EFFECT OF VISUAL IMPAIRMENT AND EYE DISEASES ON QUALITY OF LIFE

Dona Mariam Isac1, Gurvinder Kaur2, Satish Thomas3

1Postgraduate Student, Department of Ophthalmology, Christian Medical College, Ludhiana, Punjab. 
2Associate Professor, Department of Ophthalmology, Christian Medical College, Ludhiana, Punjab. 
3Professor, Department of Ophthalmology, Believer’s Church Medical College, Thiruvalla, Kerala.

ABSTRACT

BACKGROUND
Assessing the impact of visual impairment on quality of life can provide a comprehensive picture of the burden of visual impairment beyond clinical evaluation. This study was conducted to evaluate the impact of visual impairment and eye diseases (cataract, glaucoma, uncorrected refractive error, retinal disease, corneal disease) on the quality of life. The objective of this study is to evaluate the effect of visual impairment and eye diseases on quality of life.

MATERIALS AND METHODS
600 patients who attended the outpatient Department of Ophthalmology in Christian Medical College, Ludhiana from December 2013 to May 2015 were evaluated and administered the National Eye Institute 25-item Visual Function Questionnaire (NEI VFQ-25), which has a base set of 25 vision-targeted questions. All answered items were scored, so that a higher score indicated better functioning. One-Way ANOVA and Kruskal-Wallis test were used depending on the parametric assumptions. Multiple regression was used to compare the scores with and without adjustment of visual acuity. A two-tailed P value < 0.05 was considered significant.

RESULTS
There was reduction in the score for each subscale and composite score of the NEI VFQ-25, as the visual acuity in the better eye reduced. In patients with glaucoma there was reduction in most of the domains of quality of life, especially in the peripheral vision which was lowest in them. In subjects with corneal disease, cataract, uncorrected refractive error and retinal disease also scores in all domains, especially in psychosocial domains of life which shows that eye disease affects subjects emotionally and causes morbidity. On comparing the effect of these diseases on quality of life with and without adjustment of vision, it was shown that visual impairment is predominantly responsible for poor quality of life.

CONCLUSION
Visual impairment has significant effect on quality of life. The lower the visual acuity, the greater was the deficit in subscale. The effect on quality of life was mostly due to decreased visual acuity rather than due to eye diseases.

KEYWORDS
Visual Impairment, Quality of Life, Eye Diseases, NEI VFQ-25.


BACKGROUND
Visual impairment and blindness due to ocular disease is a significant public health problem in many parts of the world including India. According to Global data on visual impairments in 2013, the estimated number of people visually impaired in the world was 285 million which included 39 million blind and 246 million people with low vision. It has been found out that 65% of people who are visually impaired and 82% of the blind are 50 years and above. In India with a total population of 1.2 billion people, there are an estimated 15 million blind with an additional 52 million visually impaired. The common causes of blindness in India are cataract (62.6%), refractive errors (19.7%), glaucoma (5.8%) and corneal pathologies (0.9%) and retinal disorders (4.7%).

*Financial or Other Competing Interest*: None. 
Submission 02-09-2016, Peer Review 27-09-2016, 
Acceptance 03-10-2016, Published 08-10-2016.

Corresponding Author: 
Dr. Gurvinder Kaur, 
Department of Ophthalmology, 
Christian Medical College, Ludhiana, Punjab. 
E-mail: gurvinder.eye@gmail.com 
DOI: 10.14260/jemds/2016/1367

Evaluating clinically just helps us to know the extent of visual impairment, but assessing the impact of visual impairment on quality of life can provide a comprehensive picture of the burden of visual impairment beyond clinical evaluation.

Although, reports are available on the prevalence of various causes of visual impairment and risk factors for the eye diseases, the effect of these diseases on the quality of life has not been extensively investigated. Visual impairment has been shown to have negative effect on health related quality of life. It also has a significant impact on daily functioning including social activities and emotional functioning. Therefore, the purpose of the study is to show the effect of visual impairment on quality of life and to determine the correlation of eye diseases- uncorrected refractive error, corneal diseases, cataract, glaucoma and retinal diseases with quality of life.

