Effectiveness of a Structured Teaching Programme on Knowledge Regarding Baby Bottle Tooth Decay Among Mothers of Toddlers in Community Settings of Rajouri District, Jammu and Kashmir: A Pre-Experimental Study

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Abstract

Background: Baby bottle tooth decay, a severe and preventable form of early childhood caries, remains highly prevalent worldwide and contributes to pain, infection, early tooth loss, and long-term oral complications in young children. Mothers are primary caregivers and play a central role in preventive oral health practices during the toddler years.

Objectives: To assess the level of knowledge regarding baby bottle tooth decay among mothers of toddlers, to evaluate the effectiveness of a structured teaching programme (STP) on their knowledge, to compare the pretest and post-test knowledge and to examine associations between pre-test knowledge and selected socio-demographic variables.

Methods: A pre-experimental, adopted a one group pre-test–post-test design in selected community areas of Rajouri district, Jammu and Kashmir, for a one-month duration (Sept to October 2023). A total of 120 mothers of toddlers were selected using random sampling. Data were collected using a validated structured knowledge questionnaire (25 items; reliability r=0.82), and the STP (45 minutes, lecture–discussion with audiovisual aids. Pre-test and post-test knowledge scores were analysed using descriptive statistics, paired t-test, independent t-test, and chi-square test at 0.05 significance.

Results: Overall, 85% of mothers had inadequate pre-test knowledge, and 15% had moderate knowledge; none had adequate knowledge. The overall mean pre-test score for the combined sample was 16.03±1.67 (maximum 30). Following the STP, 95.83% of mothers showed adequate knowledge and 4.17% had moderate knowledge, with a mean post-test score of 27.21±0.98. The improvement in knowledge was highly significant (paired t=30.75**, p<0.01), demonstrating the effectiveness of the STP. Significant associations were observed between pre-test knowledge and age, type of family, occupation, source of information, and socioeconomic status.

Conclusion: The structured teaching programme was highly effective in improving mothers' knowledge regarding baby bottle tooth decay, suggesting that nurse-led educational interventions in community settings can strengthen primary prevention of early childhood caries. Integration of such programmes into routine maternal and child health services is recommended.

Keywords: baby bottle tooth decay; early childhood caries; mothers; toddlers; structured teaching programme; oral health education; pre-experimental study

Introduction

Baby bottle tooth decay, often referred to as early childhood caries, nursing caries, or comforter caries, is a rapidly progressive form of dental caries that predominantly affects the maxillary incisors and frequently involves primary molars.[1] It is strongly associated with prolonged and inappropriate bottle-feeding practices, especially nocturnal feeding with sweetened liquids, and can begin soon after tooth eruption.[2] If untreated, baby bottle tooth decay can cause pain, difficulty in chewing, disturbed sleep,

speech problems, and psychosocial issues, and may predispose to malocclusion, abscess formation, and decay in the permanent dentition.[3]

Despite global declines in caries experience in some high-income countries, early childhood caries remains a substantial public health concern in both developed and developing settings.[4] Studies from England and the United States report early childhood caries prevalence ranging from about 6.8–12% and 11–53.1%, respectively.[5] A review of caries in maxillary anterior teeth among young children documented particularly high prevalence in parts of Africa and South-East Asia.[6] In India, prevalence of caries among children aged 8–48 months has been reported around 44%, and the National Oral Health Survey (2014–2016) documented caries prevalence of 53.8% and a mean DMFT of 1.8 in children younger than 12 years.[7] Regional studies, including work from Andhra Pradesh and Jammu and Kashmir, have also highlighted a high burden of early childhood caries in preschool children, especially in low socioeconomic groups.[8,9]

Multiple factors contribute to baby bottle tooth decay, including frequent exposure of teeth to fermentable carbohydrates in feeding bottles, nocturnal bottle feeding, delayed initiation of oral hygiene, limited access to preventive dental care, and low caregiver awareness.[10] Mothers of toddlers are central to prevention because they largely determine feeding patterns, bedtime routines, and daily oral hygiene practices.[11] Several studies have shown gaps in parental knowledge regarding early childhood caries and its prevention, and have recommended targeted educational interventions for caregivers.[12,13]

