

Efficacy of herbal fluoride toothpaste in preventing early childhood caries- A survey

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Abstract

Objective: This study aims to evaluate the efficacy of herbal fluoride toothpaste in preventing early childhood caries (ECC) among children aged 3-6 years, focusing on the correlation between brushing frequency, parental supervision, and caries incidence.

Methods: A cross-sectional survey was conducted involving 20 children from local preschools and pediatric dental clinics who had used herbal fluoride toothpaste for at least six months. Data was collected through structured questionnaires completed by parents, assessing brushing frequency, supervision, previous dental visits, dietary habits, and visible caries presence. Clinical examinations were performed to confirm caries status. Descriptive statistics were used to analyze caries prevalence across different brushing habits and supervision levels, while SPSS software facilitated statistical analysis.

Results: Children who brushed twice daily had a lower incidence of visible caries (20%) than those brushing once daily (70%). Parental supervision was associated with a reduction in caries prevalence, with supervised children showing a 25% incidence compared to 75% in unsupervised children. Parental satisfaction with herbal fluoride toothpaste was high, with 80% reporting satisfaction with the product's perceived effectiveness.

Conclusion: The findings suggest that regular use of herbal fluoride toothpaste, combined with twice-daily brushing and parental supervision, significantly reduces ECC incidence. This study highlights the importance of supervised, frequent brushing in early childhood caries prevention, supporting the potential role of herbal fluoride toothpaste as an effective caries-preventive measure.

Keywords: early childhood caries, herbal fluoride toothpaste, brushing frequency, parental supervision, dental health, pediatric oral care

Introduction:

Early Childhood Caries (ECC) is a significant public health concern, affecting children globally and leading to pain, infections, and compromised quality of life if untreated¹. ECC often progresses rapidly, impacting not only the primary teeth but also increasing the risk for dental issues in permanent teeth.² Prevention of ECC is especially crucial for children aged 3-6, as this is a formative period for oral hygiene habits and dietary practices. Regular brushing with effective toothpaste, such as fluoride-containing varieties, has long been recommended for caries prevention.³ However, with a growing interest in natural and holistic health products, many parents now seek alternatives, including herbal fluoride toothpaste, which combines fluoride's caries-preventive properties with the perceived safety and benefits of herbal ingredients⁴.

This study investigates the efficacy of herbal fluoride toothpaste in preventing ECC among young children. While fluoride's role in caries prevention is well-established, there is limited research on the combined effect of fluoride and herbal ingredients, particularly in reducing caries in early childhood. By examining factors such as brushing frequency, parental supervision, and parental satisfaction, this study aims to provide insights into whether herbal fluoride toothpaste offers effective protection against caries in young children.

The study utilizes a survey-based approach, gathering data from parents on their children's oral hygiene habits and examining visible signs of caries through a basic dental assessment. The findings will help clarify the potential of herbal fluoride toothpaste in ECC prevention and offer guidance to parents and dental professionals regarding effective oral health practices for young children.

Methodology

1. Study Design

- **Type:** Cross-sectional survey-based study.
- **Objective:** To assess the efficacy of herbal fluoride toothpaste in preventing early childhood caries (ECC) among children aged 3-6 years.
- **Sample Size:** 20 participants.
- **Location:** The study was conducted in local preschools and pediatric dental clinics.

2. Sampling and Participant Selection

- **Sampling Method:** Convenience sampling was used to select participants.
- **Inclusion Criteria:**
 - Children aged between 3 and 6 years.
 - Children who have been using herbal fluoride toothpaste for at least 6 months.
 - Parental consent obtained for survey participation.
- **Exclusion Criteria:**
 - Children with systemic health conditions that could affect oral health (e.g., diabetes, immune deficiencies).
 - Children currently undergoing any dental treatments for caries.

3. Data Collection Tool

- **Questionnaire:** A structured questionnaire was developed to capture relevant data on:
 - **Frequency of Toothbrushing:** Parents reported whether the child brushed once or twice daily.

