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# Visual Function and Quality of Life in Korean Patients with Glaucoma

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**The relationship between visual acuity, the level of visual field impairment, visual functioning, and the quality of life was evaluated in Korean patients with glaucoma. Forty-three consecutive glaucoma patients from the glaucoma service at Severance Eye and Ear Hospital were included in this study. Each subject underwent a vision-specific functional status questionnaire (VF-14), a modified VF-14 (VF'-14) and general quality-of-life questionnaires of the Medical Outcomes Study 36-Items Short Form Health Survey (SF-36). The visual acuity and visual field measurements with a Humphrey automated perimeter were taken within one month of the initial visit. The mean age of the subjects was 57.9 ± 17.8. Among these patients, there were 23 males and 20 females. The mean deviation (MD) and the corrected pattern standard deviation (CPSD) by the automated perimeter in the eye with the better visual acuity were -5.87 ± 5.16dB and 3.92 ± 2.74dB respectively. The VF-14 and SF-36 scores were 41.28 ± 14.56 and 52.39 ± 6.61 respectively. There were significant correlations between the VF-14, VF'-14, and the MD of the better eye ($p < 0.05$). In Korean patients with glaucoma, the VF-14 and VF'-14 have significant relationship with the MD of the better eye in the visual field.**

**Key words:** glaucoma, SF-36, visual field, VF-14

## INTRODUCTION

Traditionally, the clinical outcomes such as the intraocular pressure, the visual acuity, and the visual field have been used to evaluate the effects of treatment and the visual status in patients with glaucoma.[1-3] However, the visual acuity or the visual field may be an inadequate indicator of the visual function impairment in glaucoma patients. Because the goal of treatment in glaucoma patients is not to improve the clinical outcomes but to improve the quality of life, an assessment of the vision-specific functioning and the quality of life are important. There have been few studies assessing the visual function and quality of life among Korean patients with glaucoma. This study investigated the association between the objective clinical measure of the visual function (visual acuity and visual field), the vision-specific functional status questionnaires with the VF-14, and the general quality-of-life questionnaires of the Medical Outcomes Study 36-Items Short Form Health Survey (SF-36) in Korean patients with glaucoma.

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## MATERIALS AND METHODS

*Patients selection*

The subjects consisted of 43 consecutive glaucoma patients who were recruited from the glaucoma clinic at Youngdong Severance Hospital from November to December, 1999. The eligibility criteria included an age of at least 30 years, no cognitive, hearing and mobile impairments, and at least 1-year duration. Patients with other eye diseases were excluded. However, because of the high prevalence of early, non-visually significant cataracts among the patients with glaucoma, all patients with a cataract of the Lens Opacities Classification System III (LOCS III) grade 2 or less were eligible for inclusion. In addition, patients with pseudophakia in 1 or both eyes were also eligible. Each subject was examined for the best corrected visual acuity, the intraocular pressure, and the visual field by the Humphrey automated perimetry within 1 month of the initial visit.

*Questionnaires*

(1) Visual funtion index (VF-14)

The VF-14 was developed by Steinberg et al. as an index of the visual function for patients with cataracts.[4] The visual function index (VF-14) is known to be useful in various vision threatening disease.[4-9] It was selected as the measure of the patient's vision specific function because it has been shown to be reliable and effective.[4] The VF-14 includes 14 questions for assessing the vision-targeted activities, such as reading small print, doing fine handwork, night driving, reading a newspaper or a book, reading signs, writing checks or completing forms, watching television, sports involvement, seeing steps, stairs, or curbs, playing table games, reading large print material, cooking, driving during the day, recognizing people at close distances. However, there are some differences in the Korean life style compared to that of a westernized country. Four extra questions, riding bus or subway in the daytime, riding bus or subway at night, playing Chinese chess or badook on a table, and decoration were added. This modified visual index is referred to as VF'-14. All the items were on a five-point scale from 0 to 100, with 0 indicating an inability to do any of the activities and 100 indicating no difficulty to do the activities.

(2) 36-item short-form health survey (SF-36)

The SF-36 is a generic health related quality of life measure for chronically ill patients.[10,11] There are 8 subscales in the SF-36: general health, physical function, role limitations due to physical and mental disability, mental health, social function, vitality, and bodily pain. All subscales are scored on a 0 to 100 scale with 100 indicating the best possible score and 0 indicates the worst.

The VF-14 and SF-36 were self-administered.

