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Original Article

Modified Bahasa Malaysia version of VF-14 questionnaire: assessing the impact of glaucoma in rural area of Malaysia

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Abstract

Purpose: To evaluate the functional impairment of glaucoma patients, using a modified Bahasa Malaysia version of VF-14 questionnaire, and to correlate the score with the severity of the disease.

Methods: One-to-one interview by trained interviewers was conducted on glaucoma patients seen in the eye clinic of Hospital Universiti Sains Malaysia, using a modified validated Bahasa Malaysia version of VF-14 questionnaire. The severity of glaucoma was determined based on the better-eye Advanced Glaucoma Intervention Study Scale (AGIS) score of visual field analysis on the latest most reliable visual field. The literacy rate, living situation, better-eye visual acuity and lens status were also documented.

Results: A total of 110 glaucoma patients were recruited (54.5% primary open-angle glaucoma, 21.8% primary angle-closure glaucoma, 19.2% normotensive glaucoma and 4.5% pseudoexfoliative glaucoma) and majority with bilateral involvement. Based on the better-eye AGIS score, 41.5% were in advanced stage, 29.1% moderate and 29.1% mild. There was a significant association between VF-14 scoring with the better-eye AGIS score ($r = -0.579$, $P < 0.001$), age ($r = -0.313$, $P = 0.000$) and better-eye visual acuity ($r = -0.752$, $P = 0.000$). Based on the multivariate analysis, there was a significant association of the questionnaire score and better-eye AGIS score ($P < 0.001$).

Conclusion: The Bahasa Malaysia version of modified VF-14 questionnaire is a useful tool in quantifying quality of life among glaucoma patients in rural area with high illiteracy rate and provides moderate correlation with severity of the disease. Customization of quality of life questionnaire according to custom and culture of the community will provide better insight to the functional impairment of glaucoma patients.

Key words: glaucoma, literacy, quality of life, rural, visual field defect.

Introduction

Glaucoma is a disease that causes progressive damage of the optic nerve resulting in significant progressive constriction of the visual field, which slowly impairs patient's daily routine such as navigation, reading and other social activities. The afflicted patients may not only lose the freedom of mobilization but also suffer various psychological effects, for example, fear of blindness, potential side-effects of both medical and surgical intervention, financial difficulties due to cost of visits and treatments. Clinical assessment is not the only important aspect of glaucoma management. Recently, there is a growing interest in assessing functional capacity and quality of life (QOL) of the affected patients.[1,2]

Health-related quality of life (HRQOL) assessments such as VF-14, National Eye Institute Visual Functioning Questionnaire, Medical Outcomes Study 36-Item Short Form were designed to standardize and codify the assessment of visual function on QOL. VF-14 was found to be more sensitive than generic HRQOL questionnaire. VF-14, which was designed for cataract patient's outcomes research,[3] consists of 18 questions to assess 14 vision-related activities, ranging from reading prints of various sizes to driving. Several studies had already demonstrated the sensitivity of this questionnaire in assessing functional activities of glaucoma patients.[3–5]

The VF-14 questionnaire, which was initially developed for use with English-speaking patients, has been translated

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and validated in Spanish[6] and French.[7] Recently, we have already modified, translated and validated this questionnaire into Bahasa Malaysia (Rosnita A. Evaluation of visual function status pre and post cataract surgery using a modified VF-14. Dissertation submitted in partial fulfillment for the degree of Master of Medicine [Ophthalmology] Universiti Sains Malaysia, 2003). A study of outcomes of cataract surgery was conducted using this Bahasa Malaysia version of the VF-14. However, no studies to date have been reported for glaucoma patients especially in rural Malaysia. Glaucoma usually affects elderly patients.[8,9] In rural area where the illiteracy rate is quite high, commonly they failed to even notice their visual incapability, which led to late presentation of the disease.[9,10] The objective of our study was to determine the relationship between the QOL among glaucoma patients in a rural area, using the modified Bahasa Malaysia version of the VF-14, with their objective functional damage.

Methods

This cross-sectional study was conducted involving 110 consecutive glaucoma patients seen in the Eye Clinic, Hospital Universiti Sains Malaysia, Kelantan between April 2005 and February 2006 with approval of the Ethical Committees, School of Medical Sciences, Universiti Sains Malaysia. The majority of our patients came from the rural area of Kelantan, which is located at the northeast of Malaysia bordering Thailand and is the poorest state in Malaysia.[11] The adult literacy rate of Kelantan is 90.4% based on National Censor Board 2000,[1] with only 88.3% in rural area of Kelantan.

