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Dr. Kojagori Chaudhuri
MDS (Post Graduate Trainee), Department of Paediatric and Preventive Dentistry, Guru Nanak Institute of Dental Sciences and Research, WBUHS, Kolkata, West Bengal, India

Dr. Shabnam Zahir
Professor & Head, Department of Paediatric and Preventive Dentistry, Guru Nanak Institute of Dental Sciences and Research, WBUHS, Kolkata, West Bengal, India

Dr. Piyali Datta
Associate Professor, Department of Paediatric and Preventive Dentistry, Guru Nanak Institute of Dental Sciences and Research, WBUHS, Kolkata, West Bengal, India

Dr. Sumit Bandyopadhyay
MDS (Post Graduate Trainee), Department of Paediatric and Preventive Dentistry, Guru Nanak Institute of Dental Sciences and Research, WBUHS, Kolkata, West Bengal, India

Dr. Poulami Das
MDS (Post Graduate Trainee), Department of Paediatric and Preventive Dentistry, Guru Nanak Institute of Dental Sciences and Research, WBUHS, Kolkata, West Bengal, India

Corresponding Author:
Dr. Kojagori Chaudhuri
MDS (Post Graduate Trainee), Department of Paediatric and Preventive Dentistry, Guru Nanak Institute of Dental Sciences and Research, WBUHS, Kolkata, West Bengal, India

Development and validation of a trilingual oral health care knowledge (OHCK) questionnaire for caregivers of children with and without special health care needs (SHCN)

Kojagori Chaudhuri, Shabnam Zahir, Piyali Datta, Sumit Bandyopadhyay and Poulami Das

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Abstract
Background: Caregiver-related knowledge and practices play a decisive role in determining the oral health trajectory of children. In a linguistically diverse country like India, the lack of culturally and linguistically validated assessment tools remains a significant limitation.
Aim: To evaluate the validity and reliability of a trilingual (English-Hindi-Bengali) Oral Health Care Knowledge Questionnaire designed for caregivers of Children with and without special health care needs (SHCN)
Materials and Methods: A total of 60 caregivers participated in the validation process. Internal consistency was assessed using Cronbach's alpha. Construct validity was evaluated by item-total correlation analysis. Test-retest reliability was established using the Intraclass Correlation Coefficient (ICC) with 95% confidence intervals.
Results: The overall Cronbach's alpha value of the questionnaire was 0.871, indicating excellent internal consistency. All items demonstrated statistically significant item-total correlations exceeding the critical value, confirming strong construct validity. Test-retest reliability showed ICC values ranging from 0.703 to 0.998, indicating acceptable to excellent repeatability.
Conclusion: The trilingual oral health care knowledge questionnaire demonstrated strong reliability and validity and is a psychometrically sound tool for assessing oral hygiene knowledge and practices among caregivers of both Children with and without special health care needs (SHCN) in the Indian population.

Keywords: Oral health questionnaire, paediatric population, special health care needs, reliability, validity, trilingual tool

Introduction

Oral diseases continue to be among the most prevalent chronic conditions affecting children worldwide and in India, with dental caries and gingival diseases significantly impacting growth, nutrition, speech, aesthetics, and quality of life [1, 2]. The establishment of healthy oral hygiene practices during childhood is critically dependent on the knowledge, attitudes, and practices (KAP) of caregivers. This influence becomes even more pronounced in children with special health care needs, where physical, cognitive, and behavioral limitations may compromise independent oral hygiene maintenance and increase disease susceptibility [3, 4].

In India, linguistic and cultural diversity poses a significant challenge to standardized oral health assessment. A large proportion of caregivers are not fluent in English, and the use of non-validated translated tools may compromise data accuracy and reliability. Simple linguistic translation without formal validation is insufficient, as it may alter conceptual meaning and psychometric integrity [5]. Therefore, there is a growing emphasis on the development and validation of culturally and linguistically appropriate tools for oral health assessment in both Children with and without special health care needs (SHCN) [6, 7].

Recent instrument development studies in paediatric dentistry emphasize that cross-cultural adaptation must include forward-backward translation, pilot testing, and psychometric evaluation, including internal consistency, construct validity, and test-retest reliability [8].

Several validated Hindi and regional-language versions of oral health questionnaires have demonstrated acceptable reliability (Cronbach's alpha ≥ 0.70) and strong temporal stability (ICC ≥ 0.70), supporting the feasibility of multilingual oral health assessment tools in Indian populations [9-11].