*Data analysis*

The visual acuity were analyzed by calculating logMAR (WMAR).[12] The weighted average logMAR represents a summary score of visual acuity from both eyes, with the better eye given a weight of 0.75 and the worse eye a weight of 0.25.[13] Counting fingers was analyzed numerically as a visual acuity of 20/1000, hand motion as 20/2000, and light perception or no light perception as 20/4000.[6] The visual field testing was considered reliable only when the false-positive and false-negative errors were $\leq$ 30% and the fixation loss were $\leq$ 20% by Humphrey perimetry. The MD and CPSD from Humphrey perimetry were used as the visual field index. Pearson correlation was used with SPSS 10.0 to determine the correlations between the weighted logMAR visual acuity, MD, CPSD, VF-14, VF'-14, and SF-36.

## RESULTS

The mean age of the subjects was 57.9 $\pm$ 17.8 years. The types of glaucoma in the subjects were primary open angle glaucoma (15 subjects), primary angle closure glaucoma (12 subjects), normal tension glaucoma (11 subjects), and secondary glaucoma (5 subjects). The groups of glaucoma treatment were the medication-only group (18 subjects), the laser-only group (1 subject), the surgery-only group (6 subjects), the laser and medication group (7 subjects), and the surgery and medication group (11 subjects). There were 9 subjects with systemic dis-

**Table 1.** Patients' characteristics

| Characteristics | |
|---|---|
| Age (years) | 57.9 ±17.8 |
| Male : female | 23 : 20 |
| Types of glaucoma (No. of eyes) | |
| Primary open angle glaucoma | 15 |
| Primary closed angle glaucoma | 12 |
| Normal tension glaucoma | 11 |
| Secondary glaucoma | 5 |
| Visual acuity (logMAR) | |
| Better eye | -0.12 ±0.15 |
| Worse eye | -0.44 ±0.58 |
| Mean deviation (dB) | |
| Better eye | -5.87 ±5.16 |
| Worse eye | -13.13 ±8.01 |
| Corrected standard deviation(dB) | |
| Better eye | 3.92 ±2.74 |
| Worse eye | 6.46 ±3.76 |
| VF-14 | 41.28 ±14.56 |
| SF-36 | 52.39 ±6.61 |

eases including diabetes mellitus and hypertension, and among the items of the questionnaire, the status of living and education were excluded from the analysis, as many participants left them unanswered. In the visual field of the participants, the mean of the MD was -5.87 ± 5.16 in the better eye and -13.13 ± 8.01 in the worse eye, and that of the CPSD was 3.92 ± 2.74 in the better eye and 6.46 ± 3.76 in the worse eye. The mean VF-14, VF'-14, and SF-36 score was 41.28 ± 14.56, 39.37 ± 13.93, and 52.39 ± 6.61, respectively (Table 1). The mean logMAR visual acuity of the subjects was -0.12 ± 0.15 in the better eye and -0.44 ± 0.58 in the worse eye. Visual acuity of all participants was better than 20/70, and that of the 35 subjects (81.4%) was above 20/30.

Table 2 provides the strength of the Pearson correlation coefficients between the clinical variables and the questionnaire scores. There was no significant correlation between the clinical variables and the SF-36. Some correlations between the visual field impairment and the visual function were found e.g. between the VF-14 and MD of the better eye ($r = -0.439$, $p < 0.05$, Figure 1), and between the VF'-14 and MD of the better eye ($r = -0.441$, $p < 0.05$, Figure 2). On the other hand, there was no significant correlation between the visual field defect and the visual function in the worse eye. Figure 1 and 2 also provided the linear regression equations to indicate the effect of a unit change in level of visual field impairment on the visual function index questionnaire score.

## DISCUSSION

The measurement of the clinical outcomes such as visual acuity or visual field may not accurately reflect the perceived ability of a visual function and the quality of life in patients with glaucoma. Several studies have assessed the visual function and the quality of life in patients with glaucoma.[7-9,14-17]

Although the VF-14 was developed as a questionnaire to measure the visual function of patients with cataracts, the VF-14 scores of patients with glaucoma were reported to correlate with level of visual

**Table 2.** Pearson correlation between the visual acuity, the visual field, the VF-14, and the SF-36

| | VF-14 | | VF'-14 | | SF-36 | |
|---|---|---|---|---|---|---|
| | r | p | r | p | r | P |
| Weighted average VA | -0.180 | 0.253 | -0.161 | 0.308 | -0.020 | 0.898 |
| MD | | | | | | |
| Better eye | -0.439* | 0.004 | -0.441* | 0.003 | -0.280 | 0.073 |
| Worse eye | -0.232 | 0.138 | -0.204 | 0.194 | -0.079 | 0.619 |
| CPSD | | | | | | |
| Better eye | 0.228 | 0.152 | 0.218 | 0.171 | -0.013 | 0.938 |
| Worse eye | 0.078 | 0.631 | 0.096 | 0.556 | 0.286 | 0.073 |

