

ORIGINAL ARTICLE

Development and validation of a questionnaire in Hindi language to assess Parental Knowledge, Attitude and Practices regarding Calcium and Vitamin D deficiency in children

Suresh Chand¹, Shivendra Kumar Singh², Shalini Tripathi³, Syed Faisal Afaque⁴,
Pratyaksha Pandit⁵, Ajai Singh⁶

^{1,4,6}Department of Paediatric Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh

^{2,5}Department of Community Medicine and Public Health, King George's Medical University, Lucknow, Uttar Pradesh

³Department of Pediatrics, King George's Medical University, Lucknow, Uttar Pradesh

CORRESPONDING AUTHOR

Dr. Suresh Chand, Assistant Professor, Department of Paediatric Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh, India 226003

Email: sureshdocucms@gmail.com

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ABSTRACT

Background: Despite being in temperate zone, India is endemic to nutritional rickets. However, very little has been studied on knowledge, perception and cultural practices of Indian communities, towards calcium and vitamin-D deficiency in children. **Aim & Objective:** The study aimed to develop and validate a questionnaire in Hindi language for the assessment of knowledge, attitude, and practices of parents towards calcium and vitamin D deficiency among children. **Methodology:** We searched electronic databases for item generation. The questionnaire was developed in Hindi language by five experts in the field of pediatrics, pediatric orthopaedics and community medicine using Delphi method. After language correction from Hindi language experts, a convenient sample of 30 participants filled the questionnaire and tested for internal consistency and test-retest reliability. **Results:** The overall Cronbach's alpha value for the finalized 46-item scale indicated an acceptable reliability (alpha = 0.91). The internal consistency reliability for six domains created was acceptable. The results revealed 'high' test-retest reliability, and there was no statistically significant difference noted between any of the first test and re-test corresponding values ($p > 0.05$). **Conclusion:** The present questionnaire developed in Hindi Language to assess knowledge, attitude and practices (KAP) of parents towards Calcium & Vitamin-D deficiency in children, has a good validity and reliability. This newly developed instrument could prove its use to highlight the gaps that may exist among parents. The use of this tool may help clinicians, health educators and policy makers to identify key areas of intervention with regards to Calcium & Vitamin-D deficiency in children.

KEYWORDS

Knowledge; Awareness; Practices; Vitamin D Deficiency; Calcium Deficiency; Questionnaire Validation

INTRODUCTION

A child's growing skeleton has an increased demand for calcium and vitamin D (1,2). Children and adolescents frequently suffer from calcium/ Vitamin-D deficiency (Rickets) (3). Both skeletal and extra-skeletal manifestations are present in patients with nutritional rickets. Skeletal symptoms include swollen wrists and ankles, delayed tooth eruption, knee/leg deformity, rachitic rosary, frontal bossing, craniotabes etc. On the other hand, extra-skeletal findings include muscle weakness and hypocalcemic seizures (4).

Despite being in temperate zone, India is endemic to nutritional rickets.(4) The cause of nutritional rickets usually involves a combination of low dietary intake and lack of sunlight exposure with overlapping contributions by local cultural, environmental, and genetic factors. Low sunlight exposure, air pollution, widely vegetarian diet and malnutrition might be cause of prevalent rickets in north India. (4,5) A lot has been described in literature about etio-pathogenesis of rickets and its treatment (2). Similarly, vast amount of literature is available regarding medical treatment of rickets or surgical treatment of leg deformities due to rickets. (6,7) However, very little has been studied on knowledge, perception, and cultural practices of Indian communities, especially of parents, towards calcium and vitamin-D deficiency in children: causes and presentation, and its management. A brief literature review was conducted and revealed that no such questionnaire or tool is available in Indian languages. To develop and validate a Hindi language questionnaire for the assessment of knowledge, attitude, and practices of parents towards calcium and vitamin D deficiency among children.