The inclusion criteria included an age of 40 years or above and a confirmed diagnosis of primary open-angle glaucoma (POAG), normotensive glaucoma (NTG) or primary angle-closure glaucoma (PACG), which were diagnosed based on consensus of International Society for Geographical and Epidemiological Ophthalmology definition.[12] Pseudoexfoliative glaucoma (PXG) was diagnosed based on the presence of pseudoexfoliative materials in anterior segment of the eye and evidence of increased vertical cup:disc ratio and glaucomatous visual field defect. Unilateral or bilateral pseudophakic patients were also included, provided they had at least undergone 3-month recuperation from their cataract surgery. Those with cataract of more than grade 1 according to the Lens Opacities Classification System II (LOCS II),[13] laser treatment (e.g. laser peripheral iridotomy, argon laser iridoplasty, photocoagulation) or any intraocular surgical intervention within 3 months before the VF-14 assessment, other concurrent ocular problem except for corrected refractive error (e.g. diabetic retinopathy) were excluded from the study. The assessment of the lens status was conducted by two masked investigators (AY and CMT); the potential patients will be excluded if either one of the investigator graded the lens as more than grade 1 of LOCS II. Patients with other types of glaucoma such as congenital glaucoma, developmental glaucoma, glaucoma suspects and secondary glaucoma except for PXG were also excluded. Those with the presence of cataract more than grade 1 of LOCS II and other ocular pathology of the other eye in unilateral cases of glaucoma were also excluded. Informed consent was obtained before conducting a one-to-one interview using the VF-14. The recruitment and selection of participants was done by two investigators (CMT and AY).

A medical officer (KRM) and five trained medical students conducted the interviews (they were trained for 2 weeks before the pilot study) from April 2005 to February 2006 using a modified Bahasa Malaysia version of VF-14. The questionnaire had been modified to include questions on visual functions relevant to local culture and activities, such as to read small print including the Quran or the Bible, recognizing street signs and faces, seeing steps and curbs, doing fine handwork such as sewing, wood carving and carpentry, counting moneys, ability to involve in outdoor activities (e.g. fishing and gardening), cooking, watching television and driving. Patients were asked whether they had difficulty doing each of the activities even with their corrective spectacles. Patients who responded yes, were later asked to rate the amount of difficulty: little difficulty (score = 3), moderate (score = 2), great deal of difficulty (score = 1) and inability to perform the activities due to their visual disability (score = 0). An item was not included in the scoring if the patient did not do the activity for reasons other than their vision such as physical inhibitions. The total score was then calculated and multiplied by 25 to obtain the VF-14 score. A pilot study using VF-14 was conducted on 20 glaucoma patients before the actual recruitment period and was also included in the study. The patients were also asked: their current occupation, level of education completed, living arrangement, and ability to read and count either in Bahasa Malaysia, Jawi (Arabic form of Bahasa Malaysia) or another language. Illiteracy was defined as the inability to read and count in Bahasa Malaysia and English as most reading materials and forms are in those two languages.

An ophthalmologist (LSAT), who was masked to the VF-14 questionnaire score, conducted the clinical assessment and evaluated the severity of glaucoma. The type of glaucoma, duration of the disease from the initial diagnosis, previous glaucoma management including surgical or laser intervention, number of current glaucoma medications and comorbidities were extracted from the patient's medical record. Clinical assessment including Snellen visual acuity with appropriate corrective glasses, intraocular pressure using Goldmann applanation tonometry, optic disc examination and automated perimetry using a Humphrey visual field analyser were also carried out. The latest most reliable (false positive and false negative not exceeding 33%, fixation loss not exceeding 20%) visual field based on 30–2 SITA fast programme was obtained (either during the recent visit or the most recent visual field assessment) and analysis was based on the Advanced Glaucoma Intervention Study Scale (AGIS).[14] In summary, AGIS scores were calculated based on scoring in areas: upper field, lower field and nasal field. The scores ranged from 0 to 20, where 0 represents no defects and 20 signifies end stage. Severity of the glaucoma was

classified as mild (score 0–8), moderate (score 9–12) and severe (score 13–20) based on modified AGIS score. For bilateral cases, the better score from the two eyes was used.

Statistical analysis was performed using SPSS 12 (SPSS Inc., Chicago, IL, USA). Multiple linear regressions employing a stepwise procedure were used to determine relationship between VF-14 scores and clinical characteristics. The correlation of the parameters with the VF-14 scores was based on Pearson's correlation. Kruskall–Wallis one-way analysis of variance (ANOVA) was performed to examine the association between severity of glaucoma and VF-14 score while adjusting for age, lens status, visual acuity and literacy ability as the confounding factors. Significance was determined at the 0.05 levels for all tests.

Results

We recruited 60 (54.5%) people with POAG, 24 (21.8%) with PACG, 21 (19.2%) with NTG and five (4.5%) with PXG. Mostly were bilateral cases (Table 1). The unilateral cases were mainly PXG and PACG, with the other eye either primary angle-closure/primary angle-closure suspect or pseudoexfoliation syndrome. Overall, 41.8% (46) of total recruited patients were classified as having advanced glaucoma, 32 (29.1%) were graded moderate and 32 (29.1%) were found to have mild glaucoma based on AGIS scores. The majority of the severe or advanced glaucoma cases had either POAG (49% of total POAG) or PACG (50% of total PACG).

