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Development and Validation of an Arabic Version of the Visual Functioning Index VF-14 for Cataract Patients

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ABSTRACT

Purpose: To develop and validate an Arabic version of the Visual Functioning Index (VF-14) for patients with cataracts.

Materials and Methods: The VF-14 was translated into Arabic by an epidemiologist and an ophthalmologist, both fluent in Arabic and English. The VF-14 was administered to patients diagnosed with cataract at two hospitals in Egypt and two hospitals in Saudi Arabia. Patients were also administered three other forms; the cataract symptoms score (CSS); global measure of vision; and cataract medical form. Internal reliability and external validity were measured. Index sensitivity to visual acuity was detected and potential effective factors were investigated. Correlation analyses were performed. A p value less than 0.05 was considered statistically significant.

Results: The translated VF-14 was consistent and reliable ($\sigma = 0.763$, $p < 0.0001$). It was also statistically significantly sensitive to vision ($p < 0.0001$). The mean calculated index was 62.18 ± 19.34, and was highly correlated with; CSS and other scores ($p < 0.0001$, all cases). Factors that may affect the index are; age, sex, vision, wearing glasses, type, position, and severity of cataract.

Conclusion: The Arabic VF 14 is a reliable and valid tool for evaluation of both visual functioning and quality of visual life among cataract patients. It is also sensitive to changes in visual acuity, demographic, and clinical characteristics.

Key words: Cataract Outcome, Validation, Visual Function Index, Visual Function

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INTRODUCTION

Cataract is the major cause of low vision and blindness in the Middle East (45.2%) and worldwide (50%).[1,2] In the Middle Eastern region, 31.4 million individuals aged 60 years or older and 20.8 million below 60 years of age are visually disabled due to cataract.[3] As the volume of cataract surgery increases due to the aging population, there is a need to continually monitor and evaluate surgical outcomes and the impact on visual function and quality of life. The Visual Functioning Index VF-14 was developed and validated by Steinberg and colleagues in the early nineties.[4] The rationale for developing this index was the need for a tool that can accurately measure cataract surgery outcomes as visual acuity alone was considered as an insufficient measure.[5,6] Since its introduction, the VF-14 has been widely accepted and utilized for various ocular diseases that can affect vision including estimation of the need and urgency of cataract surgery. The VF-14 has been used to evaluate and compare different surgical procedures. This index has been used for glaucoma, retina, cornea, keratoplasty, macular degeneration, low vision, and prevention of blindness research.[7-11]

The VF-14 was originally developed in English for developed countries, consequently, there was a debate regarding its

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global validity. Therefore, various investigators have translated, modified and validated the VF-14 to suit different languages and settings. The VF-14 has proved to be reliable, valid, and highly consistent when used for different purposes, in different languages and settings.

In 1999, Karin van Dijk and colleagues (1999) validated a modified version for African countries where a lot of research to prevent blindness – specifically from cataract – takes place.[12] In the Middle East, Arabic is spoken in 22 Arabic countries with a total population of 291 million inhabitants. Additionally, the prevalence of blindness in this region is one of the highest.[13] There is also a dramatic increase in ocular research that mandates the need to develop and validate a reliable Arabic version of the VF-14. Therefore, we sought to translate, adapt, and validate an Arabic version of the VF-14 for subsequent use in ophthalmologic research.

MATERIALS AND METHODS

The current study was conducted in a cross sectional study design. The original VF-14 questionnaire was separately translated into Arabic by two different ocular researchers (an epidemiologist from Egypt and an ophthalmologist from Saudi Arabia who were fluent in both Arabic and English). Subsequently the two versions were matched and unified. The new Arabic questionnaire was translated back to English by a third researcher (ophthalmologist) and then matched to the original version by an optometrist whose native language was English. Minimal modifications were required by the research team to formulate a final version of the Arabic VF-14 questionnaire to suit the Arabic culture.