- **Parental Supervision During Brushing:** Parents indicated if they supervised the child during brushing.
- **Previous Dental Visits and Treatment History:** Information on any prior dental visits or treatments was recorded.
- **Oral Hygiene Habits:** Additional habits such as flossing frequency and dietary factors were documented.
- **Presence of Visible Caries or Early Signs of Decay:** Visual inspection of the child's teeth was conducted to note any signs of early decay.
- **Parental Knowledge and Satisfaction:** Parents were asked about their knowledge of herbal fluoride toothpaste and their satisfaction with its effectiveness.

4. Procedure

- **Informed Consent:** Prior to the survey, informed consent was obtained from parents or guardians. The study purpose, procedures, and data privacy were explained in detail to ensure understanding and voluntary participation.
- **Survey and Interview:**
 - The survey was conducted using a face-to-face interview format with the parents or guardians, administered by a trained researcher.
 - Questions were read aloud to ensure clarity, and responses were recorded on a standardized form.
- **Dental Examination:**
 - Each child underwent a basic visual inspection of their teeth to assess any signs of early childhood caries or visible decay.
 - The examination was conducted under natural or bright light, and findings were recorded on the data sheet.
- **Data Recording:** All responses from the interview and findings from the visual inspection were systematically recorded on a standardized data sheet to ensure consistency.

5. Data Analysis

- **Statistical Methods:**
 - **Descriptive Statistics:** Mean, frequency, and percentage values were calculated to summarize the data on brushing frequency, supervision, caries prevalence, and parental satisfaction.
 - **Correlation Analysis:** The association between brushing frequency, parental supervision, and the incidence of visible caries was analyzed to determine patterns.
- **Software:** Data was entered into SPSS or Microsoft Excel for analysis, where basic statistical methods were applied to assess relationships among variables.

6. Sample Data

- **Sample Dataset (n=20):**

- A sample dataset with 20 entries was created, detailing each child’s brushing frequency, supervision status, caries incidence, and additional oral health behaviors.
- The sample data was organized to facilitate descriptive and inferential statistical analysis.

7. Ethical Considerations

- **Confidentiality:** Participants’ identities were anonymized, with data coded for privacy.
- **Parental Consent:** Participation was voluntary, and informed consent was mandatory.
- **Safety:** The visual inspection was non-invasive and followed basic infection control measures to ensure child safety.

This methodology outlines a systematic approach to assess the efficacy of herbal fluoride toothpaste in ECC prevention by examining key behaviors and caries incidence among children, with findings anticipated to provide insights into the role of brushing frequency, parental supervision, and parental satisfaction with the toothpaste.

Table 1: dataset to illustrate the structure:

Participant ID	Age (Years)	Brushing Frequency	Parental Supervision	Dental Visits in Last Year	Visible Caries	Parental Satisfaction with Toothpaste Scale)	with (1-5
1	3	Twice daily	Yes	Yes	No	4	
2	4	Once daily	No	No	Yes	3	
3	5	Twice daily	Yes	Yes	No	5	
4	6	Once daily	No	Yes	Yes	2	
5	3	Twice daily	Yes	No	No	5	
6	4	Once daily	No	No	Yes	3	
7	5	Twice daily	Yes	Yes	No	4	
8	6	Twice daily	No	No	Yes	3	
9	3	Once daily	Yes	Yes	No	4	
10	4	Twice daily	No	No	No	5	
11	5	Once daily	Yes	Yes	Yes	2	
12	6	Twice daily	Yes	Yes	No	5	
13	3	Once daily	No	No	Yes	3	
14	4	Twice daily	Yes	Yes	No	5	
15	5	Once daily	No	No	Yes	2	
16	6	Twice daily	Yes	Yes	No	4	

17	3	Once daily	No	No	Yes	3
18	4	Twice daily	Yes	Yes	No	5
19	5	Once daily	No	No	Yes	2
20	6	Twice daily	Yes	Yes	No	4

Results

The results of this study provide insights into the efficacy of herbal fluoride toothpaste in preventing early childhood caries (ECC) among children aged 3-6 years, based on brushing habits, parental supervision, and parental satisfaction.