Nurses working in community health and maternal–child health services are strategically placed to provide systematic health education and counselling to mothers on infant and toddler oral health.14 Structured teaching programmes, designed with clear objectives and standardized content, can be an efficient, low-cost strategy to improve caregiver knowledge and influence preventive behaviour.[15]

The present study was conducted in selected community areas of Rajouri district, Jammu and Kashmir, to assess the baseline knowledge of mothers of toddlers regarding baby bottle tooth decay, implement a structured teaching programme, and evaluate its effectiveness using a pre-experimental design.

Materials and Methods

Study design and setting

A quantitative, pre-experimental research approach using a one group pre-test–post-test design was employed. The study was conducted in selected community areas of Rajouri district, Jammu and Kashmir, India, chosen for feasibility, availability of eligible mothers, and administrative approval.

Population and sample

The target population comprised all mothers of toddlers residing in the community areas of Rajouri district. The accessible population included mothers of toddlers in the selected community areas who met the inclusion criteria. A total sample of 120 mothers of toddlers was selected. Purposive sampling was used for the selection of the study participants.

Inclusion criteria

- Mothers of toddlers willing to participate in the study
- Mothers able to understand Hindi or English (or Urdu, as per operational criteria)
- Mothers available during the data collection period

Exclusion criteria

- Mothers unwilling to participate
- Mothers not available at the time of data collection
- Mothers who had been exposed to a similar educational programme on baby bottle tooth decay in the preceding six months

Variables

- Research variable: Level of knowledge of mothers regarding baby bottle tooth decay.
- Socio-demographic variables: Age, type of family, education, occupation, socioeconomic status and Information source.

Tool development and validation

Data were collected using a structured interview schedule developed by the investigator based on a literature review, blueprint preparation, and expert input. The tool comprised:

- Section A: Socio-demographic proforma with 10 item such as age, type of family, education, occupation, source of information, previous knowledge, socioeconomic status, spouse education, spouse occupation, access to information).
- Section B: Structured knowledge questionnaire with 30 multiple-choice items covering definition, causes, risk factors, signs and symptoms, complications, and prevention/management of baby bottle tooth decay.

Each correct response was scored 1, and each incorrect response 0, giving a maximum score of 30. Knowledge levels were categorised as:

- Inadequate: 0–14
- Moderate: 15–23
- Adequate: 24–30

Content validity was established by a panel of seven experts in child health nursing, medical professionals, and a statistician, who reviewed items for relevance, clarity, and coverage; suggested modifications were incorporated. Reliability was assessed by the test–retest method (Karl Pearson correlation) on a subset of mothers, yielding r=0.82, indicating acceptable reliability.

Structured Teaching Programme (STP)

The STP was developed as a 45-minute session using a lecture-cum-discussion supported by charts and other audiovisual aids. The content covered:

1. Introduction and definition of baby bottle tooth decay
2. Etiology and risk factors (feeding practices, nocturnal bottle use, sugary liquids)
3. Signs and symptoms and progression of lesions
4. Short- and long-term complications
5. Preventive practices (appropriate feeding, bottle weaning, oral hygiene, dental visits)
6. Simple management and referral for suspected caries

Internal validity of the STP content and sequence was established through expert review.

Data collection procedure

Formal administrative permission was obtained from relevant authorities (e.g., Block Medical Officer, Community Health Officer) of the selected community areas. Ethical principles of informed consent, confidentiality, and voluntary participation were observed.

Data collection was carried out over approximately one month from 5th Sept to October 5th 2023.

Day 1:

- Rapport was established with mothers in both groups.
- Pre-test knowledge was assessed using the structured questionnaire (self-administered or interviewer-administered as needed).
- Immediately after the pre-test, the STP was delivered only to the experimental group (45 minutes).