The mean age of the selected patients was 67.1 years (SD 9.5). Almost two-thirds were Malays. Twenty-three patients (20.9%) were illiterate and 35 did not receive any formal education (Table 1). Most were not working, being retirees and home managers. However, most of them had good family support with only one patient was living alone. None were living in the nursing homes.

Many of our participants expressed concerns about their ability to drive at night (70.4%), read newspaper or book (57.1%), read small print (56.7%) and perform fine manual tasks (46.75%) (Fig. 1). There was a significant association between the severity staging of glaucoma and each of the visual tasks specified in our questionnaire (Table 2). There was no significant association in difficulty performing visual tasks and literacy rate except for doing fine work ($P = 0.039$). Patients without any formal education seemed to encounter significant difficulty in performing fine work ($P = 0.005$) and doing outdoor activities ($P = 0.019$) (Table 3).

Based on univariate analysis, there was significant inverse correlation ($r = -0.579$, $P < 0.001$) between the severity of glaucoma based on AGIS scale and VF-14 scores using our modified questionnaire (Fig. 2). We also explored the association between several *a priori* potential confounding factors (age, visual acuity and the lens status) and found weak correlation with age ($r = -0.313$, $P < 0.001$) (Fig. 3) and strong correlation with visual acuity of the better eye ($r = -0.752$, $P < 0.001$) (Fig. 4) although the lens status ($r = 0.042$, $P = 0.102$) was not associated (Fig. 5). Multivariate analysis using

Table 1. Patient and ocular characteristics ($N = 110$)

Characteristics	*n*	%
Demographic data		
Sex		
Male	66	60.0
Female	44	40.0
Race		
Malay	80	72.7
Chinese	30	27.3
Literacy rate		
Literate	87	79.1
Illiterate	23	20.9
Education level		
Tertiary	9	8.2
Secondary	26	23.6
Primary	40	36.4
No formal education	35	31.8
Occupations		
Professionals	7	6.4
Office workers	6	5.5
Business	7	6.4
Laborer	9	8.2
Farmer/fisherman	7	6.4
Home manager	16	14.4
Retiree	26	23.6
Not working	32	29.1
Living arrangement		
Family	40	36.4
Extended family	40	36.4
Spouse	29	26.3
Alone	1	0.9
Ocular characteristics		
Types of glaucoma		
POAG	60	54.5
PACG	24	21.8
NTG	21	19.1
PXG	5	4.5
Laterality		
Unilateral	18	16.4
Bilateral	92	83.6
Staging of glaucoma		
(based on the better-eye AGIS score)		
Mild (0–8)	32	29.1
Moderate (9–12)	32	29.1
Severe (13–20)	46	41.8
Lens status of the better eye		
No cataract	20	18.2
LOCS II grade 1	63	57.3
Pseudophakic	27	24.5
Treatment modalities		
Medical treatment	91	82.7
Combination		
Medical & trabeculectomy	9	8.2
Medical & laser	5	4.6
Laser & trabeculectomy	3	2.7
Medical, laser & trabeculectomy	2	1.8

AGIS, Advanced Glaucoma Intervention Study Scale; LOCS II, Lens Opacities Classification System II; NTG, normotensive glaucoma; PACG, primary angle-closure glaucoma; POAG, primary open-angle glaucoma; PXG, pseudoexfoliative glaucoma.

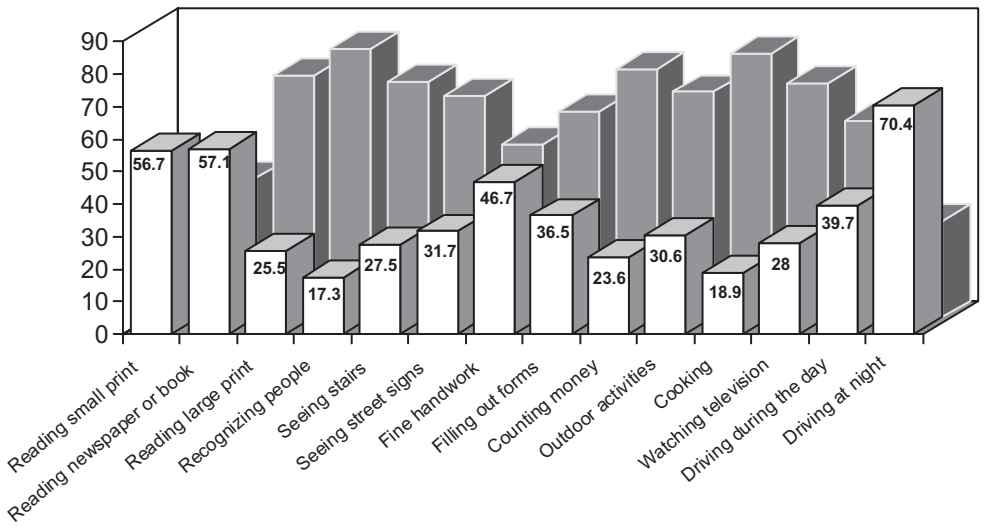

Figure 1. The percentage of difficulty in performing visual tasks according to VF-14 questionnaire. ☐ Yes with difficulty, ■ No difficulty.