Material and methodology

Phase 1. Literature review, Item development and Draft Questionnaire

To select the domains used in constructing the questionnaire pertaining to calcium and vitamin D deficiency, knowledge aspects and practices, we searched electronic databases (PubMed, PubMed Central, Google scholar, Embase). A questionnaire was drafted to

reflect current evidence on local social, cultural & environmental factors influencing the risk of calcium and vitamin-D deficiency in children. The goal was to create a tool that captures data on knowledge about calcium/ Vitamin-D deficiency or Rickets in children, attitude & practices of parents that may be risk/protective factors.

The proposed questionnaire comprised of close-ended questions. It was a self-reported questionnaire, made in Hindi language (as it is dominant language of state of Uttar Pradesh, India). The aim was to make the resulting questionnaire not more than 50 questions in length and that should not take longer than 20 minutes to complete.

First, questions were included to capture data on knowledge of parents towards calcium & vitamin-D deficiency and its presentation in children. In the second part, questions regarding knowledge on causes of calcium & vitamin-D deficiency. Third section included, questions towards attitude and practices of participants.

Phase 2. Content and Face Validity

Expert Review: In this step, the instrument was evaluated on the different aspects of items selected and content area covered and its overall relevance. After the development of a draft questionnaire, an expert panel of five members (paediatrician, orthopaedician and community physician) reviewed the document for content validity/ face validity. Experts were invited to provide comments on specific questions as well as the overall questionnaire, and to score each item for content validity and clarity, with response options given as 1 = "not relevant", 2 = "somewhat relevant", 3 = "quite relevant" or 4 = "highly relevant". Responses were summed and averaged to determine a mean score for the relevancy and clarity of each question. Questions with mean score ≤ 2 were removed and revisions were made. Final content validity index came out to be 0.85. In addition, the expert comments were used to revise the questionnaire and a second draft of questionnaire was created incorporating expert feedbacks.

Two proficient Hindi language experts with masters in Hindi literature were requested to examine the full questionnaire. They reviewed

suitable language used, grammar, and ease of comprehending of the questionnaire. After modifications as per their suggestions, the questionnaire was approved for further validation process.

Cognitive Interviews: Following the expert review, cognitive interviews were conducted with parents(n=10) for contextualising the questionnaire in order to test for understandability, interpretation and cultural relevance. Participants were parents or guardians of children in vaccination clinic of our Institute, volunteering and giving consent for this interview. No incentives were provided for this voluntary participation. During the interviews, which ranged in duration from 15–30 min each, participants were instructed to complete the questionnaire by “thinking out loud” as they read and answer each question. Comments were noted and later analysed to identify common themes, any difficulty in comprehending the questions. Based on this feedback, a 2.0 version of the questionnaire was finalized. This completed the development stage of the study.

Testing of Questionnaire: For pilot testing, a convenient sample size of 30 was taken. Participants were recruited from parents/guardians attending the vaccination clinic of institute. Individual Informed consent were obtained from the participants after the purpose of the survey is explained to them and confidentiality is assured. The vaccination of child was not affected by the survey process. No incentives were provided to participants.

Phase 3. Statistical analysis

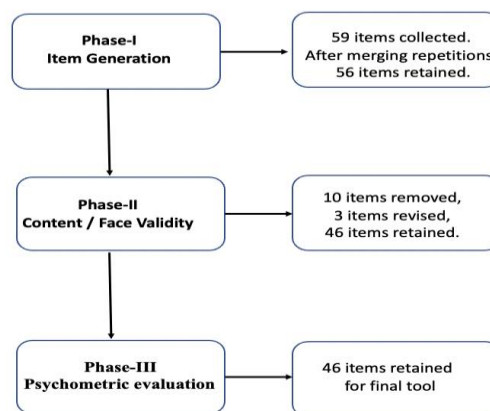
Data was entered in Microsoft excel sheet. Confidentiality of each study participant was maintained throughout the study. The data was analysed using SPSS version 26.0. Descriptive summary (Age, education, income) using frequencies, percentages, median, and interquartile range was used to present study results.

Internal consistency: Cronbach’s α values was calculated for the total scale and subscales. α

Values of 0.80, or higher, are commonly accepted as evidence of adequate internal reliability.