MATERIALS AND METHODS
This prospective study was conducted from December 2013 to May 2015 on 600 patients, who attended the Outpatient Department of Ophthalmology of our institute. In the study we took proportionate sampling which included 450 cataract, 50 uncorrected refractive error, 25 corneal disease, 25...
glaucoma and 50 retinal disease patients. Patients in the age group of 18 to 70 years with vision lower than or equal to 6/18 due to any of the following eye diseases (uncorrected refractive error, corneal disease, cataract, glaucoma and retinal disease) will be included in the study. The patients were interviewed using the National Eye Institute 25-Item Visual Function Questionnaire (NEI-VFQ). Trained investigators interviewed the subjects in the study. All interviews were conducted before any clinical examinations were performed. Written informed consent was obtained from the subjects before the interview. This study has been approved by the Ethics Committee of our Institute.

We classified education into 5 categories where category 1 denoted illiterate, category 2 denoted primary, category 3 denoted middle, category 4 denoted secondary, category 5 denoted higher secondary and graduates (education was classified further for statistical ease into Group 1 which denoted illiterate, Group 2 comprised of primary, middle and secondary and Group 3 denoted higher secondary and graduate).

For the purpose of the study, presenting visual acuity was considered and not the best corrected vision. Distant visual acuity, both presenting (with current refractive correction if any) and best corrected after refraction was measured for each eye separately using Snellen visual acuity chart. An E chart was used for participants who were illiterate. Near visual acuity was measured with Roman test types near vision chart for each eye separately. A person was considered to have uncorrected refractive error if the difference between best-corrected and presenting acuity was more than 2 lines. An anterior segment examination was performed using a slit lamp biomicroscope. The posterior segment examination was performed using a 90 diopter lens at the slit lamp and if necessary with the indirect ophthalmoscope using 20 diopter lens. Primary causes of visual impairment and eye diseases were assessed based on clinical history and examination results. If there were patients who were having more than one eye disease than the eye disease responsible for the decrease in vision was identified as the cause of visual impairment. For example, if cataract and retinal disease were present and removal of the cataract will not restore vision, we identified retinal disease as the cause of visual impairment.

The National Eye Institute 25-Item Visual Function Questionnaire, which was taken up for the study consists of a base set of 25 vision targeted questions. It is divided into 3 parts- General health and vision, Difficulty with activities and Response to vision problem. The Questionnaire is further divided into 12 vision targeted subscales which includes general health, general vision, difficulty with near vision activities, difficulty with distant vision activities, driving difficulties, ocular pain, role limitation due to vision, dependency on others due to vision, limitation in social functioning, mental health symptoms, limitation with peripheral and colour vision. The participants were asked to respond to the questionnaire depending on their experiences over the past one month. Participant’s response was excluded from specific question, if they had stopped the activity for reasons other than poor eye sight. If more than 20% of the responses were missing, the participant was excluded from the study.

In Step 1, the original numeric values from the survey were re-coded following the scoring rules. All items were scored, so that a high score represents better functioning. Each item was then converted to a 0 to 100 scale, so that the lowest and highest possible scores were set at 0 and 100 points, respectively. In this format scores represented the achieved percentage of the total possible score, e.g. a score of 50 represented 50% of the highest possible score. In Step 2, items within each subscale were averaged together to create the 12 subscale scores. In Step 3, an overall composite score for the VFQ-25 was calculated by averaging the vision-targeted subscale scores, excluding the general health rating question. By averaging the sub-scale scores rather than the individual items we gave equal weight to each sub-scale, whereas averaging the items would have given more weight to scales with more items.

The NEI-VFQ instrument was also translated to Hindi and Punjabi language.

**Statistical Analysis**

In the descriptive analysis, continuous variables were expressed as mean ± standard deviation and categorical variables were expressed as count (percentages). Univariate analysis was performed using independent unpaired t-test for normally distributed variables and Mann-Whitney U test for non-normally distributed continuous variables. One-Way ANOVA and Krukal-Wallis test were used depending on the parametric assumptions. For categorical variables, Chi-Square test was used. Fisher’s exact test was used when there were one or more of cells with an expected frequency < 5. Multiple regression was used to compare the scores with and without adjustment of visual acuity. A two-tailed P value <0.05 was considered significant.