Kruskal–Wallis one-way ANOVA demonstrated a strong significant association between the AGIS score of the better eye ($P < 0.001$) and visual acuity of the better eye ($P < 0.001$) with VF-14 scores (Table 4).

Discussion

Quality of life assessment is perhaps, the least emphasized aspect in the management of glaucoma. Most ophthalmologists and glaucomatologists emphasize mainly on intraocular pressure control, visual field progression and side-effect of medications. QOL is subjective and varies according to individuals[15] depending on their education level, literacy, living arrangement, occupation and custom. Although subjective, QOL is the main concern of most patients which usually manifests as the symptom that bring them to the hospital.

Most available QOL questionnaires were in English, which are not applicable in our population with high illiteracy rate. The modified Bahasa Malaysia version of VF-14, which is tailored to our local custom and culture, may provide us with better understanding of the impact of glaucoma in our local patient's daily activities. For example, the original VF-14 includes the ability to play golf, handball, etc., which is not a popular sport among our local community. Thus, in our modified version we replaced that with the involvement of outdoor activities such as fishing, wood carving and gardening. Playing card and lottery is illegal in our community and was replaced by evaluating their ability in counting money. This questionnaire will also be useful and easily adapted in the neighbouring countries such as Indonesia and Brunei because of the similarity with our custom and culture. In addition, Bahasa Melayu is also their national language.

Although VF-14 concentrates more of the central vision functional activities, it was also found useful in glaucoma[4–6,15–17] suggesting that the central vision is also affected not just by perimetric constriction. We found a significant linear reduction of modified VF-14 scores according to the better-eye visual field damage based on AGIS score in our study, suggesting the ability of this questionnaire representing the actual functional damage in our patients. Odberg *et al*. argued that the association QOL assessment based on *P*-value is of no value, the correlation or *r*-value is more accurate in representing the actual impact of visual field damage in the glaucoma patients' daily activities.[18] Using correlation coefficient classified by Parrish *et al*.,[5] we demonstrated moderate correlation ($r = -0.579$; $r^2 > 30\%$). This association is expected as 75.5% of our glaucoma patients had severe to moderate field damage. Early or mild visual field damage will not significantly affect their visual-related activities[16–18] and thus is difficult to quantify with VF-14 questionnaire. Because of the lack of awareness and social deprivation[9,10] especially in rural area, most of our glaucoma patients were presented to us with advanced disc cupping on the initial presentation.[9]

Several studies[4,5,16,17] demonstrated weak to moderate correlation between VF-14 score and visual field impairment, although their statistical analysis and visual field assessment differs from one study to another. The Estermann binocular visual field[19] assessment seemed to be the most popular, but recently this assessment technique was found to be lack of breadth and poorly correlated with visual function.[20] Better correlation was observed with the combined monocular visual field test[25] or even mean deviation (MD) pattern of the better eye.[21] Almost similar study was conducted in another Asian population by Nah *et al*.,[17] who modified and validated Korean VF-14 questionnaire, compared the score with the original VF-14 and found just a weak correlation to the MD of the better eye in the visual field. Although AGIS scoring is not ideal for quantifying the visual field damage, we believe it is able to represent to some extent the functional damage among our patients. The inclusion of unilateral cases of glaucoma, which represent the visual field of the worst eye in this study, may not accurately reflect the QOL of the affected

Table 2. Association of staging of glaucoma in the better eye with Bahasa Malaysia version of modified VF-14 questionnaire

	Better-eye glaucoma staging (%)			*P*-value (chi-squared test)
	Mild ($n = 32$)	Moderate ($n = 32$)	Severe ($n = 46$)	
Difficulty reading small print				0.05
Yes	18.2	34.5	47.3	
No	40.5	26.2	33.3	
Difficulty reading newspapers				0.00
Yes	14.3	32.1	53.6	
No	45.2	28.6	26.8	
Difficulty reading large print				0.02
Yes	16.0	20.0	64.0	
No	31.5	35.6	32.9	
Difficulty recognizing people				0.01
Yes	10.5	15.8	73.7	
No	33.0	31.9	35.2	
Difficulty seeing stairs				<0.001
Yes	10.0	16.7	73.3	
No	36.7	34.2	29.1	
Difficulty seeing street signs				<0.001
Yes	3.1	40.6	56.3	
No	42.0	24.6	33.3	
Difficulty doing fine handwork				<0.001
Yes	21.4	16.7	61.9	
No	33.3	41.7	25.0	
Difficulty filling out forms				0.02
Yes	19.4	22.6	58.1	
No	31.5	40.7	27.8	
Difficulty counting money				<0.001
Yes	15.4	11.5	73.1	
No	33.3	34.5	32.1	
Difficulty doing outdoor activities				<0.001
Yes	9.1	21.2	69.7	
No	37.3	33.3	29.3	
Difficulty cooking				<0.001
Yes	5.0	15.0	80.0	
No	34.9	32.6	32.6	
Difficulty watching television				<0.001
Yes	10.0	10.0	80.0	
No	36.4	36.4	27.3	
Difficulty driving during the day				0.02
Yes	6.9	37.9	55.2	
No	36.4	25.0	38.6	
Difficulty driving at night				0.04
Yes	16.0	30.0	54.0	
No	42.9	28.6	28.6	