Test–retest reliability: All participants were invited to participate in ‘test-retest reliability’ testing of the questionnaire. Participants were requested to complete the questionnaire second time approximately four weeks later. Parents coming for regular follow up visits or next vaccination dose were included for this test-retest session. To assess test–retest reliability, interclass correlation coefficients was calculated.

Figure 1. Flow Chart of methodology used for questionnaire development



Ethical Consideration: Approval was obtained from Institutional Ethical Committee before starting the study (Reference code: 112th ECM IIA P3). Informed consent was obtained from all the participants. We followed a structured protocol based on recommendations and methodology of standard literature on the questionnaire/ survey development. (8,9)

RESULTS

3.1. Demographic Characteristics

The test was conducted on 30 parents/guardians attending the paediatric routine vaccination clinic of the institute. Table 1 shows the characteristics of study participants in pilot testing phase.

Table 1. Demographics of participants surveyed

| | |
|-------------------------------|--|
| Number of participants | 30 |
| Mean Age | 32.27 + 7.77 years (range 24-45 years) |
| Median Income of family | INR 15000/- (Range 5000-50,000/-) |

| Number of participants | 30 |
|---|---|
| Participants | Mothers (53%) Father (33%) Guardians (13.3%) |
| Highest Educational qualification | Illiterate= 10% Upto Primary/5th Class= 10% High School/10th Class= 16.7% Intermediate or a Diploma = 40% Graduation & Above= 23.3% |
| Total Members in the family | Average=4.7 (Range= 3 to 8.) |
| Mother's Diet | Vegetarian= 56.6% Vegetarian with Egg= 6.6% Non-Vegetarian= 36.6% |
| Residing area | Village= 50% City= 46.6% Slums= 3.3% |
| House type | Flat= 10% Standalone House= 60% Kachha House= 26.6% Hut = 3.3% |
| Is there direct sunlight entry in house during part of day? | Yes= 93.3% No= 6.6% |

3.2. Phase 1- Literature review, Item development and Draft Questionnaire

In the preliminary phase 59 items were collected by all the experts combined. As Hindi was first language of all experts, items were collected in Hindi language directly. Then, the items were organized into five categories with

sub-domains (Table 2). After removing three repetitive items, the first draft of questionnaire included 56 items (12 items on demography, 19 items on knowledge, 11 items on attitudes, 8 items on practices and 6 items on medical history).

Table 2. Questionnaire: Categories/Domains

| S. No. | Category | Domain |
|--------|-------------------------|---|
| 1 | Sociodemographic | Basic sociodemographic information included. |
| 2 | Knowledge | SOURCE of Vitamin D and Calcium (Domain 1) ROLE of Vitamin D and Calcium (Domain 2) Causes and presentations of Vitamin D and Calcium Deficiency (Domain 3) |
| 3 | Perception and Attitude | about importance of Vitamin D and calcium or towards features suggestive of deficiency in Child (Domain 4) |
| 4 | Practices | that may be preventive/ risk factors of Vitamin D and calcium deficiency (Domain 5) |
| 5 | Medical History | (Domain 6) |

3.3. Phase 2. Content and Face Validity

Expert Review: The draft questionnaire was distributed to expert panel and 10 items with mean score ≤ 2 were removed. After this round, second draft of questionnaire with 46 items was ready.

This second draft was sent to Hindi language experts for reviewing suitable language used, grammar, and ease of comprehending of the questionnaire. Seven items were rephrased/modified.

Cognitive Interviews: The 46 item questionnaire was distributed among 10 volunteers as described in methodology. Based on the suggestions and comments, three items were reframed for comprehension of the questionnaire.

Now this final version of questionnaire was used for testing and further validation. (Attached as supplement file).

3.4. Phase 3. Instrument reliability testing and data analysis

The internal consistency reliability of the final questionnaire was obtained. The overall Cronbach’s alpha vale for the instrument indicated an acceptable reliability (alpha = 0.91). Additionally, the internal consistency

reliability for each of the six domains was noted to be acceptable, as shown in Table 3. As sociodemographic data was qualitative, it was excluded from domains undergoing psychometric evaluation.