Day 7 (post-intervention):

Post-test knowledge was assessed in both groups using the same structured questionnaire.

Data Analysis

Data was analysed using both descriptive and inferential test statistics. SPSS v25 was used for data analysis. Descriptive such as mean ± SD, frequency %) and inferential statistics, paired t-test, χ^2 were used. ($p<0.05$ level).

Results

Section I: Demographic Characteristics

Table 1: Socio-Demographic Profile **(N=120)**

Variable	Category	f (%)
Age	20-25	41 (34.2)
	26-30	54 (45.0)
	31-35	5 (4.2)
	36-40	20 (16.7)
Type of Family	Nuclear	52 (43.3)
	Joint	68 (56.7)
Education	Primary	47 (39.2)
	Secondary	37 (30.8)
	Higher Sec	17 (14.2)
	Graduate+	19 (15.8)
Occupation	Govt Job	22 (18.3)
	Private	35 (29.2)
	Housewife	50 (41.7)
	Other	13 (10.8)
Socioeconomic Status	Lower	63 (52.5)
	Middle	37 (30.8)
	Higher	20 (16.7)
Information Source	Relatives	47 (39.2)
	Internet	33 (27.5)
	Newspaper	25 (20.8)
	Others	15 (12.5)

Section II: Pre-test Knowledge Assessment

Table 2: Pre-test Knowledge Distribution (N=120)

Knowledge Level	f	(%)
Inadequate (0-14)	102	85.0%
Moderate (15-23)	18	15.0%
Adequate (≥24)	0	0.0%

Section III: Post-test Knowledge Assessment

Table 2: Post-test Knowledge Distribution (N=120)

Knowledge Level	f	(%)
Inadequate (0-14)	0	0.0%
Moderate (15-23)	05	4.2%
Adequate (≥24)	115	95.8%

Section IV: Effectiveness of STP on knowledge regarding Baby bottle tooth decay

Table 3: Mean SD, Median, Range and inferential statistics, Paired t test; Comparison of pre and post-test level of knowledge (N=120)

Parameter	Mean ± SD	Median	Mode	Range	Paired t	df	p
Pre-test Knowledge	16.03±1.67	16	17	8-19	30.75	119	<0.001**
Post-test Knowledge	27.21±0.98	28	28	21-28			

*Highly Statistically Significant

Section V: Pre-Test Associations

Table Association between pretest knowledge and sociodemographic variables (N=120)

Variable	χ^2	df	p
Age	17.06**	6	<0.01
Type of Family	10.11**	2	<0.01
Occupation	19.10**	6	<0.01
Information Source	23.3**	6	<0.01

(*Significant at 0.01)

Discussion

Effectiveness: 69% knowledge gain aligns with Indian STP trials (pre-test 9.3 to post-test 21.93)[14] and Iranian mothers (significant self-efficacy rise).[15] Near-ceiling post-test effects reflect intervention potency in low-literacy settings.

Baseline Deficits: 85% inadequate knowledge mirrors global patterns (Iraq 5.1/20, India parental gaps).[11, 12] Relatives (39%) as primary source indicates misinformation risk as well as evidence-based source of information channels.[14]

Demographic Associations/Influences: Age, occupation, Socioeconomic status associations reflect exposure/literacy effects; housewives (41.7%) showed largest gains, supporting targeted delivery.[16]

Limitations

The study might have a risk of Self-report bias.

The study was delimited to a specific geographical region (Rajouri-specific).

Implications/Recommendations

Integrating STP into ICDS/Anganwadi training and training ASHA workers, along with the development of multilingual modules, is essential for improving knowledge among the targeted populations.

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Declaration of Interests of Conflict

None declared

Conclusion

Structured teaching programme is highly effective in improving maternal knowledge regarding baby bottle tooth decay, with this study demonstrating a 69% knowledge gain and 95.8% achieving adequate levels post-intervention.

These findings establish STP as a scalable, low-cost prevention strategy for India's 44-55% early childhood caries burden regions, particularly in underserved rural areas like Jammu & Kashmir.[17]

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