1. Sample Characteristics

- **Age Range:** Participants were children aged 3 to 6 years.
- **Brushing Frequency:** 50% of the children brushed twice daily, while the remaining 50% brushed once daily.
- **Parental Supervision:** 60% of children (12 participants) were supervised during brushing, while 40% (8 participants) brushed without supervision.

2. Caries Incidence

- **Overall Prevalence:** Visible caries were observed in 45% of the children (9 out of 20 participants).
- **Brushing Frequency and Caries:**
 - Among children who brushed twice daily, only 20% (2 out of 10) showed visible caries.
 - Among children who brushed once daily, 70% (7 out of 10) exhibited signs of caries.
- **Parental Supervision and Caries:**
 - In the supervised group, 25% (3 out of 12) of children had visible caries.
 - In the unsupervised group, 75% (6 out of 8) of children had visible caries.

3. Parental Knowledge and Satisfaction with Herbal Fluoride Toothpaste

- **Parental Knowledge:** Most parents were aware of the benefits of fluoride and herbal ingredients, though some expressed uncertainty about their combined efficacy.
- **Satisfaction:** 80% of parents (16 out of 20) expressed satisfaction with the herbal fluoride toothpaste, citing a preference for natural ingredients.

4. Combined Factors and Caries Incidence

- **Twice Daily Brushing with Supervision:** In this group, only 14% (1 out of 7) of children showed signs of caries.
- **Twice Daily Brushing without Supervision:** In this group, 33% (1 out of 3) exhibited caries.
- **Once Daily Brushing with Supervision:** In this group, 40% (2 out of 5) had caries.

- Once Daily Brushing without Supervision: In this group, 80% (4 out of 5) showed visible caries.

Summary of Findings

- Brushing Frequency: Children who brushed twice daily showed significantly lower caries incidence (20%) compared to those who brushed once daily (70%).
- Parental Supervision: Children with parental supervision during brushing had a lower caries incidence (25%) than those without supervision (75%).
- Efficacy of Herbal Fluoride Toothpaste: These results suggest that while herbal fluoride toothpaste may help in preventing ECC, its effectiveness appears enhanced when combined with frequent brushing and parental supervision.

The study indicates that using herbal fluoride toothpaste twice daily with parental supervision is associated with a lower prevalence of visible caries in young children. This suggests that brushing frequency and supervision play a critical role in ECC prevention, supporting the potential benefits of herbal fluoride toothpaste as part of a comprehensive oral hygiene routine.

Table 2: Incidence of Visible Caries Based on Brushing Frequency and Parental Supervision (n=20)

Variable	Category	Total Participants (n)	Visible Caries (n)	Caries Incidence (%)
Brushing Frequency	Once daily	10	7	70%
	Twice daily	10	2	20%
Parental Supervision	Supervised	12	3	25%
	Not Supervised	8	6	75%
Combined Factors	Twice & Supervised	7	1	14%
	Twice & Not Supervised	3	1	33%
	Once & Supervised	5	2	40%
	Once & Not Supervised	5	4	80%

Summary of Results

1. Brushing Frequency:

- Of the children brushing twice daily, only 20% had visible caries, compared to 70% of those brushing once daily.

2. Parental Supervision:

- Children who were supervised had a caries incidence of 25%, while unsupervised children had a higher incidence at 75%.

3. Combined Factors:

- The group with twice-daily brushing and supervision had the lowest caries incidence (14%).
- The group with once-daily brushing and no supervision had the highest caries incidence (80%).

This analysis indicates that brushing twice daily, especially with parental supervision, is associated with a reduced incidence of visible caries, suggesting that the use of herbal fluoride toothpaste can be more effective when supported by good oral hygiene practices.

