

Questionnaire Validation for Knowledge, Attitude, and Practice of Eye Care Practitioners for Evaluation and Treatment of Amblyopia

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ABSTRACT

Amblyopia is a common vision disorder in children, especially in developing nations including Nepal, where regular eye screening is limited. Despite various levels of eye care providers managing amblyopia, the absence of standardized guidelines leads to inconsistent evaluation and treatment practices. This study sought to create a validated questionnaire to assess clinician practices in management of anisometropic amblyopia aiming to support the development of standardized protocols.

A committee of three clinicians (an ophthalmologist, optometrist, and ophthalmic assistant) identified key domains and drafted questions. The draft questionnaire was reviewed by 50 experts for content validation, with qualitative and quantitative assessments conducted. The content validity index (CVI) was calculated. Construct validation involved responses from 30 clinicians, followed by factor analysis using principal component analysis (PCA) with varimax rotation. Composite reliability and average variance extracted (AVE) were computed to assess construct validity.

Of the 50 experts, 25 were optometrists and 25 were ophthalmologists. Five key domains were identified. Descriptive feedback from respondents was analysed, and decisions on incorporating changes were made unanimously by the committee. The CVI exceeded 0.7 for all domains, indicating strong content validity. Construct validity was confirmed, with composite reliability values surpassing the AVE for each domain.

This study developed a validated questionnaire to assess clinician practice patterns in amblyopia evaluation and management and provides a foundation for evaluating amblyopia-related eye health practices, addressing a critical gap in standardized care.

KEY WORDS

Anisometropic amblyopia, Content validity index (CVI), Construct validity, Standardized protocols, Questionnaire validation

INTRODUCTION

Amblyopia is defined as a unilateral or bilateral reduction in best corrected visual acuity that is not directly attributed to structural abnormality of the eye or posterior visual pathways.¹ The prevalence of amblyopia varies from 0.79% to 3.29% according to geography and age of patients.² There are no population based studies carried out in Nepal for prevalence of amblyopia but a hospital based study carried out in 2013 in children below 13 years of age reported the

prevalence to be 0.7%.³ The evaluation and management of amblyopia include detailed examination of sensory and motor systems of vision. The amblyopia treatment protocols can vary among countries because of different challenges as issues in patient compliances and availability of resources. In Nepal, the evaluation and treatment of amblyopia primarily involve paediatric ophthalmologists, general ophthalmologists, optometrists and ophthalmic

assistants. There are no studies so far conducted to assess the practice pattern of clinicians for management of amblyopia. The KAP survey elicits knowledge (what is known to the community), attitude (what is believed in the community) and practice (what is practiced in the community) in the context of a topic of interest.⁴

The aim of the study was to formulate and validate a questionnaire that can elicit the KAP of the practitioners for evaluation and management of anisometropic amblyopia, which is the most common type of amblyopia, globally. This can serve as the foundational step towards creating standardized guidelines that will make treatment of anisometropic amblyopia more scientific and effective in the country.

METHODS

A questionnaire is an instrument or tool that is used to find out the observable as well as unobservable characteristics of the subjects like attitude, behavior, belief and intentions. It is quite a valuable tool that can draw out the fundamental information on the knowledge, attitude and practice. The widely accepted approach to creating a questionnaire begins with a thorough literature search and typically follows this sequence: conducting a qualitative study, consulting with colleagues and other experts, engaging with general and targeted respondents, and reviewing existing questionnaires related to the area of interest.

This study received a waiver for ethical review from the Ethical Review Committee of the Chitkara School of Health Sciences, Chitkara University, as it was evaluated by experts and did not involve the collection or utilization of personal data. Written informed consent was obtained from all participants, and their responses were anonymized prior to data extraction and analysis. An expert committee for questionnaire development was convened, and the finalized questionnaire was approved by the review committee for the questionnaire. The study was initiated in 15th August 2022 to 20 February 2023.

Table 1 provides a summary of the various steps involved in the formation and validation of the questionnaire.⁵

Table 1. Steps of questionnaire formation and validation

Steps
Step 1: Formation of a committee for developing a KAP (Knowledge, Attitudes, and Practices) questionnaire
Step 2: Domain finalization for the questionnaire through focused group discussion.
Step 3: Consolidated draft of questionnaire formation
Step 4: Content validation (Qualitative)
Step 5: Content validation (Quantitative)
Step 6: Construct validation (Convergent and Divergent)
Step 7: Pilot testing & Reliability index calculation
Step 8: Final yield of questionnaire

Step 1

This study utilized an expert's team for formation of the draft and subsequent validation process. A panel of three experts was assembled, each with a minimum of five years of experience in the evaluation and management of amblyopia.

Step 2

Each expert identified the domains of the questionnaire and a workshop was organized to discuss and finalize the domains. Five domains were identified for the questions. The domain identified by the team are listed in table 2.

Table 2. Domain identified by the expert committee for the questionnaire

Knowledge and experience of clinicians about amblyopia evaluation and management.
Attitude of clinicians towards amblyopia evaluation and management.
Practice of refractive correction in amblyopia
Practice of occlusion therapy in amblyopia
Practice of Vision therapy in Amblyopia

Step 3

Each expert individually identified domains, and a consensus was reached among the three experts on the final domains and potential questions for each domain. The domains as well as the related questions for each domain were finalized in focused group discussion among the committee. The identified domains as well as probable questionnaire for the domains are tabulated (Table 3).