**: p<0.05, VF-14: visual function index -14, SF-36: 36-item short form health survey, VA: visual acuity, MD: mean deviation, CPSD: corrected pattern standard deviation.*

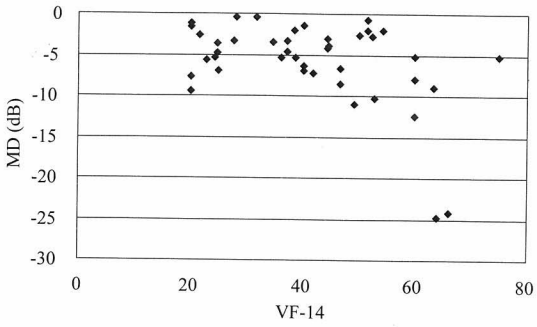


**Fig. 1.** A scatterplot of the Visual Function Index-14 (VF-14) score with the mean deviation (MD) of the better eye (r= -0.439, p < 0.05). The estimated curve equation between VF-14 and MD is "y = -0.154 x + 0.476".

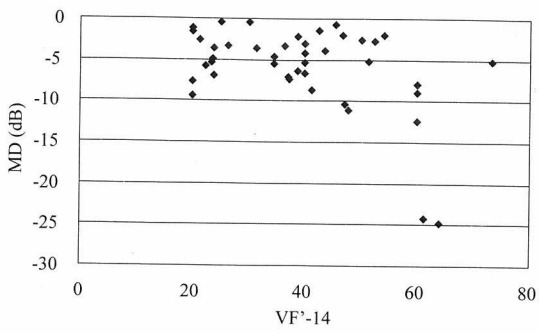


**Fig. 2.** A scatterplot of the modified Visual Function Index-14 (VF'-14) score with the mean deviation (MD) of the better eye (r= -0.441, p < 0.05). The estimated curve equation between VF'-14 and MD is "y = -0.161 x +0.475".

fields impairment.[7-9,14,15] Parrish et al. reported that results of the visual fields performed with Humphrey perimetry were modestly correlated with the VF-14 in 147 glaucoma patients.[7] Gutierrez et al. also reported that the greater visual field impairments in the better eye was significantly associated with poorer VF-14 scores.[15] In our results, there were some correlations between the VF-14 or the VF'-14 scores and the MD in the better eye. The correlation between the visual fields and the VF-14 in our study was less than other reports. The VF-14 scores of patients with slightly reduced visual fields may not lower because large visual field defects may be necessary to represent the impairments of visual functioning described in the VF-14. As there were a small number of subjects with relatively good visual fields, the association between the visual field defects and the VF-14 may have been underestimated. The cultural differences in the item of the VF-14 questionnaire might have caused the underestimation of the correlations. Driving a car in day or night is an unusual activity in elderly Koreans. Although some questions were added to the original VF-14, the modified VF-14 did not improve the correlations between the visual fields defects and the visual function index. More defined forms of the visual function index may be needed for Korean patients with glaucoma.

It was believed that there might be no correlation between the visual acuity and the VF-14 score in our study. This is because most of our subjects had a relatively good visual acuity (81.4% of subjects were above 20/30.).

Parrish et al.[7] reported that the SF-36 was weakly correlated with the visual acuity or visual field impairment. Gutierrez et al.[15] reported that there was no difference between the SF-36 score of patients with glaucoma and that of the reference group patients. There was no relationship between the visual acuity or the visual field defects and the SF-36 in our results. Because the SF-36 was developed as a global quality-of-life questionnaire rather than as a disease or organ specific measurement, it was believed that the SF-36 scores would show a weak correlation with level of visual field impairment. In comparison with the results of the VF-14, this indicates that vision-targeted questionnaires are more sensitive than a generic health-related quality of life measure.

Glaucoma usually does not produce symptoms until the end stage. Thus a general questionnaire of the level of visual functioning or the quality of life may not be appropriate for glaucoma patients. Choosing the questionnaire on the quality of life and visual functioning for glaucoma patients should be based on what the clinicians wish to know about the patients. Although there were some correlations between the VF-14 and the MD in the better eye, a more modified or specialized form of questionnaire rather than the VF-14 or the SF-36 is needed, particularly in Korean patients. More specialized questionnaires will be a promising tool for monitoring

the quality and the outcomes of care for patients with glaucoma in the aspect of preserving the visual function.

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