Danish version of Visual Function Questionnaire-25 and its use in age-related macular degeneration

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ABSTRACT

INTRODUCTION: Assessment of visual function can be a complex task and objective means of measurement of visual function do not always correlate with patients' self-perceived visual abilities. The purpose of this study was to translate the visual function questionnaire (VFQ)-25 into Danish with particular focus on its use in patients with late age-related macular degeneration (AMD).

MATERIAL AND METHODS: The translation was done in accordance with standard internationally adopted methods. This includes forward translation, back translation, examination of translation quality, and adjudication by bilingual speakers. We presented the questionnaire to 120 consecutive patients with exudative AMD referred to our department and to 25 healthy individuals. We tested the reliability of the Danish version by measuring test-retest reliability, estimated the internal consistency of the questionnaire (Cronbach's α value) and analysed the discriminatory power (validity) of the questionnaire by comparing scores of patients with scores from control individuals without known eye disease.

RESULTS: The translated questionnaire produced high test-retest correlations (range 0.8-0.9), had a relatively high level of internal consistency (range 0.4-0.9) and a high discriminatory power.

CONCLUSION: The Danish version of VFQ-25 produces acceptable values of validity and reliability in patients with AMD.

Assessment of visual function can be a complex task and objective means for the measurement of visual function do not always correlate with the person's self-perceived visual abilities [1]. For routine visual acuity assessment in daily clinical practice, the Snellen Visual Acuity Chart or the Early Treatment Diabetic Retinopathy Study (ETDRS) Chart is generally used [2]. These charts measure visual acuity from a distance of six or four meters, but little information is obtained about the visual ability needed to perform tasks requiring good vision at a closer distance. Despite these shortcomings of the Snellen and ETDRS charts, they remain widely used and accepted as primary outcome measurements of treatment efficacy [3, 4].

To compensate for these shortcomings, several questionnaires have been developed to provide a more detailed account of treatment efficacy and patient-perceived visual ability [1]. The Visual Function Questionnaire (VFQ) developed at the National Eye Institute, Bethesda, Maryland, USA, is one of the more widely used methods [5]. Initially, the questionnaire comprised 51 questions, but in response to clinicians' feedback, it was reduced to 25 questions (VFQ-25), which made it more appropriate for use in daily clinical practice [6].

The questions included in the VFQ-25 were selected on the basis of extensive focus group interviews with several groups of patients with different eye diseases including age-related macular degeneration (AMD) [5, 7]. The questionnaire generates subscales for the following dimensions of vision-targeted, health-related quality of life: overall general health, overall general vision, problems because of ocular pain, difficulty with near-vision activities, difficulties with distance-vision activities, limitations in social function due to visual difficulties, mental health problems due to vision, role difficulties due to vision, dependency on others due to diminished vision, driving difficulties because of diminished vision, difficulties with colour vision and difficulties with peripheral vision. Each of the subscales is scored on a 0 to 100 scale in which 100 indicates the best possible and 0 the worst possible function. There are 14 optional items in a voluntary appendix (VFQ-39). The VFQ-25 has been extensively validated and has been translated into several different languages [8-12]. The purpose of this study was to translate the VFQ-25 (including the appendix – VFQ-39) into Danish with par-

Patient with age-related macular degeneration on both eyes attempting to read.

ORIGINAL ARTICLE

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ticular focus on its use for patients with late AMD [7, 13]. We wanted to test the reliability of the Danish version by measuring the test-retest reliability, and we also set out to estimate the internal consistency of the questionnaire (Cronbach's α value) and to analyse the discriminatory power (validity) of the questionnaire by comparing scores of patients with scores from control individuals without known eye disease.

MATERIAL AND METHODS

Translation of the questionnaire into Danish and data collection

The translation was done in conformity with internationally adopted standard methods [14]. This includes forward translation, back translation, examination of translation quality, and adjudication by bilingual speakers.

The resulting initial translation was presented to 15 patients with late AMD and it was noted if patients expressed confusion or the questions seemed ambiguous to the patient. After the initial interviews, a new version was made based on comments, suggestions and the interviewers' experiences.

The interview was interviewer-administered because many of the patients had such a poor vision that they could not read the questionnaire themselves.