individual. Thus, so far, our study provides the strongest moderate correlation as compared with previous studies.[4,5]

The ability to perform visual-related task may also be influenced by other possible modifiers such as cataract, visual acuity and age. Age and visual acuity were certainly strong possible modifiers in various QOL questionnaires.[5,21,22] Similarly, we found a significant association of VF-14 scores with age and visual acuity, but after adjusting to other confounding factors, visual acuity of the better eye was found to be the stronger modifier. In the presence of perimetric constriction of bilateral or unilateral cases, the visual acuity of the better eye was found to be the most important factor in determining QOL of the affected individual. Similarly, the visual acuity of the better eye had a stronger influence than the worst eye in several other reports.[21,22]

In the absence of age-matched non-glaucoma patients in our study, we were unable to ascertain the influence of age with VF-14 scores. However, Gutierrez *et al.* found no significant difference of VF-14 scores between glaucoma and age-matched non-glaucoma individual.[4] A significant reduction of vision-related activities among glaucoma patients compared with age, race, gender, income, living situation and occupation-matched control group, was observed by Sherwood *et al.*[23] We believed that the ideal control or

Table 3. Association of education level and literacy with Bahasa Malaysia version of modified VF-14 questionnaire

	Educational level (%)				Literacy level (%)		
	Higher ($n = 35$)	Primary ($n = 40$)	Nil ($n = 35$)	P-value	Literate ($n = 81$)	Illiterate ($n = 23$)	P-value
Difficulty reading small print				0.88			0.47
Yes	34.5	40.0	25.5		78.2	21.8	
No	38.1	40.5	21.4		81.0	19.0	
Difficulty reading newspapers				0.77			0.52
Yes	33.9	42.9	23.2		76.8	23.2	
No	38.1	35.7	26.2		78.6	21.4	
Difficulty reading large print				0.30			0.72
Yes	24.0	44.0	32.0		76.0	24.0	
No	39.7	39.7	20.5		79.5	20.5	
Difficulty recognizing people				0.08			0.21
Yes	10.5	52.6	36.8		57.9	42.1	
No	36.3	33.0	30.8		72.5	27.5	
Difficulty seeing stairs				0.10			**0.04**
Yes	23.3	30.0	46.7		56.7	43.3	
No	35.4	39.2	25.3		75.9	24.1	
Difficulty seeing street signs				0.98			0.95
Yes	34.4	37.5	28.1		75.0	25.0	
No	34.8	39.1	26.1		75.4	25.6	
Difficulty doing fine handwork				**0.01**			**0.04**
Yes	21.4	31.0	47.6		64.3	35.7	
No	41.7	41.7	16.7		83.3	16.7	
Difficulty filling out forms				**0.05**			0.04
Yes	25.8	48.4	25.3		74.2	25.8	
No	48.1	42.6	9.3		90.7	9.3	
Difficulty counting money				0.08			0.12
Yes	15.4	38.5	46.2		57.7	42.3	
No	36.9	35.7	27.4		73.8	26.2	
Difficulty doing outdoor activities				**0.02**			0.14
Yes	15.2	39.4	45.5		60.6	39.4	
No	40.0	36.0	24.0		74.7	25.3	
Difficulty cooking				0.16			0.24
Yes	15.0	40.0	45.0		60.0	40.0	
No	34.9	37.2	27.9		73.3	26.7	
Difficulty watching television				0.14			0.22
Yes	20.0	36.7	43.3		63.3	36.7	
No	36.4	37.7	26.0		75.3	24.7	
Difficulty driving during the day				0.87			0.81
Yes	48.3	37.9	13.8		86.2	13.8	
No	47.7	34.1	18.2		84.1	15.9	
Difficulty driving at night				0.64			0.98
Yes	46.0	38.0	16.0		86.0	14.0	
No	57.1	33.3	9.5		85.7	14.3	

P-value is based on chi-squared test.

reference group should not only comprise of age-matched non-glaucoma patients but also match for their current living status, occupation, gender, ethnicity and even literacy ability. As expected, lens status did not play an important role, as only the mildest form of cataract was included in our study. VF-14 outcome may also be affected by the presence of other ocular comorbidities such as retinal vasculopathy or maculopathy, which was already excluded in this study. After adjusting to these factors, there was still statistically significant association of the VF-14 score with the AGIS visual field score of the better eye ($P < 0.001$) based on the multivariate analysis in this study.