**RESULTS**

A proportionate sampling was taken. We completed quality-of-life and vision function questionnaires for all the participants who had ocular examinations and were enrolled in this study. Patients in the age group of 18 to 70 years were enrolled in the study. The average age in our study was 59.87 years in cataract, 63.98 years in cornea group, 60.69 years in glaucoma, 33.3 years in refractive error and 50.41 years in retina group. Out of 600 subjects enrolled in the study, 57.1% were females and 42.8% were males. About half of the subjects in the study were illiterate. We classified education into 3 groups where Group 1 denoted illiterate; Group 2 denoted primary, middle and secondary education; and Group 3 denoted higher secondary education and graduate. NEI VFQ-25 is the most commonly used vision specific instrument for the assessment of quality of life. The VFQ-25 consists of a base set of 25 vision-targeted questions representing 11 vision-related subscales plus an additional single-item general health rating question.

There was reduction in the score for each subscale and composite score of the NEIVFQ-25, as the visual acuity in the better eye reduced [Table 1]. The lesser the acuity, the greater was the deficit in the subscales.

There is a statistical significant reduction in the composite scores as the visual impairment progresses with p value of 0.000. The composite score of category 1, 2, 3 and 4 was 69.28, 56.04, 42.23 and 24.17 respectively [Figure 1].
In patients with glaucoma there was reduction in most of the domains of quality of life, especially in relation to general vision, role difficulties, mental health, dependency and peripheral vision. Among all the disease categories, the peripheral vision was lowest in the subjects of glaucoma with mean of 41 [Table 2].

Subjects with corneal diseases reported greatest decrements in the area of general vision, near vision, distant vision and in psychosocial domains of life. The scores for role difficulties, ocular pain and colour vision were lowest in subjects with corneal disease with average of 24, 73.96 and 65 respectively when compared to other eye diseases [Table 2]. In subjects with refractive error, the lowest score was seen in the subscale of general vision and role difficulties. But they had better scores when compared to those with cataract, glaucoma, retinal and corneal diseases [Table 2].

In patients with retinal disease the maximum reduction was seen in general vision, near vision, mental health and role difficulties with average score of 37.2, 44.20, 38.60, 38.82 respectively [Table 2].

In patients with cataract the scores were low in most of the domains of quality of life with maximum reduction in scores of general vision, role difficulties, mental health and peripheral vision [Table 2].

The comparison of the subscale scores in each disease with and without adjustment for visual acuity was also done. Glaucoma subjects had large decrement in the score of peripheral vision in patients after adjusting for visual acuity. There was also statistically significant reduction in the scores of social functioning, role difficulties, dependency and colour vision even after adjusting for vision [Table 3]. In subjects with cornea, the reduction in all the subscale scores when adjusted for the visual acuity was not statistically significant [Table 4]. There was a positive co-relation in subjects with refractive error in most of the subscales in both with and without adjustment for visual acuity [Table 5]. The difference in scores between with and without adjustment of visual acuity groups was modest. In subjects with retinal disease, the reduction seen in all subscale scores after adjusting for the visual acuity was not significant when compared to without adjustment for visual acuity [Table 6]. In cataract subjects, there was only slight change in the scores when adjusted for visual acuity [Table 7].