Three other forms were administered in parallel with the VF-14 form including the Cataract Symptoms Score (CSS), Global Measure of Vision (including; Trouble and Satisfaction with current vision forms), and a cataract medical form which collected information on patient demographics, visual acuity, and grade, type, and position of cataract. Cataract categorization and grading were simplified and standardized using international guidelines.[14-16] Meanwhile, patient visual acuity classification followed the World Health Organization (WHO) standardized guideline.[17,18]

Scoring and scaling system

Each of the VF-14 questions was given a score ranging from 0 – 4 as follows; 4; "*no difficulty*", 3; "*a little difficulty*", 2; "*moderate difficulty*", 1; "*a great deal of difficulty*" and 0; "*Unable to do the activity*" while "*not applicable*" was left blank and excluded from the analysis. The scores were added for all questions and the total was divided by the total number of answered questions. The total score was then multiplied by 4 to get the overall index for each person which indicated the patient's visual functioning scale ranging from (0 – 100) where 0 meant unable to do all applicable activities, and 100 means best possible visual functioning. Likewise, the global measure of vision index (trouble and satisfaction with current vision) were scored in terms of trouble as; 0; "*None*", 1; "*A little*", 2; "*A moderate amount*", 3; "*A great deal*" and in terms of satisfaction as; 3; "*Very dissatisfied*", 2; "*Moderately dissatisfied*", 1; "*Satisfied*", and 0; "*Very satisfied*". The CSS was calculated as; 3; "*Very bothered*", 2; "*Somewhat bothered*", 1; "*A little bothered*" and 0; "*Not at all bothered*". Calculations of the overall index were performed through summing the total results in a cataract symptoms index for each patient ranging from 0 (*no symptoms or not bothered by any of the symptoms*) to 15 (*very bothered by all five symptoms*).

Implementation of the index

The integrated package of forms was administered to a total of 1413 cataract patients from two hospitals in Egypt and two others in Saudi Arabia. Patients recruited for the study were scheduled for surgery within 3 months (maximum). Inclusion criteria were; Arabic as a native language, age of 20 years or older, no prior ocular surgery, no combined procedures, in addition to absence of any ocular co-morbidities.

Statistical analysis and validation

Data management/verification processes were conducted and all ineligible data were removed due to; missing, incomplete, facing contradictions, and or inconsistencies. Validation process included three phases; (1) scoring and descriptive analysis, (2) internal consistency testing (reliability) using Cronbach's α test, (3) testing validity by evaluating correlation between the VF-14 score and; the logarithm of the minimum angle of resolution (LogMAR) visual acuity, CSS, Visual Trouble Score, and Visual Satisfaction Score using Pearson's correlation coefficient. One way analysis of variance (ANOVA) was performed to investigate the sensitivity of the VF-14 to different levels of visual acuity while multiple linear regression was conducted to investigate different factors affecting the new index. A p value less than 0.05 was considered statistically significant. The unit of analysis was the person (not eye) where; visual acuity and the corresponding group of vision were calculated as an average of (0.25* the worse eye + 0.75* the best eye).

Ethics approval was obtained from the Institutional Research and Ethics Board (IREB) of King Saud University (IREB-09-702) and the study conformed to the tenets of the Declaration of Helsinki.

RESULTS

The index was administered to patients booked for cataract surgery from March 1st to September 30th 2010 who met the inclusion criteria. During data management, 33 cases were excluded leaving a total of 1380 patients. The study cohort was

recruited from the following institutions; 324 (23.5%) patients from King Abdul Aziz University Hospital, Riyadh; 186 (13.5%) patients from King Fahd Hospital, Baha; 522 (37.8%) patients from Magrabi Eye Hospital, Cairo and; 348 (25.2%) patients from Magrabi Eye Center, Tanta. The first two hospitals were based in two different governorates in Saudi Arabia and the other two hospitals were based in two different governorates in Egypt.

The mean age (±SD) was 63.41 ± 11.19 years (range, 24 years to 80 years). There were 840 (60.9%) males and 540 (39.1%) females. The majority (840; 60.9%) of patients were undergoing surgery on the left eye and 720 (52.2%) patients had visual acuity <20/40. Ninety (6.5%) patients were wearing spectacles. Most (690; 50%) of the patients presented with severe cataract, and posterior sub-capsular cataract was present in 930 (67.4%) patients [Table 1].

The mean score for the VF-14 was 62.18 ± 19.34 (range, 15.38 to 88.89) [Table 2]. Data on demographics, visual acuity, IOL power and mean score of the visual function index are presented in Table 2. Cronbach's α test for intra-class correlation indicated that the index was statistically significantly reliable (Cronbach's α; 0.763, 95% confidence intervals (CI): [0.743 – 0.782]; $p < 0.0001$).