Since different investigators performed the interviews, a detailed "interview guide" was written so that e.g. all investigators responded in the same fashion to potential remarks from the patients. Best corrected visual acuity was obtained for all patients using the ETDRS chart in accordance with a standardized protocol [2].

Study population

We presented the questionnaire to 120 consecutive patients with exudative AMD referred to our department and to 25 individuals with no known eye disease recruited among persons accompanying patients at our department. The median age of the healthy individuals was 67 years (54-79 years) and the female-to-male ratio was 19/6. We did test-retesting a week apart with ten randomly selected controls.

Among the patients with AMD, eight had signs of bilateral exudative AMD. The female-to-male ratio was 80/40. The median age was 79 years (63-92 years). The median visual acuity score on the ETDRS charts was 72 letters (17-94 letters) (corresponding approximately to a Snellen equivalent of 0.6) on the better eye and a median score of 49 letters (0-89 letters) (corresponding approximately to a Snellen equivalents of 0.2) on the poorer eye.

Statistics

Statistical analysis was performed using the IBM SPSS statistics version 19 for Windows.

Descriptive data are given as median and range as the results were not normally distributed (Kolmogorov-Smirnoff). Test for reliability was performed with Cronbach's α value as the index for internal consistency for each subscale. Test-retest reliability was quantified using the intra-class correlation and test-retest correlations. Test for validity was calculated using Pearson's rank correlations. Comparisons between patients and controls were performed using the Mann-Whitney test. A p value of less than 0.05 was considered significant.

RESULTS

Translation

Some changes from the original version and initial translation were made to ensure that the text fitted the Danish patients' context [15]. For instance, in the original version of the questionnaire, the distinction "true or false" is used. However, all the Danish patients objected to this wording, since they found it very harsh and they preferred "correct or incorrect". Other items were changed to be more appropriate for Danish lifestyles and habits. Very few, if any, Danish patients "go bowling" as a leisure habit, so bowling was replaced by petanque, an activity many patients mentioned as a leisure habit. Some questions were updated because none of the patients receive bills on a regular basis, but only receive bank letters containing information regarding already paid bills, so the question was adopted accordingly. We have also added a question regarding the use of a computer to the near vision subscale, since this was an activity not mentioned in the original VFQ-25 questionnaire, but widely mentioned among our patients.

TABLE 1

Internal consistency (Cronbach's α), inter-item correlations and intraclass correlations for Visual Function Questionnaire scores in patients with AMD (n = 120).

	No. of items	Cronbach's α patients	Inter-item correlation patients	Intraclass correlation (95% CI)	Test-retest reliability (n = 10)
General health	2	0.69	0.57	0.95 (0.92-0.98)	0.98
General vision	2	0.79	0.66	0.96 (0.94-0.97)	0.96
Ocular pain	2	0.41	0.28	0.78 (0.80-0.90)	0.85
Near activities	6	0.88	0.54	0.93 (0.90-0.98)	0.96
Distance activities	6	0.82	0.45	0.92 (0.89-0.95)	0.96
Social function	3	0.68	0.42	0.89 (0.85-0.91)	0.87
Mental health	5	0.84	0.52	0.84 (0.79-0.88)	0.94
Role difficulties	4	0.88	0.65	0.87 (0.84-0.91)	0.95
Dependency	4	0.89	0.68	0.88 (0.86-0.92)	0.94
Driving	3	0.5	0.4	0.99 (0.97-1.0)	0.99
Colour vision	1	NA	0.78	0.95 (0.92-0.98)	0.95
Peripheral vision	1	NA	0.72	0.90 (0.90-0.98)	0.95

AMD = age-related macular degeneration; CI = confidence interval-; NA = not applicable.

Reliability

We generally found high levels of internal consistency (Cronbach's α values) and inter-item correlations on all subscales excluding driving (0.5) and ocular pain (0.4) in patients (**Table 1**). The internal consistency was highest in the subscales referring to vision-specific subscales such as near activities and distance activities, while they were lower in the general health and social function subscales. The test-retest reliability was between 0.85 and 0.99 and also high intraclass correlations were observed. We did no test-retest on patients since the progression of exudative AMD can be rapid.

