LETTER

Glaucome symptom scale: is it a reliable measure of symptoms in glaucoma patients?

Glaucome is the leading cause of irrevers-ible blindness worldwide after cataract and accounts for 10% of the world’s blind. Although patients with acute angle closure glaucoma are symptomatic, those with other forms of glaucoma (at least in the early stages) usually do not experience many symptoms, thereby, resulting in the disease often going unnoticed with possible progression. In some cases, patients with fluctuating levels of intraocular pressure may experience blurred vision and see haloes around lights. The Glaucome Symptom Scale (GSS) was developed to assess ophthalmic symptoms experienced by patients with glaucoma. The GSS comprises 10 ocular symptoms, of which six are non-visual and four are visual. The non-visual symptoms include ‘burning/smarting/stinging’, ‘tearing’, ‘dryness’, ‘itching’, ‘soreness/tiredness’, and ‘feeling of something in the eye’. The visual symp-toms include ‘blurry/dim vision’, ‘hard to see in daylight’, ‘hard to see in darkness’, and ‘halos around lights’. The GSS is unique in that it assesses symptoms as compared with visual functioning by other glaucoma-specific questionnaires. Like most questionnaires in ophthalmology, the GSS was also developed using traditional psychometric methods, that is, the classical test theory (CTT). The limitations of CTT have been well acknowledged. A major shortcoming of CTT pertains to its scoring assumptions: Likert or summary scoring in which the scores are calculated from simple additions of ordinal values assigned to response categories for each item. Such a method of scoring is erroneous as it assumes that response categories are equidistant on a measurement scale and that all questions are of equal difficulty, and thereby treating the whole questionnaire as interval scale based on ordinal level scoring. This limitation is overcome by the use of item response theory, in particular Rasch analysis, that makes use of interval-level data. A particularly important advantage is the fact that when questionnaire data fit the stringent requirements of the Rasch model, the ordinal scores generated by summing scores for all items (summary score) can be transformed into interval level or linear measurements. This means that by using a Rasch-based scale, symptoms can then be measured on a linear scale.

Additionally, Rasch analysis helps improve sensitivity to change by reducing noise in measurement and so has improvemental requirements for outcomes research. Recently, the GSS was subjected to Rasch analysis in an Australian Glaucoma population. Although the investigators found the GSS to have good psychometric characteristics, an important property—targeting was suboptimal indicating that the GSS was unable to assess fully the range of symp-toms in their sample which perhaps did not possess the severity of visual field (VF) loss to experience the symptoms. Given this result, we investigated the psychometric properties of the GSS using Rasch analysis in an Indian Glaucoma population with more severe forms of glaucoma (moderate to severe VF loss).

Records of adult patients with established bilateral primary glaucoma and glaucomatous VF loss (using Humphrey Visual Fields Analyzer 24-2 program) were prescreened for eligibility in the study. Given our aim, we prescreened and selected consecutive records of those patients with moderate (6–12 dB) or severe VF loss (<12 dB) in better eye for inclusion and those with diffuse reduction in sensitivity (as this could be related to cataract and affect the results) were excluded. Eligible patients were invited to participate in the study during their routine follow-up visit to L V Prasad Eye Institute, Hyderabad, India between November 2010 and January 2011. The GSS was administered to 129 consecutive eligible participants on the day of their appointment. While a little over one-half (55%) self-administered the GSS, trained interviewers administered it to the remaining participants. The Ethics Committee for human research at the L V Prasad Eye Institute approved the study and consented participants provided written informed consent. Rasch analysis was performed using Winsteps software.

The mean (±SD) age of the participants was 60.9±13.05 years (range, 20–87 years) and 69% were male. The median duration since diagnosis was 7.0 years (range, 1–58 years). One-half of the participants (49.6%) had primary open angle glaucoma; males constituted 83% of this group. By comparison, only 38.8% had primary angle closure glaucoma; over one-half (54%) were females. This latter finding is in accordance with a clinic-based and two population-based studies from India, the Andhra Pradesh Eye Disease Study and the Chennai Glaucoma Study. The median presenting better and worse eye acuity (logMAR) was 0.0 (Snellen equivalent, 20/20) and 0.30 (Snellen equivalent, 20/40) respectively. The mean (±SD) intraocular pressures were 15.1±4.3 and 15.8±6.5 mm Hg in the right and left eyes respectively. Participants did not use the rating scale as it was intended to, requiring reduction in number of categories from five to three. However, person separation reliability was inadequate indicating that the GSS could not reliably differentiate among the partici-pants’ symptoms (table 1). The GSS was poorly targeted with most participants not bothered by symptoms in the GSS. All items fit the Rasch model and unidimensional-ity was present, implying that GSS was a unidimensional measure of glaucoma symptoms.

The GSS is unable to discriminate among glaucoma patients based on their symptoms in India. Based on the suboptimal performance of the GSS as demonstrated in the present study and that of Lamoureux et al., we do not recommend the use of GSS to assess patients with glaucoma having moderate to severe field loss (but with relatively good central vision). Given these findings of the GSS and the lack of glaucoma symptom-specific questionnaires, there may be a need to develop one by researchers in future. A superior approach, however, would be creation of an item bank of glaucoma symptoms items, inclusive of GSS, and utilise computer-adaptive testing for measurement.

Table 1: Overall performance of the Glaucome Symptom Scale

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values</th>
<th>Ideal values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of items</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>No. of misfitting items</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Person separation reliability*</td>
<td>0.68</td>
<td>&gt;0.80</td>
</tr>
<tr>
<td>Mean item location</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean person location†</td>
<td>1.33</td>
<td>0</td>
</tr>
<tr>
<td>Principal components analysis‡ (eigenvalue for first contrast)</td>
<td>1.8</td>
<td>&lt;2.0</td>
</tr>
</tbody>
</table>

*Indicates measurement precision—ability to discriminate among participants based on their symptoms and values >0.80 suggest that the questionnaire can discriminate among at least three strata of participants based on the underlying construct.

†Difference between person and item location (usually set to zero) indicates targeting of item difficulty (ie, bothersome) to participants’ symptoms.

‡An assessment of unidimensionality.

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Acknowledgements The authors wish to thank all the participants who volunteered to participate in the study.

Contributors VKG conceived and designed the study. SPR, SB, DKB and RS helped with data acquisition, entry and drafting the article. CSG, HLR, SS, VPR and AKM helped with data acquisition, interpretation and revised the article by providing important intellectual inputs. All the authors approved the final version of the manuscript.

Funding This research was supported in part by Hyderabad Eye Research Foundation.

Competing interests None.

Patient consent Obtained.

Ethics approval Ethics approval was provided by the L V Prasad Eye Institute Ethics committee, L V Prasad Eye Institute, Hyderabad, India.

Provenance and peer review Not commissioned; externally peer reviewed.

Proprietary interest statement The authors have no personal financial interest in the development, production, or sale of any device discussed herein.


doi:10.1136/bjophthalmol-2012-302041

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Vijaya K Gothwal, Shailaja P Reddy, Seelam Bharani, Deepak K Bagga, Rebecca Sumalini, Chandra Sekhar Garudadri, Harsha Laxmana Rao, Sirisha Senthil, Vanita Pathak-Ray and Anil K Mandal

Br J Ophthalmol published online November 30, 2012

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