### Table 1. Co-relation between Different Categories of Visual Acuity and Subscales

<table>
<thead>
<tr>
<th>Better Eye</th>
<th>6/18 to &lt;6/60</th>
<th>6/60 to &lt;3/60</th>
<th>3/60 to &lt;1/60</th>
<th>1/60 to PI</th>
<th>Positive</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Patients</td>
<td>396</td>
<td>89</td>
<td>79</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GH</td>
<td>29.25</td>
<td>30.34</td>
<td>25.96</td>
<td>25</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>GV</td>
<td>47.56</td>
<td>40.56</td>
<td>31.03</td>
<td>19.44</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>OP</td>
<td>90.53</td>
<td>89.39</td>
<td>90.50</td>
<td>85.36</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>64.17</td>
<td>51.95</td>
<td>32.41</td>
<td>12.65</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>64.51</td>
<td>49.89</td>
<td>33.99</td>
<td>20.09</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>SF</td>
<td>77.80</td>
<td>64.04</td>
<td>44.67</td>
<td>21.43</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>MH</td>
<td>60.56</td>
<td>39.54</td>
<td>27.58</td>
<td>13.22</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>51.39</td>
<td>36.16</td>
<td>28.78</td>
<td>11.76</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>De</td>
<td>79.80</td>
<td>55.91</td>
<td>36.10</td>
<td>12.87</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>DR</td>
<td>67.81</td>
<td>62.48</td>
<td>24.97</td>
<td>24.95</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>91.99</td>
<td>82.95</td>
<td>63.46</td>
<td>27.78</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>PV</td>
<td>65.32</td>
<td>50.04</td>
<td>31.82</td>
<td>16.67</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Composite Score</td>
<td>69.28</td>
<td>56.04</td>
<td>42.23</td>
<td>24.17</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2. Subscale Scores in each Disease Category without adjusting for Visual Acuity

<table>
<thead>
<tr>
<th></th>
<th>Glaucoma</th>
<th>Cornea</th>
<th>Refractive Error</th>
<th>Retina</th>
<th>Cataract</th>
</tr>
</thead>
<tbody>
<tr>
<td>GH</td>
<td>27</td>
<td>24</td>
<td>46.5</td>
<td>26</td>
<td>27.40</td>
</tr>
<tr>
<td>GV</td>
<td>43.2</td>
<td>34.4</td>
<td>59.8</td>
<td>37.2</td>
<td>41.80</td>
</tr>
<tr>
<td>OP</td>
<td>87</td>
<td>73.96</td>
<td>81.1</td>
<td>93.02</td>
<td>91.70</td>
</tr>
<tr>
<td>N</td>
<td>51.98</td>
<td>38.2</td>
<td>84.71</td>
<td>44.20</td>
<td>54.56</td>
</tr>
<tr>
<td>D</td>
<td>57.49</td>
<td>39.58</td>
<td>70.05</td>
<td>54.16</td>
<td>55.08</td>
</tr>
<tr>
<td>SF</td>
<td>64</td>
<td>49.5</td>
<td>91.48</td>
<td>60.58</td>
<td>66.17</td>
</tr>
<tr>
<td>MH</td>
<td>40.25</td>
<td>35.66</td>
<td>75.39</td>
<td>38.60</td>
<td>50.45</td>
</tr>
<tr>
<td>RD</td>
<td>34.52</td>
<td>24</td>
<td>67.68</td>
<td>38.82</td>
<td>43.56</td>
</tr>
<tr>
<td>De</td>
<td>52.3</td>
<td>45.82</td>
<td>86.28</td>
<td>54.29</td>
<td>66.81</td>
</tr>
<tr>
<td>DR</td>
<td>58.38</td>
<td>62.5</td>
<td>80.08</td>
<td>72.22</td>
<td>63.45</td>
</tr>
<tr>
<td>CV</td>
<td>74</td>
<td>65</td>
<td>97</td>
<td>77</td>
<td>53.66</td>
</tr>
<tr>
<td>PV</td>
<td>41</td>
<td>42</td>
<td>80.5</td>
<td>53.66</td>
<td>54.57</td>
</tr>
</tbody>
</table>

**Composite Score**: 54

**Table 1. Co-relation between Different Categories of Visual Acuity and Subscales**

**Figure 1. Effect of Different Categories of Vision on Composite Score**

**DISCUSSION**

Impaired vision is the leading type of impairment in the world. But little is known about the effect of visual impairment on quality of life. The National Eye Institute 25-Item Visual Function Questionnaire (NEI-VFQ25) used in the study was sensitive to changes in vision-specific domains of QOL. According to Bremon-Gignac et al, it is the only instrument that is capable of providing information that is both sensitive and specific to eye problems, while at the same time providing information on the general health condition. The demographic variables considered in the study were age, gender and education. The age group included in the study was between 18 and 70 years. Patients with age more than 70 were excluded, as commonly these patients had other age related co-morbidities.