It is much more difficult to define at what degree of visual field defect, the glaucoma patients become symptomatic with declining in QOL. This point probably varies widely between individuals because of varying self-awareness and different lifestyle. For similar reason, our glaucoma patients demonstrated significant association between the stagings of glaucoma of the better eye (AGIS score) with each of the visual task in modified VF-14 questionnaire. Those with

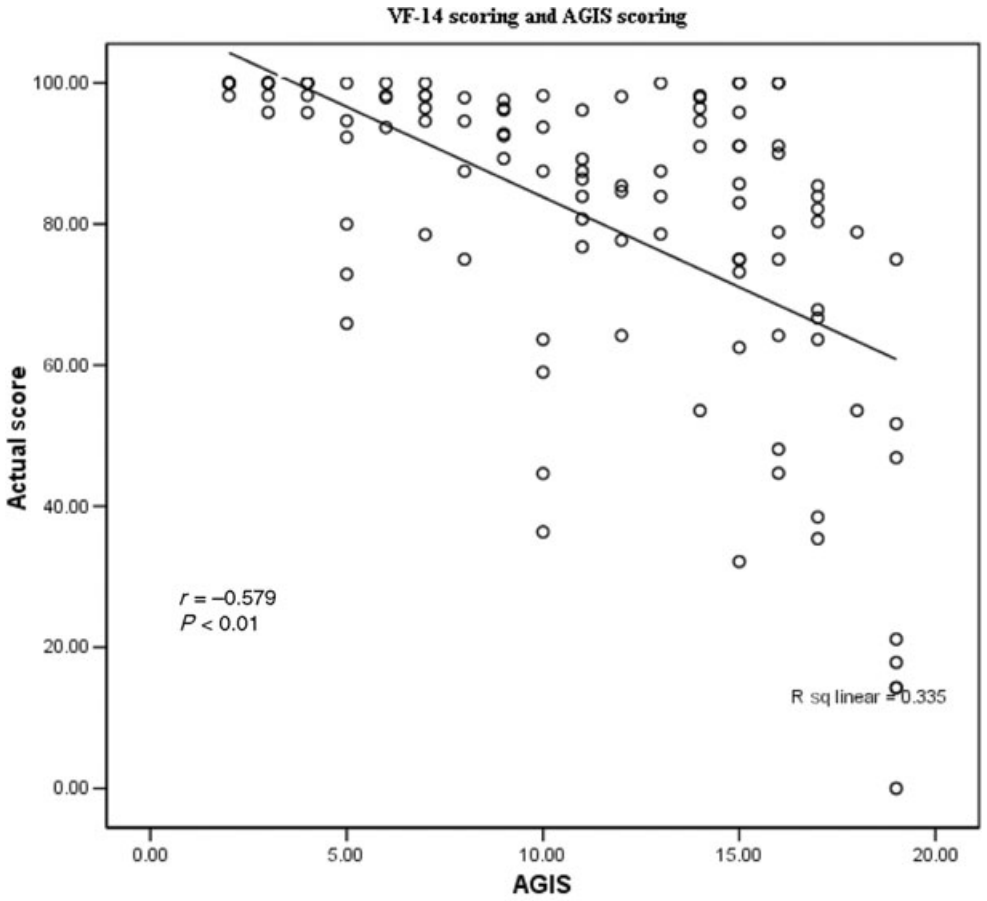

Figure 2. Scatterplot illustrating the best correlations of the modified VF-14 score with the better-eye Advanced Glaucoma Intervention Study Scale (AGIS) visual field score.

Table 4. ANOVA multivariate analysis using Kruskall–Wallis between the modified VF-14 score and possible confounding factors

	Age	Better-eye AGIS score	Lens status	Better-eye visual acuity	Illiteracy
Chi-squared test	25.41	99.56	24.57	34.73	25.00
P-value	0.09	**<0.001**	0.11	**0.01**	0.10

$P < 0.05$ is considered statistically significant. AGIS, Advanced Glaucoma Intervention Study Scale.

more advanced visual field defects have more difficulties in conducting their daily activities. In addition, their literacy ability and educational status may also contribute to the VF-14 score. However, there was no significant association observed in our study except for ability to perform fine handwork and outdoor activities. As majority of our patients were home manager, retiree or jobless, most of them might spend more time doing fine handwork such as sewing, handicraft among the women or outdoor activities such as gardening or fishing, which may be perceived as more important than reading books or newspaper. A major drawback in our study was that we failed to ascertain the use of appropriate corrective glasses while performing the visual-related activities because of their economic status. Certainly, the accuracy of the VF-14 scores will be affected.