Furthermore, caregivers of children with special health care needs often demonstrate varied levels of oral health knowledge due to limited access to preventive services, socioeconomic barriers, and complex treatment needs [12]. Thus, a validated trilingual (English-Hindi-Bengali) oral hygiene questionnaire applicable to both Children with and without special health care needs (SHCN) is essential for accurate epidemiological research, public health planning, caregiver education assessment, and outcome evaluation of preventive interventions.

Hence, the present study was undertaken to assess the validity and reliability of a trilingual oral hygiene questionnaire designed for caregivers of both neurotypical children and children with special health care needs in the Indian paediatric population.

Materials and Methods

Study Design and Participants

This was a questionnaire validation study conducted among 60 caregivers of paediatric patients. Caregivers of both neurotypical children and children with special health care needs were included. Participants provided informed consent prior to inclusion.

Questionnaire Structure

The trilingual oral hygiene questionnaire consisted of 18 structured items assessing the following domains:

- Child's medical and medication history
- Dental visit history and dental treatment experience
- Perception of the importance of oral health
- Tooth brushing frequency and oral hygiene practices
- Type of cleaning aids and toothpaste used
- Awareness of cariogenic foods and beverages
- Recognition of early signs of dental disease
- Awareness regarding fluoride and its sources

The questionnaire was developed in English. Using forward-backward translation techniques, the questionnaire was methodically translated into Bengali and Hindi. An English-Hindi transcriptionist converted the questionnaire into Hindi. Another translator then back-translated the Hindi version into English. The person in charge of the back-translation was unfamiliar with the original English version of the questionnaire, and the two translators worked separately. After consulting with all translators and investigators, the back-translated English version was compared to the original English version, and changes were made in the Hindi version. The Bengali version was translated using a similar process.

Statistical Analysis

Internal consistency was assessed using Cronbach's alpha coefficient. Construct validity was evaluated using item-total correlation analysis with statistical significance set at the appropriate critical value for the sample size. The Intraclass Correlation Coefficient (ICC) with 95% confidence intervals was used to evaluate test-retest reliability. Statistical analysis was performed using standard reliability and validity testing procedures.

Results

Internal Consistency

The overall Cronbach's alpha for the questionnaire was 0.871, indicating high internal consistency and strong inter-item correlation. This value exceeded the commonly accepted threshold for newly developed instruments, confirming that the questionnaire reliably measures the intended construct (Table 1).

Construct Validity

All questionnaire items demonstrated item-total correlation values above the critical level, confirming that each item contributed meaningfully to the overall construct. Items related to dental service utilization, oral hygiene practices, perception of oral health importance, recognition of disease indicators, and fluoride awareness showed moderate to strong correlations. The range of "Cronbach's alpha if item deleted" values remained uniformly high, indicating that no single item adversely affected the internal structure of the scale (Table 2).

Test-Retest Reliability

The ICC values ranged from 0.703 to 0.998 across all questionnaire items, demonstrating acceptable to excellent temporal stability. Items related to the importance of oral health, dental visitation, and brushing frequency showed particularly high reproducibility. Slightly lower ICC values were observed in certain knowledge-based items related to diet and fluoride sources, reflecting expected variability in recall-based responses (Table 3).

Table 1: Internal consistency

SL No.	Dimension	Chronbach's Alpha
1.	Overall	0.871

Table 2: Construct Validity

Questions	Item-Total Correlation	Cronbach's Alpha if item removed
Is your child taking any medication?	0.742**	0.866
If yes, what medication?	0.530	0.876
Did your child ever go to a dentist?	0.576*	0.872
If yes, what dental treatment he/she received?	0.712**	0.867
Importance of good dental health (multiple responses allowed)	0.558*	0.875
Importance of good dental health for general health	0.774**	0.864
How often one needs to visit a dentist	0.461	0.878
What should be the frequency of toothbrushing?	0.629*	0.870
What do you mainly use for tooth cleaning?	0.775**	0.863
Which toothpaste do you use for your child?	0.725**	0.866
Which food group mainly causes dental decay?	0.475	0.877
Which drinks can cause tooth decay? (multiple responses allowed)	0.769**	0.865
What you need to do on finding a cavity starting in your tooth	0.556*	0.873

Blood on your toothbrush while brushing usually means	0.537	0.876
What should be your action when you regularly see blood on your toothbrush?	0.777**	0.864
Have you heard about fluoride?	0.559*	0.874
If yes, what is main benefit of fluoride for teeth?	0.450	0.878
Various sources of fluoride (multiple responses allowed)	0.594*	0.872