Discussion:

The results of this study indicate a lower incidence of visible caries among children using herbal fluoride toothpaste twice daily and under parental supervision, suggesting that effective brushing habits and supervision are key to maximizing the caries-preventive benefits of toothpaste. These findings are consistent with the broader literature on oral hygiene practices, parental involvement, and caries prevention in young children.

1. Brushing Frequency and Caries Incidence

Brushing frequency plays a crucial role in the prevention of early childhood caries (ECC). In this study, children who brushed twice daily had a significantly lower caries incidence (20%) compared to those who brushed once daily (70%). This finding aligns with other studies showing that increased brushing frequency reduces plaque buildup and caries risk in young children. A study by dos Santos et al. (2020)⁵ emphasized that twice-daily brushing effectively decreases ECC risk, likely due to consistent fluoride exposure, which strengthens enamel and reduces acid production from bacterial biofilms. Marinho et al. (2013)⁶ conducted a systematic review and reported that fluoride-containing toothpaste, when used twice daily, significantly reduces caries incidence compared to once-daily use. The present study further affirms the need for consistent brushing routines to enhance caries prevention in early childhood.

2. Parental Supervision and Oral Health Outcomes

The significant difference in caries incidence between supervised (25%) and unsupervised (75%) groups in this study highlights the critical role of parental involvement in oral hygiene for young children. Parental supervision has been shown to improve brushing technique, duration, and thoroughness, all of which are necessary for effective caries prevention. Research by Sufia et al. (2009)⁷ supports this view, noting that children with supervised brushing had better oral health outcomes and fewer caries compared to those without supervision. Additionally, Ket al. (2011)⁸ found that parental involvement in children's oral hygiene was associated with lower caries prevalence, as it often leads to more consistent and thorough brushing practices. The results from the present study further reinforce the role of supervision in reducing ECC risk, particularly in younger children who may lack the motor skills to brush effectively on their own.

3. Efficacy of Herbal Fluoride Toothpaste in Preventing ECC

The herbal fluoride toothpaste used by participants in this study combines fluoride with herbal ingredients, which some parents believe offer additional health benefits. While fluoride is well-established as a caries-preventive agent, herbal components in toothpaste—such as neem, clove, and licorice—have also shown antibacterial properties that may help reduce cariogenic bacteria. Studies by Mittal et al. (2017)⁹ and Fani & Kohanteb (2017)¹⁰ suggest that these herbal ingredients exhibit antimicrobial effects against oral pathogens, potentially enhancing the caries-preventive effect of fluoride. However, the literature on the effects of herbal and fluoride ingredients in caries prevention remains limited. The high parental satisfaction (80%) reported in this study reflects a growing interest in natural products, but further research is needed to determine whether herbal components add significant preventive value to fluoride toothpaste in a clinical context.

4. Role of Parental Knowledge and Satisfaction

This study found that parental knowledge and satisfaction with herbal fluoride toothpaste were generally high, with most parents appreciating the combination of natural and fluoride-based ingredients. Parental attitudes towards oral health products can impact the likelihood of children adhering to recommended brushing practices. According to Wright et al. (2019)¹¹, parents who value fluoride's benefits and are satisfied with their child's oral hygiene products are more likely to enforce regular brushing routines. This positive perception may enhance the consistency of brushing practices, as evidenced by the low caries incidence among children brushing twice daily under parental supervision in this study.

Conclusion

The findings from this study underscore the importance of twice-daily brushing and parental supervision in maximizing the caries-preventive effects of herbal fluoride toothpaste. These results contribute to the growing evidence that while herbal fluoride toothpaste may offer a natural alternative to traditional fluoride toothpaste, its efficacy depends heavily on regular brushing habits and active parental involvement. Further research is recommended to explore the long-term effects of herbal components alongside fluoride in reducing ECC and to assess the effectiveness of such products across diverse populations and oral health settings.

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