We expected significant association between literacy level and visual-related activities, but because of our loose definition of literacy, even ability to read small and larger print failed to produce significant association. Some of the 'illiterates' were still able to read in other languages such as Jawi and Mandarin. Moreover, some of them never perceived their difficulty in reading small or large print or even filling out forms as a problem because they never felt the need to do so because of strong family support and their lifestyle.

Mobility is always the main problem encountered among elderly,[24] which may change their living status in developed countries and increase their dependency. Majority of our patients reported problem in driving at night, but because of good family support and wide practice of extended family living arrangement, none of them were living in nursing homes.

In conclusion, the Bahasa Malaysia version of modified VF-14 questionnaire is a useful tool in quantifying QOL in glaucoma patients even for those in rural area with less social

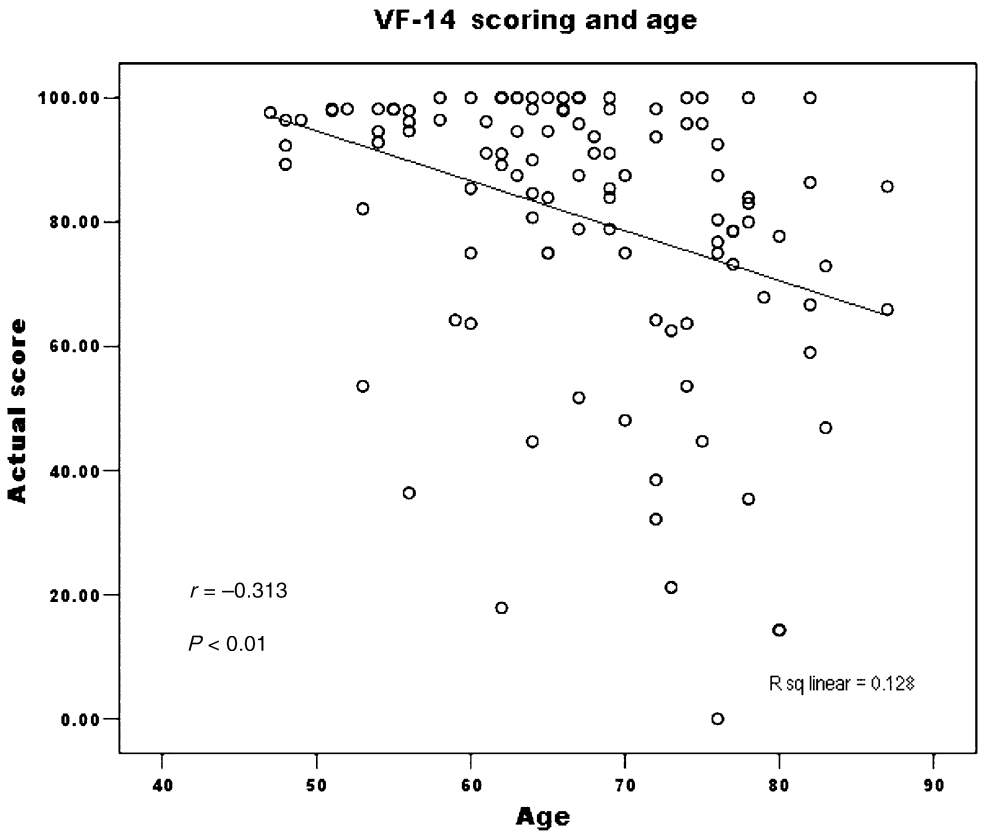

Figure 3. Scatterplot illustrating the best correlations of the modified VF-14 score with the age of the glaucoma patients.