The VF index had statistically significant inverse correlations with the Cataract Symptom Score, Trouble Index, Dissatisfaction Index, and the overall LogMAR Visual Acuity (Pearson ρ: −0.76, −0.63, −0.73, −0.77 respectively; $p < 0.0001$ for all correlation tests).

The index showed a high correspondence to the level of vision as clearly demonstrated in Table 3. The VF score gradually decreased with decreasing visual acuity [Figure 1]. There was a statistically significant difference in the mean VF-14 score among the − WHO standard − groups of visual acuity (Normal, Low vision, Severe low vision, and Blindness) (ANOVA F; 714.52, $p < 0.0001$). *Post hoc* analysis using Tukey's test indicated that the source of variation was in all alternatively tested groups except for the low vision and normal groups [Table 4].

Multiple regression analysis indicated that factors affecting the VF index were; Age, Sex, Vision Group, Spectacle wear, Type, and Position of cataract and Severity of Cataract Symptoms. All factors were highly statistically significant ($p < 0.0001$, all cases) except for Sex ($p = 0.001$), and Sclerotic position of cataract ($p = 0.032$).

DISCUSSION

The need for translation and validation of quality of life indices into local languages has been extensively addressed by the literature. The VF-14 was translated and validated into French,

Table 1: Distribution of cases per type and position of cataract at presentation

Type	No.	%	Position	No.	%
Moderate	660	47.8	Posterior sub-capsular	930	67.4
Severe	690	50	Cortical	330	23.9
White Brown	30	2.2	Nuclear	60	4.3
			Sclerotic	30	2.2
			Others	30	2.2
Total	1380	100	Total	1380	100

Table 3: Average visual function score per different groups of Visual Acuity

Visual acuity group	N	Mean (SD) score	95% Confidence interval
>= 20/40	11	80.29 (6.57)	(75.88 – 84.70)
20/50 - 20/160	769	74.23 (12.10)	(73.37 75.09)
20/200 - 20/400	270	56.45 (13.09)	(54.88 – 58.01)
CF, HM, LP, NLP	330	38.19 (11.38)	(36.96 – 39.42)
Total	1380	62.18 (19.34)	(61.16 63.20)

CF: Counting fingers, HM: Hand movement, LP: Light perception, NLP: No light perception

Table 2: Demographics and mean score of visual functioning questionnaires and visual acuity

Index	Mean	SD	(Min – Max)
Age	63.41	11.9	(24 – 80)
Cataract surgical score (CSS)	11.78	2.39	(7 – 15)
Visual trouble score	2.38	0.53	(1 – 3)
Visual dissatisfaction score	2.49	0.5	(2 – 3)
IOL measure	21.83	1.13	(20 – 25)
Visual function score	62.18	19.34	(15.38 – 88.9)
Visual acuity (LogMAR) of operated eye	1.27	0.54	(0.18 – 3)
Visual acuity (LogMAR) of fellow eye	0.62	0.43	(0.10 – 1.6)
Visual acuity (LogMAR) of the better eye	0.60	0.44	(0.10 – 1.6)
Visual acuity (LogMAR) of the worst eye	1.90	0.97	(0.30 – 4)
Visual acuity (LogMAR) averaged per person (75% of best eye + 25% of worst eye)	0.92	0.56	(0.21 – 2.2)

SD: Standard deviation, Log MAR: The logarithm of the minimum angle of resolution

Table 4: Matrix of Binary Differences between Groups (Post Hoc analysis)

Group I	Group II	Mean Difference	S. E.	*P* value	95% Confidence Interval
Normal	Low vision	6.06	3.68	0.351	(-3.39 – 15.52)
	Severe low vision	23.85	3.72	<0.0001	(14.27 – 33.42)
	Blind	42.10	3.71	<0.0001	(32.56 – 51.65)
Low vision	Severe L.V.	17.78	0.86	<0.0001	(15.58 – 19.99)
	Blind	36.04	0.80	<0.0001	(33.99 – 38.09)
Severe low vision	Blind	18.26	0.99	<0.0001	(15.70 – 20.81)