Table 3: Test-Retest Reliability

SL. No	Questions	ICC	95% Confidence Interval	
			Lower	Upper
1	Is your child taking any medication?	0.984	0.969	0.997
2	If yes, what medication?	0.976	0.958	0.994
3	Did your child ever go to a dentist?	0.991	0.982	0.998
4	If yes, what dental treatment he/she received?	0.938	0.742*	0.956*
5	Importance of good dental health (multiple responses allowed)	0.968	0.944	0.989
6	Importance of good dental health for general health	0.998	0.995	1.000
7	How often one needs to visit a dentist	0.987	0.971	0.996
8	Frequency of tooth brushing	0.974	0.941	0.990
9	What do you mainly use for tooth cleaning?	0.772	0.436*	0.915*
10	Which toothpaste do you use for your child?	0.904	0.821*	0.979*
11	Which food group mainly causes dental decay?	0.812	0.518*	0.931*
12	Which drinks can cause tooth decay? (multiple responses allowed)	0.703	0.301*	0.842*
13	What you need to do on finding a cavity starting in your tooth	0.728	0.328*	0.884*
14	Blood on your toothbrush while brushing usually means	0.915	0.855*	0.982*
15	What should be your action when you regularly see blood on your toothbrush?	0.803	0.645*	0.951*
16	Have you heard about fluoride?	0.753	0.399*	0.910*
17	Main benefit of fluoride	0.786	0.703*	0.957*
18	Various sources of fluoride (multiple responses allowed)	0.829	0.612*	0.946*

Discussion

The present study demonstrated strong psychometric properties for the trilingual oral hygiene questionnaire, with high internal consistency (Cronbach's alpha=0.871), statistically significant construct validity for all items, and acceptable to excellent test-retest reliability (ICC range: 0.703-0.998). These findings confirm that the questionnaire is a reliable and valid instrument for assessing oral hygiene knowledge and practices among caregivers of both Children with and without special health care needs (SHCN).

The observed Cronbach's alpha value is comparable to previously validated oral health questionnaires in Indian and international populations, where values between 0.80 and 0.90 have been reported for caregiver-based oral health tools [9, 10, 13]. Similarly, validated Hindi and regional language versions of ECOHIS, OHIP-14, and CPQ tools have demonstrated alpha values ranging from 0.82 to 0.89, supporting the internal consistency achieved in the present questionnaire [10, 11, 14].

All 18 items in the present questionnaire showed statistically significant item-total correlations exceeding the critical value of 0.254, confirming robust construct validity. Knowledge-related items addressing cariogenic diet, fluoride awareness, and recognition of early disease signs showed comparatively lower correlations than attitude- and behaviour-based items, which is consistent with previously reported trends in KAP-based oral health instruments [8, 15]. Knowledge domains are known to be more susceptible to short-term recall bias and educational exposure, particularly among caregivers of special children who often experience gaps in structured oral health education [12, 16].

The test-retest reliability results further confirm excellent temporal stability of the instrument. The highest ICC values were observed for questions related to the importance of oral health and dental visitation patterns, indicating consistent caregiver perception and reporting. Slightly lower ICC values observed in items related to diet and fluoride sources reflect expected variability in knowledge-based responses, as previously reported in multicentre questionnaire validation studies [13, 15].

From a public health and clinical perspective, the availability of a validated trilingual questionnaire applicable to both Children with and without special health care needs (SHCN) holds significant importance. Studies have shown that structured caregiver education programs significantly improve oral health outcomes among children with special health care needs, but accurate baseline assessment is critical to evaluate intervention effectiveness [16, 17]. The present tool enables standardized assessment across diverse linguistic groups, allowing its use in community surveys, hospital-based studies, preventive outreach programs, and special care dentistry settings.

However, despite strong reliability and validity, further evaluation of cross-language measurement invariance using factor analysis is recommended, as suggested by recent psychometric guidelines [5, 8]. Additionally, future multicentre studies with larger and more diverse samples should evaluate the responsiveness of this questionnaire to detect changes following oral health education interventions.

Conclusion

The trilingual OHCK questionnaire demonstrated strong internal consistency, construct validity, and excellent test-retest reliability. It serves as a robust and culturally adaptable tool for assessing oral health knowledge among caregivers of children with and without SHCN in diverse Indian populations.

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Conflict of Interest
Not available

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