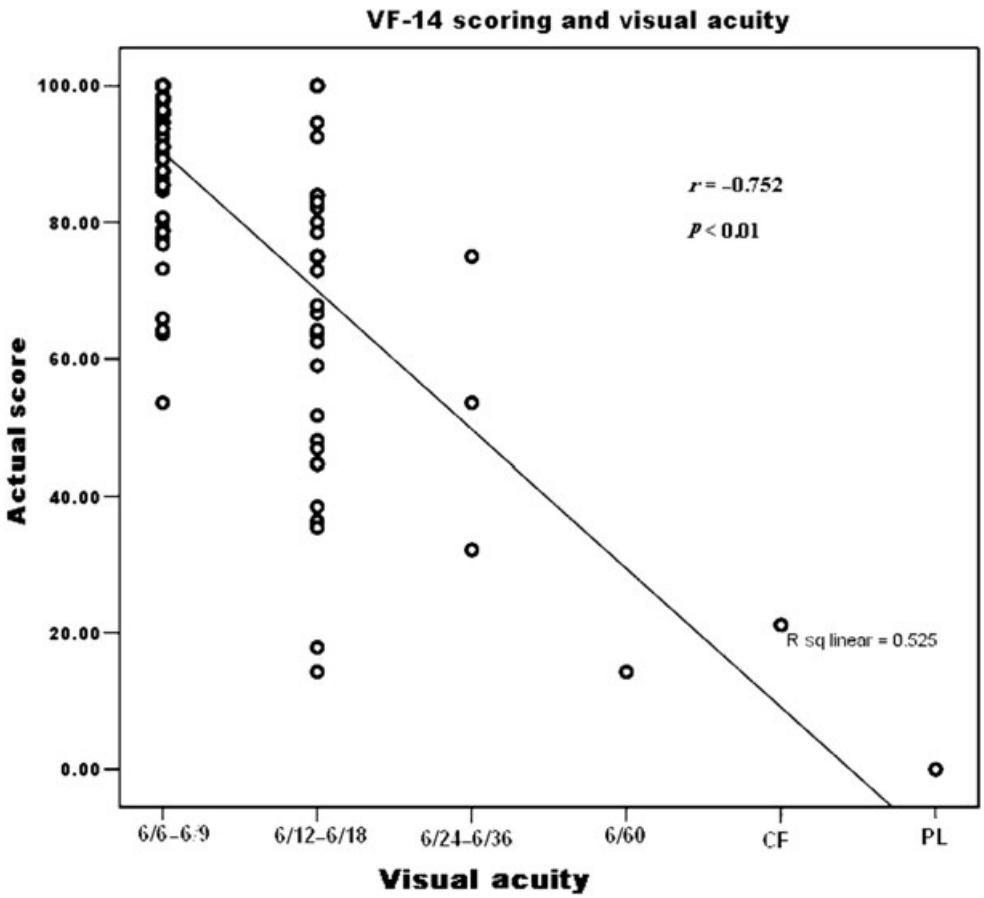

Figure 4. Scatterplot illustrating the best correlations of the modified VF-14 score with the better-eye visual acuity. CF, counting fingers; PL, perception to light.

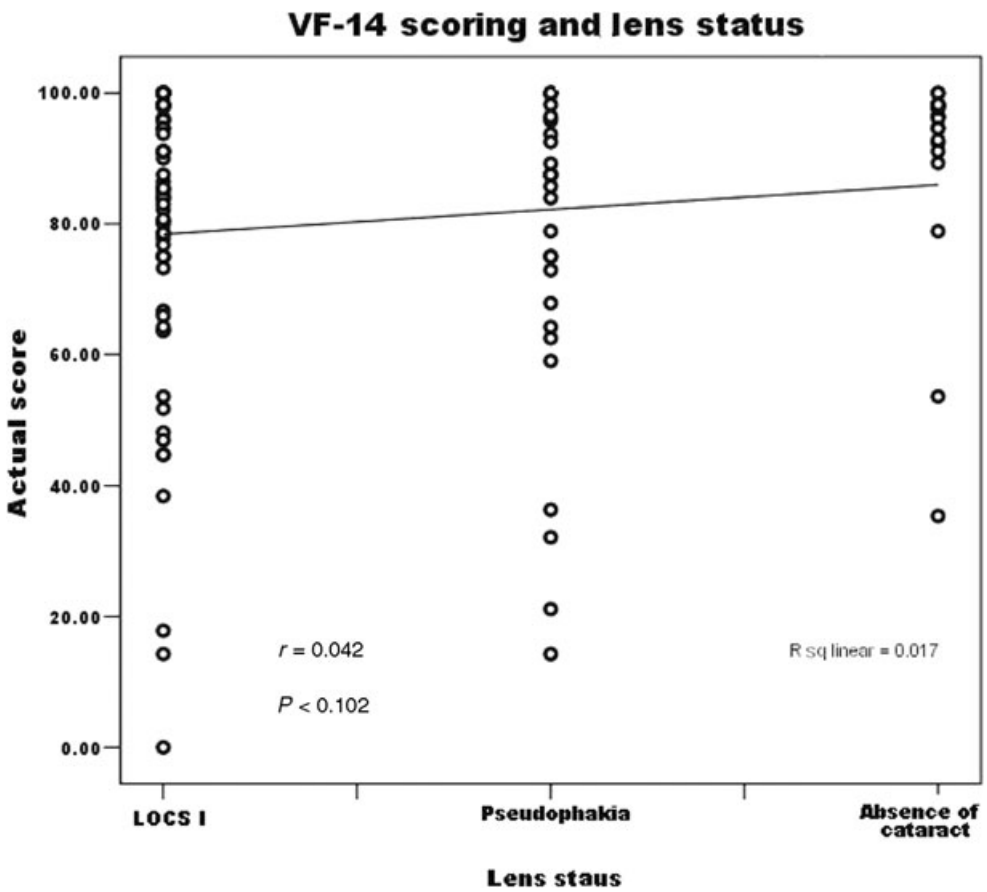

Figure 5. Scatterplot illustrating the best correlations of the modified VF-14 score with lens status.

privilege and higher illiteracy rate. There was a strong moderate correlation with better-eye AGIS visual field score after adjusting to age, visual acuity and lens status. In the future, customization of QOL questionnaire according to the population perhaps will provide better insight of the actual functional problem experienced by glaucoma patients.

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