S.E: Denotes standard, $P < 0.05$ indicates statistical significance

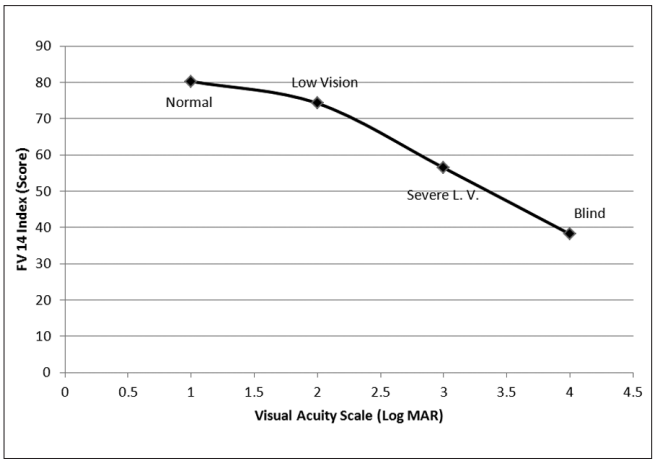

Figure 1: Pattern of visual functioning index (VF 14) with different levels of visual acuity

Italian, Spanish, Turkish, Brazilian, Chinese, and several other languages. The VF-14 index was found to have good validity after translation and validation into different languages with minimal adaptation to each language. The rationale for this localization is to adjust for the cultural and other community specific differences. Additionally, there were many attempts to develop similar indices for different age groups.[19,20] However, the VF-14 showed convenient flexibility either to minimal modifications, reproducibility,[21] or to shortening of its questions where it persisted to be reliable and valid.[22] Despite the availability of similar indices such as the National Eye Institute NEI VFQ 25, or the WHO VF 20, the VF-14 – which was developed as cataract specific – was then widely utilized for evaluation of other ocular interventions including long term follow up.[23] Furthermore, the VF-14 proved to be a reliable tool for decision making[24] and prioritization of waiting lists in cataract surgeries.

In an effort to cope with the tremendous increase in ocular research in many Arabic speaking countries, we translated and minimally modified the VF-14 for use in Arabic speaking countries and communities. The new index showed highly significant reliability and validity and was comparable to classic outcome assessment indices including; LogMAR visual acuity, dissatisfaction, and trouble with vision indices (global measures of vision). The CSS is widely accepted as a reliable, valid, and very sensitive tool to assess cataract patients preoperatively. It is internationally recognized as a highly correlated index to the VF-14.[25,26] Our results are consistent with this international trend. Hence, using the Arabic version would enable international comparisons in addition to standardization of quality eye care. The sensitivity of the Arabic VF-14 to change in vision is similar to the findings of Steinberg and co-workers[4] and the general trend to other translation and validation studies.[25,26] This provides additional evidence on the reliability and validity of the VF-14 as a tool for measuring visual functioning for cataract patients. Additional studies are required to assess the effectiveness of the Arabic VF-14 in other ocular diseases and to use it as a tool for evaluation and comparison of different procedures.

CONCLUSION

The findings of this study indicate that the Arabic VF-14 is a reliable and valid tool for evaluation of both visual functioning and quality of visual life among cataract patients preoperatively. The new Arabic tool can be affected by age, sex, spectacle wear, in addition to different levels of vision and the maturity, severity, type, and position of cataract. The Arabic VF-14 is highly recommended for evaluating visual function as an outcome indicator of surgical intervention either in cataract or in other ocular diseases after pre-testing. It can also be used in decision making process for surgical interventions and for prioritization of surgical waiting lists.