Validity and Visual Function Questionnaire subscale scores

We found that the translated questionnaire has good discriminatory power. The control individuals scored higher on the subscales where AMD is known to affect visual performance and we observed no difference between control individuals and patients on subscales less affected by AMD (i.e. ocular pain, colour vision and peripheral vision (**Table 2**). Studying potential ceiling/floor effects, we identified a limited effect in patients, while healthy individuals seem to show a ceiling trend (Table 2).

There were marked correlations between VFQ scores and functions mutuality affected by AMD such as distance activities and near activities, whereas we found lower and non-significant correlations between subscales not traditionally affected by AMD: ocular pain, peripheral vision and colour vision (**Table 3**).

TABLE 2

Visual Function Questionnaire discriminatory power. Visual Function Questionnaire scores in patients with AMD (n = 120) and healthy individuals (Mann-Whitney: patients compared with controls).

	No. of items	Patients, n, median (min.-max.)	Controls, n, median (min.-max.)	Mann-Whitney p value
General health	2	65 (0-100)	82 (70-82.5)	0.007
Floor %		0.8	0	
Ceiling %		5.8	0	
General vision	2	60 (10-90)	95 (80-100)	< 0.001
Floor %		0	0	
Ceiling %		0	33	
Ocular pain	2	100 (0-100)	100 (75-100)	NS
Floor %		0	0	
Ceiling %		51	72	
Near activities	6	67 (0-100)	100 (92-100)	< 0.001
Floor %		0.8	0	
Ceiling %		5.8	45	
Distance activities	6	65 (0-100)	100 (83-100)	< 0.001
Floor %		27.5	0	
Ceiling %		10	63	
Social function	3	100 (0-100)	100 (100-100)	NS
Floor %		7.5	0	
Ceiling %		56.7	100	
Mental health	5	75 (0-100)	95 (85-100)	< 0.001
Floor %		4.2	0	
Ceiling %		3.3	44	
Role difficulties	4	93 (0-100)	100 (100-100)	0.001
Floor %		0.8	0	
Ceiling %		37.5	100	
Dependency	4	100 (0-100)	100 (100-100)	0.03
Floor %		3.3	0	
Ceiling %		64.2	100	
Driving	3	0 (0-100)	100 (66-100)	< 0.001
Floor %		72.5	0	
Ceiling %		8.3	55	
Colour vision	1	100 (0-100)	100 (100-100)	NS
Floor %		0.8	0	
Ceiling %		79.2	100	
Peripheral vision	1	100 (0-100)	100 (100-100)	NS
Floor %		0.8	0	
Ceiling %		74.2	100	

AMD = age-related macular degeneration; NS = not significant.

DISCUSSION

Traditional clinical methods for the assessment of visual function and responses to treatment, e.g. the Snellen chart, may fail to detect many aspects of visual disability which are important to the individual patient. For patients with AMD, new treatment modalities have been introduced fairly recently, but as treatment is both very costly and not completely risk-free to the patient, it is important to identify in more detail how patients experience the treatment and how it affects their daily functions and well-being [3, 16].

The goal of this study was to test the reliability and validity of a Danish version of the VFQ-25 questionnaire (including the appendix -VFQ-39) when presented to patients with AMD.

By comparing the original VFQ-25 as well as other translations to our translation of VFQ-25, we found that the Cronbach's α value and item-item subscale correlations scores were comparable, except from the ocular pain and driving subscales [6, 17]. However, some of the comparisons between the different studies were impeded due to differences between the patient groups used in the validation and reliability studies which form the basis for the present comparison. In the Italian and the Turkish version of the VFQ-25, the lowest Cronbach's α value (0.68 in the Italian version and 0.56 in the Turkish version) was also in the ocular pain subscale [8, 11]. In the Turkish and in the Italian studies, patients with cataract, diabetic retinopathy, glaucoma and AMD answered the questionnaire. However, no subdivision of patient categories was presented as far as Cronbach's α values on specific subscales were concerned, which makes it difficult to perform direct comparisons. One explanation for our relatively low Cronbach's α value on this subscale may be that our group of

TABLE 3

Correlations between Visual Function Questionnaire subscales in patients with AMD (n = 120). Pearson rank correlations (correlations and p value).