There was statistically significant reduction in all subscale scores, as the visual impairment progressed from category 1 to category 4. Steep decline was seen in psychosocial domains (like mental health, dependency etc.) and this decline was seen even with moderate decrease in vision. McClure et al reported that NEI-VFQ 25 scores were significantly lower for visually impaired participants except in the general health and ocular pain subscales. Nutheti et al used the World Health Organisation (WHO) QOL (WHQOL) to assess the
health related quality of life. They demonstrated that visual impairment is associated with a significant decrease in quality of life among older population in Andhra Pradesh.7

Broman et al reported that impairment of visual acuity was significantly associated with a decrement in all measured domains of vision related quality of life. Their data suggested that there was decrease in quality of life with moderate visual loss.8

In our study, the subjects with glaucoma had reduction in the scores of role difficulties, mental health and peripheral vision. After adjustment for visual acuity, we found that glaucoma disease alone still had pronounced effect on psychosocial domains, colour vision and peripheral vision. On comparing the effect of glaucoma on subscales before and after adjustment of visual acuity, it was found that glaucoma with visual impairment had more statistically significant impact on the quality of life than the disease alone. Hence, glaucoma patient’s vision was found to have significant effect on the quality of life, but in terms of peripheral vision glaucoma disease contributed to decreased quality of life. The scores changed only slightly after adjusting for visual acuity. This was expected, because glaucoma affects peripheral field than central field. The scores changed only slightly after adjusting for visual acuity. Nirmalan et al reported that subjects with glaucoma had decrease in quality of life and visual function independent of visual acuity. Nutheti et al found that subjects with glaucoma had worst presenting visual acuity in the better eye and when visual acuity was added to the model the association between the glaucoma and quality of life was significant. Hence, they suggested that some residual effect of glaucoma affects quality of life independent of visual acuity.7

The effect of corneal disease without adjusting for the visual acuity on the quality of life was statistically significant. This also suggests that the effect of corneal disease on the quality of life was dependent on visual acuity. In the study conducted by Nutheti et al, found that when visual acuity was added to the model. The association continued to be significant suggesting that impact of corneal disease was independent of visual acuity.7

Subjects with refractive error had a better quality of life when compared to other eye disease. When adjusted for visual acuity, refractive error and visual impairment had equal direction of effect on all the subscales suggesting that effect on the quality of life was dependent on visual acuity. Nutheti et al reported that visual impairment from corrected and uncorrected refractive error had no significant effect on quality of life, as 90% of them had only moderate visual impairment.7

In case of cataract and retinal disease when adjusted for visual acuity, there was only slight change in the scores and the impact on quality of life by both eye diseases were not significant. Broman et al found that the difference in the scores was slightly greater after adjustment for vision and they concluded that the low scores were not explained by decreased visual acuity for subjects with retinal disease.8

Nutheti et al reported that when visual acuity was added to the model of cataract and retinal disease, the association between quality of life and disease was insignificant. Hence, the impact of retinal disease and cataract on quality of life was mostly mediated through its effect on visual acuity.7

In our study, we also compared subscale scores between diseases. Patients with corneal pathology and glaucoma had greater decrement in subscale scores when compared to patients with cataract, retinal pathology and refractive error.

The completion of questionnaires and random selection of study subjects are the strengths of this study. The limitation in our analysis of association of visual impairment with quality of life is that we concentrated only on central acuity impairment. We had not involved other aspects of visual impairment like absence of stereopsis, loss of contrast sensitivity etc. As most of the subjects were uneducated subscales like driving could not be assessed properly, as it was not applicable in most of them.

CONCLUSION

The effect on quality of life was mostly due to visual impairment independent of the eye disease; though, some residual effect of the disease can be observed as seen in glaucoma affecting the peripheral vision. The effect of cataract on quality of life was found to be dependent on visual acuity suggesting that cataract extraction may improve quality of life by improving the vision. Early detection of eye diseases like corneal disease, glaucoma and retinal diseases is important, as the damages caused by these diseases are irreversible. This knowledge will aid in providing rehabilitation services to the patients with low vision so that they are able to use the remaining eye sight efficiently, be independent and have a better quality of life.

ACKNOWLEDGEMENT

The NFI VEQ-25 - July 1996 instrument was developed at RAND under the sponsorship of the National Eye Institute.

REFERENCES