Individual domain and total score intraclass coefficients (ICC) were calculated to further examine test-retest reliability. Additionally, Wilcoxon Signed Ranks Test was used to assess the statistical difference between first test and re-test mean values. (Table 4 and Figure 2).

The results revealed ‘high’ test-retest reliability, and there was no statistically significant difference noted between any of the first test and re-test corresponding values ($p>0.05$)

Table 3: Internal consistency for each domain and overall scores

| Domain evaluated | Cronbach alpha |
|--|----------------|
| Knowledge regarding SOURCE of Vitamin D and Calcium (Domain 1) | 0.86 |
| Knowledge regarding ROLE of Vitamin D and Calcium (Domain 2) | 0.91 |
| Knowledge about causes and presentations of Vitamin D and Calcium Deficiency (Domain 3) | 0.94 |
| Perception and attitude about importance of Vitamin D and calcium or towards features suggestive of deficiency in Child (Domain 4) | 0.93 |
| Practices that may be preventive/ risk factors of Vitamin D and calcium deficiency (Domain 5) | 0.90 |
| Medical history (Domain 6) | 0.94 |
| Total Score | 0.91 |

^p>0.05 considered NOT significant by Wilcoxon Signed Ranks Test

Figure 2: Mean scores for individual domains and total scores at first test and re-test

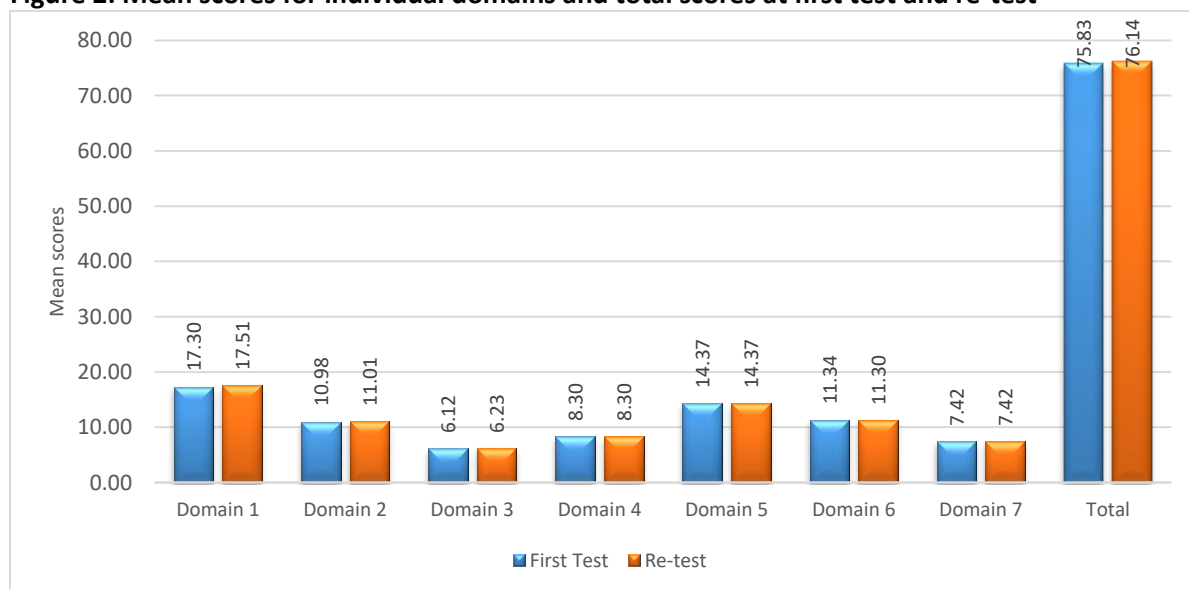


Table 4: Intra-class correlation coefficients of test and re-test sessions for each domain and overall scores along with Wilcoxon Signed Ranks Test