	General health	General vision	Ocular pain	Near activities	Distance activities	Social function	Mental health	Role difficulties	Dependency	Driving	Colour vision
General health											
General vision	0.3 p = 0.001										
Ocular pain	0.1 p = 0.26	0.23 p = 0.01									
Near activities	0.18 p = 0.05	0.74 p < 0.001	0.27 p = 0.003								
Distance activities	0.38 p < 0.001	0.45 p < 0.001	0.07 p = 0.48	0.50 p < 0.001							
Social function	0.36 p < 0.001	0.52 p < 0.001	0.21 p = 0.02	0.52 p < 0.001	0.49 p < 0.001						
Mental health	0.20 p = 0.01	0.64 p < 0.001	0.28 p < 0.001	0.69 p < 0.001	0.43 p < 0.001	0.44 p < 0.001					
Role difficulties	0.2 p = 0.02	0.70 p < 0.001	0.35 p < 0.001	0.72 p < 0.001	0.41 p < 0.001	0.62 p < 0.001	0.68 p < 0.001				
Dependency	0.25 p = 0.006	0.65 p < 0.001	0.35 p < 0.001	0.62 p < 0.001	0.40 p < 0.001	0.60 p < 0.001	0.62 p < 0.001	0.70 p < 0.001			
Driving	0.28 p = 0.002	0.30 p = 0.001	0.09 p = 0.31	0.25 p = 0.006	0.44 p < 0.001	0.28 p = 0.002	0.18 p = 0.09	0.19 p = 0.4	0.25 p = 0.006		
Colour vision	0.25 p = 0.02	0.43 p < 0.001	0.24 p < 0.02	0.55 p < 0.001	0.32 p < 0.001	0.47 p < 0.001	0.44 p < 0.001	0.57 p < 0.001	0.5 p < 0.001	0.11 p = 0.25	
Peripheral vision	0.12 p = 0.12	0.27 p = 0.003	0.286 p = 0.002	0.39 p < 0.001	0.23 p = 0.1	0.41 p < 0.001	0.35 p < 0.001	0.44 p < 0.001	0.36 p < 0.001	0.12 p = 0.20	0.40 p < 0.001

AMD = age-related macular degeneration; NS = not significant.

patients experienced no significant ocular pain (51% of the patients reported no ocular pain) and that they are therefore less motivated to answer the question. In the future, we will consider omitting the "ocular pain" subscale when only studying patients with AMD.

We did test-retest measures of reliability in healthy individuals only because progression can be swift in patients with exudative AMD and because disease progression cannot be excluded after a week. In healthy individuals, we found high test-retest reliability.

We found that VFQ scores on different subscales were similar to what was previously reported in patients with AMD [18-20]. The patients also generally had lower scores than healthy individuals, which gives an indication of the discriminatory power of the questionnaire. Our findings also showed that the questionnaire produced results that would be anticipated when studying patients with AMD, since they primarily reported problems with vision-related activities and not so much colour vision and peripheral vision which traditionally are not heavily influenced by AMD.

As anticipated, there is a ceiling effect among the healthy controls as they do not have vision-related problems, but we also see that in some subscales many patients report no problems (ceiling effect). However, most of the ceiling effect seen among our patients pertains to subscales that one would not expect to be heavily influenced by AMD (such as social function, role difficulties, dependency on others, colour vision and peripheral vision). In subscales much influenced by AMD (such as general vision, near activities, distance activities) we did see a limited ceiling effect. We would anticipate some ceiling effect also in patients, since the patients can have one good eye with normal vision which would imply that they would have only limited vision-related problems.

In conclusion, we feel that the Danish translation of the VFQ-25 gives reliable and valid results when administered to a population with AMD, except for the "ocular pain" subscale. Further investigation is needed to study the validity and reliability in Danish patients with other eye diseases and in patients of other age groups.

The translated VFQ-25 will hopefully be a useful and valuable tool in those situations where assessment of a specific visual subscale is important for the planning and monitoring of treatment and the rehabilitation of patients with AMD.

