



## Original research

# Psychometric properties of the Glaucoma Quality of Life-15 questionnaire: Use of explanatory factor analysis

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## Abstract

**Purpose:** The purposes of this study were to validate the Persian translation of the Glaucoma Quality of Life-15 (GQL-15) questionnaire, evaluate its psychometric properties, and identify new composite items and item numbers.

**Methods:** This cross-sectional study was conducted from August to November 2016, at the Glaucoma Clinic of the Ophthalmology Department at Shiraz University of Medical Sciences, Iran. One hundred ninety patients with glaucoma were enrolled. Habitual-corrected visual acuity (HCVA), intraocular pressure (IOP), slit-lamp biomicroscopy, fundus exam, and mean deviation (MD) of the visual field were recorded in the course of clinical examination by glaucoma professional. Psychometric properties, i.e. test–retest reliability, internal consistency, content validity, and construct validity were evaluated with factor analysis. Based on the Disc Damage Likelihood Scale (DDLS), patients were stratified to mild, moderate, and severe disc damage. The association between the GQL-15 scores and disease severity (mild, moderate and severe) were evaluated by the analysis of variance (ANOVA).

**Results:** Of 190 eligible glaucoma patients, reliable clinical data were available for 140 participants. Mean age (standard deviation) of the patients was 58.7 (13.3) years. Cronbach's  $\alpha$  coefficient ranged from 0.74 to 0.91, and the correlation coefficient for total score was 0.53. The content validity ratio (CVR) was 0.91 based on evaluations in expert panel. Exploratory factor analysis (EFA) based on eigenvalue higher than one identified two factors after varimax rotation for the GQL-15 which explained 66.5% of the total variance. Discriminant validity analysis disclosed statistically significant differences in mean quality of life scores between levels of disease severity.

**Conclusion:** The Persian version of the GQL-15 is a reliable and valid questionnaire for use in glaucoma clinics as a complementary tool for evidence-based decision-making.

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**Keywords:** Glaucoma; Linguistic validation; Persian; Psychometric properties; Quality of life

## Introduction

Glaucoma is a chronic, progressive disease with loss of optic nerve fibers which can lead to permanent visual field damage and blindness.<sup>1–3</sup> Glaucoma is the second most frequent cause of blindness after cataract. The worldwide prevalence of glaucoma is about 1%–4%, and it affects about 68 million people.<sup>4–7</sup>

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Important advances have been made in the diagnosis and treatment of glaucoma.<sup>8</sup> However, the use of multiple drugs and surgical procedures to lower the intraocular pressure (IOP) and long-term follow-up can decrease patients' quality of life and disability-adjusted life-years.<sup>1,6,8–11</sup> Knowledge about the patient's perceptions and a focus on patient-centered care is crucial because they can lead to more specific care, changes in patients' lifestyle, increased adherence to treatment, and improved doctor–patient communication.<sup>5,8,9,12–15</sup> Moreover, the US Food and Drug Administration have recently placed emphasis on patient-reported outcome (PRO) measures in clinical studies.<sup>16</sup>

In earlier studies, many generic and vision-specific PRO instruments have been used with glaucoma patients.<sup>17</sup> Among these, the Glaucoma Quality of Life-15 (GQL-15) questionnaire is specific, brief, and easy to use, and studies have reported a strong correlation between GQL-15 scores and objective visual indices.<sup>14,18</sup> It has already been translated and validated in different languages,<sup>6,14,18</sup> but this instrument (like similar questionnaires about patients' experiences) has elements that are culturally dependent, and to the best of our knowledge, there is no Persian version of the GQL-15. The primary aim of this study was the translation and linguistic validation of the GQL-15; the secondary aim was to evaluate the psychometric properties of the Persian version of this instrument. If its psychometric properties were found to be suboptimal, a provisional third aim was to use exploratory factor analysis (EFA) to identify new composite items and item numbers in the Persian version of the GQL-15.

## Methods

### *Patients and sample size*

This cross-sectional study was conducted from August to November 2016. One hundred ninety eligible patients with glaucoma, who were being routinely followed at the Glaucoma Clinic of the Ophthalmology Department at Shiraz University of Medical Sciences, Iran, were enrolled. Sample size was calculated based on empirical rules widely used by experts in this field and on earlier methods which have been mentioned in the literature.<sup>19,20</sup> Based on a rule of thumb (10-fold number of questionnaire items), a minimum sample of 150 subjects was required. To achieve the required sample size we used a convenience sampling method.

The eligibility criteria were ability to speak and understand Persian, an age older than 18 years, and being followed more than 6 months in the glaucoma clinic prior to enrollment. All patients were re-evaluated again on the day of the study by a glaucoma specialist for confirmation of the diagnosis and staging the glaucoma severity. Patients with primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), and secondary glaucoma were included.

The exclusion criteria were severe psychiatric problems, cognitive impairments (Dementia and Alzheimer), and other eye diseases with vision impairment secondary to other causes (cataract, corneal opacities, and age-related macular degeneration).

The study protocol complied with the tenets of the Declaration of Helsinki, and was approved by the local Ethics Committee at Shiraz University of Medical Sciences. Written informed consent was obtained from all eligible patients after they were informed about the study objectives.

### *Participant enrollment and ocular examination*

Sociodemographic characteristics of the patients were recorded on a data-gathering form and included age, gender, marital status, living situation, educational level, occupation, comorbidities, family history of glaucoma, type of glaucoma, laterality of disease, and disease duration. Before each ophthalmic examination, the main questionnaire (Persian version of the GQL-15) was administered during a face-to-face interview. In the eye clinic, complete ocular examination was done including habitual-corrected visual acuity (HCVA) measurement with the Snellen visual acuity chart, slit-lamp biomicroscopy (Haag-Streit, Bern, Switzerland), IOP with Goldmann applanation tonometry, and fundus exam with a 90-diopter non-contact lens. Visual field examinations with a Humphrey visual field analyzer (Carl Zeiss Meditec Inc., Dublin, CA, USA) (24-2 pattern Swedish Interactive Threshold Algorithm standard) were done for all participants within 4 months of recruitment. Only “reliable” visual field mean deviations were recorded. The severity of glaucoma was graded based on the amount of disc damage estimated with the Disc Damage Likelihood Scale (DDLS). The DDLS is a user-friendly method which correlates accurately with visual field changes, and shows high intra-observer and inter-observer reproducibility.<sup>21–23</sup> Optic disc damage was graded in three levels: mild (DDLS 1–4), moderate (DDLS 5–7), or severe (DDLS 8–10).

### *Linguistic validation*

The GQL-15 is a 15-item questionnaire divided into four subscales: central and near vision (two items), peripheral vision (six items), glare and dark adaptation (six items), and outdoor mobility (one item). An original version of this questionnaire was formed from 36 questions related to visual disability in daily-life activities. All questions (15 items) were significant predictors of visual field loss in factor analysis.<sup>12</sup> Response categories for each item are ordered from 1 (no difficulty) to 5 (severe difficulty), and 0 represents “abstinence from activity due to non-visual reasons”. Summary scores are reported as the sum of item-level response scores, with higher scores indicating poorer quality of life. Linguistic validation of the Persian GQL-15 was done in three stages based on standardized rules.<sup>24,25</sup>

For parallel forward translation and reconciliation, two independent professional translators, both of whom were aware of the purposes of the study, translated the GQL-15 from English into Persian. A panel (two translators and two glaucoma experts) compared and discussed both translations. Whenever necessary, changes were made until a consensus was reached regarding the primary translation (Persian version

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