REFERENCES

1. Tabbara KF. Blindness in the eastern Mediterranean countries. Br J Ophthalmol 2001;85:771-5.
2. Visual impairment and blindness. Genève: WHO; 2009. Available from: http://www.who.int/mediacentre/factsheets/fs282/en/. [Last cited in 2010 Jun].
3. Disease incidence, prevalence and disability Report. Geneva: WHO; 2004. p. 35. Report No.: 3. Available from: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_part3.pdf. [Last cited in 2010 Aug].
4. Steinberg EP, Tielsch JM, Schein OD, Javitt JC, Sharkey P, Cassard SD, *et al*. The VF-14. An index of functional impairment in patients with cataract. Arch Ophthalmol 1994;112:630-8.
5. Bernth-Petersen P. Visual functioning in cataract patients. Methods of measuring and results. Acta Ophthalmol (Copenh) 1981;59:198-205.
6. Elliott DB, Hurst MA, Weatherill J. Comparing clinical tests of visual function in cataract with the patient's perceived visual disability. Eye (Lond) 1990;4:712-7.
7. 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.
8. Linder M, Chang TS, Scott IU, Hay D, Chambers K, Sibley LM, *et al*. Validity of the visual function index (VF-14) in patients with retinal disease. Arch Ophthalmol 1999;117:1611-6.
9. Boisjoly H, Gresset J, Fontaine N, Charest M, Brunette I, LeFrancois M, *et al*. The VF-14 index of functional visual impairment in candidates for a corneal graft. Am J Ophthalmol 1999;128:38-44.
10. Riusala A, Sarna S, Immonen I. Visual function index (VF-14) in exudative age-related macular degeneration of long duration. Am J Ophthalmol 2003;135:206-12.
11. Brunette I, Gresset J, Boivin JF, Boisjoly H, Makni H. Functional outcome and satisfaction after photorefractive keratectomy. Part 1: Development and validation of a survey questionnaire. Ophthalmology 2000;107:1783-9.
12. Van Dijk K, Lewallen S, Chirambo M, Gardiner J, Hoar B, Lindley J, *et al*. Creation and testing of a practical visual function assessment for use in Africa: Correlation with visual acuity, contrast sensitivity, and near vision in Malawian adults. Br J Ophthalmol 1999;83:792-5.

13. Al Gamra H, Al Mansouri F, Khandekar R, Elshafei M, Al Qahtani O, Singh R, *et al*. Prevalence and causes of blindness, low vision and status of cataract in 50 years and older citizen of Qatar-a community based survey. Ophthalmic Epidemiol 2010;17:292-300.
14. Chylack LT Jr, Leske MC, Sperduto R, Khu P, McCarthy D. Lens opacities classification system. Arch Ophthalmol 1988;106:330-4.
15. Chylack LT Jr, Leske MC, McCarthy D, Khu P, Kashiwagi T, Sperduto R. Lens opacities classification system II (LOCS II). Arch Ophthalmol 1989;107:991-7.
16. Chylack LT Jr, Wolfe JK, Singer DM, Leske MC, Bullimore MA, Bailey IL, *et al*. The lens opacities classification system III. The longitudinal study of cataract study group. Arch Ophthalmol 1993;111:831-6.
17. International statistical classification of diseases, injuries and causes of death, 10th revision (ICD-10): H54 (9).
18. Dandona L, Dandona R. Revision of visual impairment definitions in the International statistical classification of diseases. BMC Med 2006;4:7.
19. El Byoumi BM, Mousa A. Visual function of Egyptian children with low vision and the demographic determinants. Middle East Afr J Ophthalmol 2010;17:78-82.
20. Gothwal VK, Lovie-Kitchin JE, Nutheti R. The development of the LV Prasad-functional vision questionnaire: A measure of functional vision performance of visually impaired children. Invest Ophthalmol Vis Sci 2003;44:4131-9.
21. Cassard SD, Patrick DL, Damiano AM, Legro MW, Tielsch JM, Diener-West M, *et al*. Reproducibility and responsiveness of the VF-14. An index of functional impairment in patients with cataracts. Arch Ophthalmol 1995;113:1508-13.
22. Perea-Milla E, Vidal S, Briones E, Aguirre U, Bare M, Fernandez de Larrea N, *et al*. Development and validation of clinical scores for visual outcomes after cataract surgery. Ophthalmology 2011;118:9-16.
23. Boisjoly H, Gresset J, Charest M, Fontaine N, Brunette I, LeFrancois M, *et al*. The VF-14 index of visual function in recipients of a corneal graft: A 2-year follow-up study. Am J Ophthalmol 2002;134:166-71.
24. Quintana JM, Arostegui I, Alberdi T, Escobar A, Perea E, Navarro G, *et al*. Decision trees for indication of cataract surgery based on changes in visual acuity. Ophthalmology 2010;117:1471-8.
25. Crabtree HL, Hildreth AJ, O'Connell JE, Phelan PS, Allen D, Gray CS. Measuring visual symptoms in British cataract patients: The cataract symptom scale. Br J Ophthalmol 1999;83:519-23.
26. Lee JE, Fos PJ, Sung JH, Amy BW, Zuniga MA, Lee WJ, *et al*. Relationship of cataract symptoms of preoperative patients and vision-related quality of life. Qual Life Res 2005;14:1845-53.

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