| Domain evaluated | Intra-class correlation coefficients (ICC) | P value [^] |
|--|--|----------------------|
| Knowledge regarding SOURCE of Vitamin D and Calcium (Domain 1) | 0.82 (CI: 0.78-0.87) | 0.67 |
| Knowledge regarding ROLE of Vitamin D and Calcium (Domain 2) | 0.86 (CI: 0.80-0.91) | 0.61 |
| Knowledge about causes and presentations of Vitamin D and Calcium Deficiency (Domain 3) | 0.97 (CI: 0.92-0.99) | 0.93 |
| Perception and attitude about importance of Vitamin D and calcium or towards features suggestive of deficiency in Child (Domain 4) | 0.98 (CI: 0.95-0.99) | 0.94 |
| Practices that may be preventive/ risk factors of Vitamin D and calcium deficiency (Domain 5) | 0.88 (CI: 0.83-0.93) | 0.64 |
| Medical history (Domain 6) | 0.72 (CI: 0.69-0.76) | 0.44 |
| Total Score | 0.90 (CI:0.86-0.95) | 0.71 |

[^]*p*>0.05 considered NOT significant by Wilcoxon Signed Ranks Test, CI: Confidence interval

DISCUSSION

To our knowledge, this is the first questionnaire developed in Hindi language to assess Knowledge, Attitude & Practices (KAP) of Parents towards Calcium & Vitamin-D deficiency in children. The KAP questionnaire consists of 46 items and contains knowledge, attitude and practices sub-domains. The instrument testing provided positive results for its validity and reliability in assessing KAP. Our results demonstrated acceptable content validity, reliability and test-retest reliability.

As per a survey in 2011 in India, about 43.46% population described Hindi as their mother tongue.⁽¹⁰⁾ We made the present questionnaire in Hindi language. We acknowledge that, there are many local dialects in India. In absence of formal language of these dialects, Hindi questionnaire seemed best fit.

CONCLUSION

The present questionnaire developed in Hindi Language to assess knowledge, attitude, and practices (KAP) of parents towards Calcium & Vitamin-D deficiency in children, has a good validity and reliability. This newly developed instrument could prove its use to highlight the gaps that may exist among parents.

RECOMMENDATION

Such validated tool can act as precursor for future wider population surveys/ studies and can be translated to other Indian languages also. Data from such population surveys could

act as guiding force in strategy planning for prevention & management of Rickets and associated manifestations, at community level.

The development and validation of a questionnaire in Hindi to assess parental KAP regarding calcium and vitamin D deficiency in children represent a pivotal step towards addressing a critical public health issue in India. By leveraging linguistic and cultural sensitivity, this initiative holds the potential to drive targeted interventions, inform policy decisions, and ultimately, mitigate the burden of nutritional deficiencies, ensuring healthier futures for the nation's children

The use of this tool may help clinicians, health educators and policy makers to identify key areas of intervention with regards to towards Calcium & Vitamin-D deficiency in children.

LIMITATION OF THE STUDY

This study has a few limitations. First, the present questionnaire has been developed in context of north Indian states where Hindi language and its dialects are common. Its validity will need to be verified in other areas with different language, local traditions, and cultural backgrounds. Second, the test-retest reliability was analysed on small group at a single centre. Further studies are recommended to verify stability of KAP questionnaire in various populations.

In future studies, we propose to use this tool for wider population surveys at local municipalities, residential areas, and schools.

RELEVANCE OF THE STUDY

The development and validation of a questionnaire in Hindi to assess parental KAP regarding calcium and vitamin D deficiency in children represent a pivotal step towards addressing a critical public health issue in India. By leveraging linguistic and cultural sensitivity, this initiative holds the potential to drive targeted interventions, inform policy decisions, and ultimately, mitigate the burden of nutritional deficiencies, ensuring healthier futures for the nation's children.

AUTHORS CONTRIBUTION

All authors have contributed equally.

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CONFLICT OF INTEREST

There are no conflict of interest.

DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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