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LITERATURE

1. Margolis MK, Coyne K, Kennedy-Martin T et al. Vision-specific instruments for the assessment of health-related quality of life and visual functioning: a literature review. Pharmacoeconomics 2002;20:791-812.

2. Kaiser PK. Prospective evaluation of visual acuity assessment: a comparison of Snellen versus ETDRS charts in clinical practice (An AOS thesis). Trans Am Ophthalmol Soc 2009;107:311-24.
3. Rosenfeld PJ, Brown DM, Heier JS et al. Ranibizumab for neovascular age-related macular degeneration. N Eng J Med 2006;355:1419-31.
4. Brown DM, Kaiser PK, Michels M et al. Ranibizumab versus Verteporfin for neovascular age-related macular degeneration. N Eng J Med 2006;355:1432-44.
5. Mangione CM, Berry S. Identifying the content area for the 51-item National Eye Institute Visual Functioning Questionnaire: results from focus groups with visually impaired persons. Arch Ophthalmol 1998;116:227-33.
6. Mangione CM, Lee PP, Gutierrez PR et al. National Eye Institute Visual Function Questionnaire field test investigators development of the 25-item National Eye Institute Visual Function Questionnaire. Arch Ophthalmol 2001;119:1050-8.
7. Jager RD, Mieler WF, Miller JW. Age-related macular degeneration. N Eng J Med 2008;358:2606-17.
8. Rossi GC, Milano G, Tinelli C. The Italian version of the 25-item National Eye Institute Visual Function Questionnaire: translation, validity, and reliability. J Glaucoma 2003;12:213-20.
9. Nordmann JP, Viala M, Sullivan K et al. Psychometric Validation of the National Eye Institute Visual Function Questionnaire – 25 (NEI VFQ-25) French version: in a population of patients treated for ocular hypertension and glaucoma. Pharmacoeconomics. 2004;22:197-206.
10. Suzukamo Y, Oshika T, Yuzawa M et al. Psychometric properties of the 25-item National Eye Institute Visual Function Questionnaire (NEI VFQ-25), Japanese version. Health Qual Life Outcomes. 2005;3:65.
11. Iyigun E, Bayer A, Tastan S et al. Validity and reliability study for the NEI VFQ-39 scale in chronic ophthalmic diseases – Turkish version. Acta Ophthalmol 2010;88:e115-9.
12. Wang CW, Chan CL, Jin HY. Psychometric properties of the Chinese version of the 25-item National Eye Institute Visual Function Questionnaire. Optom Vis Sci 2008;85:1091-9.
13. Cahill MT, Banks AD, Stinnett SS et al. Vision-related quality of life in patients with bilateral severe age-related macular degeneration. Ophthalmology 2005;112:152-8.
14. Acqudro C, Jambon B, Ellis D et al. Language and translations issues. In: Spilker B, editor. Quality of life and pharmacoeconomics in clinical trials. 2. Philadelphia: Lippincott Raven, 1995:575-85.
15. Olsson H. Det mindst ringe spørgeskema. København: Dansk Sociologi, 1998.
16. Sorensen TL, Kemp H. Intravitreal Ranibizumab for age-related macular degeneration Ugeskrift Laeger 2010;172:1685-9.
17. Mangione CM, Lee PP, Pitts J et al. Psychometric properties of the National Eye Institute Visual Function Questionnaire (NEI-VFQ). NEI-VFQ Field Test Investigators. Arch Ophthalmol 1998;116:1496-504.
18. Revicki DA, Rentz AM, Harnam N et al. Reliability and validity of the National Eye Institute visual function questionnaire-25 in patients with age-related macular degeneration. Invest Ophthalmol Vis Sci 2010;51: 712-7.
19. Miskala PH, Hawkins BS, Mangione CM et al. Responsiveness of the National Eye Institute Visual Function Questionnaire to changes in visual acuity: findings in patients with subfoveal choroidal neovascularisation – SST Report No. 1. Arch Ophthalmol 2003;121:531-9.
20. Miskala PH, Bressler NM, Meinert CL. Relative contributions of reduced vision and general health to NEI-VFQ scores in patients with neovascular age-related macular degeneration. Arch Ophthalmol 2004;122:758-66.