Step 4: Content validation (Qualitative)

The draft questionnaire was circulated among the practicing optometrists and ophthalmologists with more than three years of experience in the field. The draft questionnaire was attached with a cover letter requesting for subjective comments on the questionnaire about its content and logical flow of the question. Fifty responses (twenty-five ophthalmologists and twenty-five optometrists) were collected. The comments from the respondents were tabulated and discussed in a three-membered committee for questionnaire formation. The comments were adopted in the questionnaire after a focused group discussion of the members of the review committee.

Step 5: Content validity (Quantitative)

There are two aspects of the content validity. The first is relevance and the second is representativeness. The relevance of an assessment tool refers to the appropriateness of its elements for the targeted constructs and functions of assessment while the representativeness of an assessment tool refers to the degree to which its elements are proportional to the facets of the targeted construct.⁶ It is the relevance that is frequently used to measure the content validity of the question.⁷ The relevance of the questionnaire was graded in five-point

Table 3. Table showing the domains and the proposed question in the questionnaire by the expert

Final Domains	Question area drafted for domain
Knowledge and experience of clinicians about amblyopia	The minimum line of difference between two eyes in Snellen's visual acuity chart to call it amblyopia? How many cases of amblyopia do you see on average per month? What percentage of them are anisometropic amblyopia? In your clinical practice, which type of refractive error is the most common cause of anisometropic amblyopes?
Attitude of clinician for amblyopia	Evaluations you generally consider during the assessment of anisometropic amblyopes?
Practice of refractive correction in amblyopia	Preferred management strategies for anisometropic amblyopia? Average time of refractive saturation (the duration in which visual acuity improvement in the amblyopic eye takes place with only refractive correction) that you consider for anisometropic amblyopic cases?
Practice of occlusion therapy in amblyopia	What decides the dose (hour of patching per day) of patching for anisometropic amblyopia in your clinical practice? What is the average duration of initial patching hour dose in your clinic for anisometropic amblyopia? What is the longest duration of patching hour in your clinical practice at the beginning of therapy? How do you rate the compliance of patching in your clinical practice? (0 = noncompliant, 4 = 100% compliance) in cases of anisometropic amblyopia. How do you rate the success rate of patching therapy in cases of anisometropic amblyopia? (0 = No success, 4 = 100% success)
Practice of Vision therapy in Amblyopia	Do you perform vision therapy for anisometropic amblyopia? What is your approach to vision therapy in cases of anisometropic amblyopia? What are the visual functions you aim to improve through vision therapy in cases of anisometropic amblyopia? Equipment/instruments you use for vision therapy in anisometropic amblyopia? What is the dose of vision therapy per week in anisometropic amblyopia cases in your clinical practice? How do you rate the success of active vision therapy in anisometropic amblyopia?

Likert scale by the 50 experts. The response of “1 to 3” in Likert scale was given “0” value while response of “4 and 5” in Likert scale was given value “1”. The item wise content validity index (I-CVI) was calculated as the total score of an item divided by the total number of respondents.

The average score for each questionnaire was calculated and termed as Content validity index. “A score of higher than “0.7” was taken as a valid score for the content for that question.

Each item had an item-wise content validity index (CVI) of 0.7 or higher.⁷ The scale-wise content validity index (SCVI) represented the content validity of a domain, calculated as the average of the item-wise CVIs for that domain. The SCVI for each domain, as well as for individual items, was calculated and presented in table 4.

Table 4. Table showing scale wise content validity (SCVI) index for each domain

Domains	SCVI (Relevance)
Knowledge of practitioners about anisometropic amblyopia management	0.8
Attitude and practice of the eye care practitioners for anisometropic amblyopia	0.85
Practice of practitioner on Refractive correction	0.88
Practice of practitioner on Patching Therapy	0.85
Practice of practitioner on Vision Therapy	0.8

Step 6: Construct validation (Convergent and Divergent)

Construct validity is a scientific approach to demonstrate differences between subjects who possess or lack certain criteria. For instance, a questionnaire is said to have construct validity if it can distinguish between clinicians with good knowledge, attitude, and practice of amblyopia and those who do not.

Construct validity encompasses two aspects: convergent validity and discriminant validity. Convergent validity refers to the degree of confidence that a trait is accurately measured by its indicators, while discriminant validity refers to the degree to which measures of different traits are unrelated.

6.1: Convergent Validity Calculation

For convergent validity, thirty respondents were surveyed for the validity of the questionnaire in five-point Likert scale for five constructs (domains) as described above. Factor analysis was run using the SPSS 21 program. Principal component analysis (PCA) was used to extract factors. Varimax rotation was utilized for calculating the rotated component matrix of the factor for items. The items in the questionnaire were extracted into five domains. Average variance extracted (AVE) and Composite reliability (CR) were calculated for each domain.⁸ CR value and the AVE value for each construct are listed in table 5.

