which is essential for the bacterial adhesion to tooth.<sup>9</sup> Many infants and young children experience difficulties in accepting regular tooth-brushing habits. An investigation evaluated children's perceived acceptance and parent satisfaction of specialized infant toothbrushes in children 7 to 23 months of age.<sup>10</sup> The assessment of parental satisfaction and perceived baby acceptance of oral hygiene practices after nightly feeding habits in infants, however, has never been reported in India. In India, there is a lack of parental education regarding infant oral health. Since primary teeth are only temporary and will be replaced by permanent teeth, the majority of Indian mothers frequently neglect to brush them after feeding their children at night.<sup>11</sup> The current study attempted to evaluate daytime and night-time parental satisfaction and perceived baby's acceptance regarding the use of the novel infant tooth wipe versus a wet gauze piece.

This investigation finding demonstrated that mothers' were satisfied with the tooth wipes after nightly feedings. This observation might be due to the fact that a number of mothers spontaneously reported that the infant's sleep was not disrupted with the use of the tooth wipes. It was surprised to note that some mothers' reported being more concerned with disrupting their infant's sleep via an oral hygiene practice than with the increased caries risk of habitually putting their baby to sleep with a bottle-/breast-feeding without a post feeding oral cleaning.

Similarly, the infants' perceived acceptance was significantly higher with the tooth wipes at night-time. The fact that the wipes allow the mother to provide smoother and more soothing oral sensory movements in the infant's mouth might have influenced this result. However, the wipes are not a replacement for the toothbrush. They should be used in conjunction with tooth-brushing and any other effective cleaning method, most importantly before the infant's longest sleeping time. There are evidence that predental stage is not sterile and predominantly infected with *S mutans*.<sup>11,12,13</sup> Because of this reason, the use of the wipes can be also considered as a first step to oral cleaning, before the eruption of primary teeth.

The present study is a cross over design. The advantage of a cross over design or within subject design is that the subjects themselves act as their own controls and hence the expected subject variance is minimized to least and it is considered more powerful design. In our study washout period of two days was used. This period was sufficient to reduce the carryover effect of the intervention as the biofilm returned to baseline within two days hence eliminating any possibility of cross over effect.

The limitation of our study is subjective criteria are used to assess the child's cooperation and acceptance by mothers'. The scales which were used to assess cooperation and mothers' acceptance not yet been validated. In the present study tooth wipe performed better in removal of biofilm. The tooth wipes were well accepted by the babies as well as mothers. Hence it can be used along with mechanical plaque control methods to broaden the preventive measures. Parents may be educated to use tooth wipes to clean the teeth in difficult circumstance such as in social places, during travel, and at night.

## CONCLUSION

The tooth wipes are an effective method of biofilm removal for babies aged between 8 to 24 months. This method is also well accepted by mothers as well as babies.

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**DECLARATION OF CONFLICT OF INTEREST:**

The authors have no conflict of interest

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