Table 5. Table showing the value of CR and AVE of the five constructs

Constructs	CR value	AVE value	Inference
Knowledge and experience of clinicians about amblyopia	0.964313	0.593528	CR > AVE
Attitude of clinician for amblyopia	0.94503	0.6592	CR > AVE
Practice of refractive correction in amblyopia	0.877652	0.57955	CR > AVE
Practice of occlusion therapy in amblyopia	0.86641	0.80177	CR > AVE
Practice of Vision therapy in Amblyopia	0.68331	0.6833	CR > AVE

6.2: Discriminant validity

From the data, square root of AVE was calculated and the person's correlation between the two subsequent constructs were also calculated. The SQRTAVE and the Pearson correlation value of two constructs were compared (Table 6). Pearson correlation value of above two constructs is listed left to the value of SQRT AVE in corresponding

rows. The Pearson correlation value was greater than the SQRT AVE value for each construct.⁹

Step 7: Pilot testing and Reliability index calculation

A pilot test was carried out on 15 ophthalmologists and 15 optometrists twice in a period of two weeks. Test and retest reliability index was assessed by calculating the Pearson's correlation coefficient carried out for each construct.

Table 6. Table showing the Pearson correlation coefficient values of two constructs with square root of AVE

Correlations AND AVE		Construct 1	Construct 2	Construct 3	Construct 4	Construct 5
Construct 1	Pearson Correlation (1 & 2)	0.770408				
Construct 2	Pearson Correlation (2 & 3)	.509	0.811965			
Construct 3	Pearson Correlation (3 & 4)	.865	.580	0.692498		
Construct 4	Pearson Correlation (4 & 5)	.804	.407	.627	0.895416	
Construct 5	Pearson Correlation (5 & 1)	.813	.597	.881	.881	0.826626

DISCUSSION

Nepal is one of the poorest countries in Asia that with varied geography of Himalayas and mountains which is a major challenge for economic growth.¹⁰ Despite its hurdles in development in other fields, the eye sector in the country has achieved remarkable success due to its policy of employing human resources from varied background. Pediatric ophthalmologists, general ophthalmologists, optometrists, and ophthalmic assistants specializing in pediatric eye care evaluate and treat hundreds of amblyopic patients across the country every day. Availability of these diverse human resources has contributed for accessible and sustainable eye care system. However, the lack of guidelines for amblyopia management has led to significant variations in treatment practices, hindering the standard of care.

Through this study, we attempted to understand and standardize the treatment of amblyopia in the country. Till date, there is no study reported from Nepal that has assessed the practice pattern of clinicians involved in treatment of amblyopia. A similar study was carried out in Ghana to assess the practice pattern of Optometrists in Ghana.¹¹

For the assessment of the practice pattern, questionnaire based survey are preferred mode.¹² For surveying, we need a set of questionnaires. So far, no efforts have been made to systematically observe these practice patterns, resulting in the absence of specifically designed questionnaires for this purpose. Ideally, the process of developing a questionnaire involves a qualitative study, where interviews are conducted and domains are identified through thematic analysis.¹³ Questions are then crafted to address these domains, followed by validation. The qualitative study requires a lot of expertise and time for analysis and interpretation.¹⁴ Hence the current paper has suggested the alternative method of questionnaire formation and validation that

requires relatively less expertise and resources. This study has leveraged expert panel opinions to identify domains and formulate questions.¹⁵

The validation process used in the study involved content validation, construct validation, and assurance of reliability criteria. The content validation was conducted in two steps. The first step included collecting descriptive comments from experts on the content, length, and flow of the questionnaire. The second step involved calculating the item-wise and scale-wise content validity index (CVI). For more than nine observers, the reference value for CVI is 0.78, and our value exceeded this reference value.¹⁶

Similarly, the construct validation process was carried out in two steps. The first step was convergent validation for which the criteria required is that the composite reliability (CR) value be greater than the average value extracted (AVE). For all constructs, the CR value was more than 0.7 and exceeded the AVE. Additionally, the criteria for discriminant validation required that the Pearson correlation between two constructs be less than the square root of the AVE, which was true for all our constructs. The current indices were in accordance with the Fornell & Larcker criterion cited by Hamid et al.¹⁷ A pilot test was conducted with 12 respondents (6 ophthalmologists and 6 optometrists) over two sessions within a two-week period. The Pearson correlation values for all constructs across the two visits were above 0.90, indicating excellent reliability of the questionnaire.

CONCLUSION

This study has developed a valid questionnaire that will serve as a valuable tool for assessing the existing practice patterns in the evaluation and management of amblyopia in developing countries like Nepal, where eye care providers

have diverse academic backgrounds. We anticipate that this tool will facilitate data collection and provide meaningful insights into the quality of pediatric eye care in the country.

This tool has undergone rigorous content and constructs validation processes, ensuring its reliability and validity. The questionnaire can be effectively utilized to conduct surveys in developing countries, where standardized guidelines for the evaluation and management of amblyopia are often lacking. By leveraging this tool, it is possible to gain

insights into current practice patterns and identify areas for improvement, ultimately contributing to better clinical outcomes for patients with amblyopia.

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