Visual function and quality of life amongst patients with cataract attending Ophthalmology camps in a coastal district in Southern India

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Abstract

Introduction: Aim of the study was to measure the visual function and quality of life amongst cataract patients attending camps.

Methodology: A cross sectional study was conducted among patients attending Ophthalmology camp and having impaired vision due to cataract. This study was approved by the Institutional Ethics Committee. After obtaining informed consent, validated questionnaires developed by Aravind Eye Hospital, to measure the Visual functioning (VF) and Quality of Life (QOL) were administered to the patient.

Results: A total of 324 patients (201 males and 123 females) with mean age 54.33 years (SD=8.99) were interviewed. Nearly half (46.9%) of the patients had severe or grade IV visual impairment as per WHO criteria of visual impairment. Two-thirds participants admitted that impaired vision adversely affected activities of daily living. The various sub scales studied in QOL questionnaire were: self care, mobility, social and mental problems due to impaired vision. All of these were almost equally affected due to cataract. Total VF score differs significantly (p<0.0005) for various visual impairment categories, except between category 2 and 3, where there is no significant difference (p=.695). In the QOL score there exists significant difference (p<0.0005) between group 1 with respect to other groups of visual impairment. VF & QOL score had no statistically significant association with age, gender and socioeconomic class.

Conclusion: The visual function score and the quality of life score worsen as the visual acuity deteriorates due to cataract. Hence we need to strengthen our outreach programs so that we diagnose and treat cataract early leading to better quality of life.

Keywords: Visual function, Quality of life.

Introduction

The extent of vision loss is clinically assessed by visual acuity, however, different people with same level of visual impairment may function quite differently. Functional vision is defined as the vision that can be used to perform tasks using sight. Hence it is vital to know how vision loss affects a person’s ability to perform various activities of daily life and quality of life in turn. Cataract is one of the leading causes of diminished vision in India. Health related quality of life in a person suffering from cataract is affected adversely. This may be due to several reasons – extending from distress of diagnosis, fear of surgery, repeated hospital visits and associated expenditure besides limited mobility and dependency on others. To understand the burden of cataract on society, it is important to assess functional vision and quality of life of these patients and not just visual acuity. This will also help to know the patient’s priorities as well as to plan treatment and rehabilitation. This assumes greater significance in developing countries like India where the cataract burden is high and resources scarce.

Several health related quality of life questionnaires are in use for ocular diseases. The study aimed to determine the visual function and quality of life (QOL) among individuals with impaired vision due to cataract, using a validated questionnaire developed at Aravind Eye Institute, India. It was planned to assess the relationship of vision impairment with vision function as well as quality of life amongst patient diagnosed with cataract.

Materials and Methods

The study was undertaken in the field practice area of a teaching hospital in the coastal town of India actively involved in eliminating cataract related blindness. In cataract screening camps held at peripheral areas, the patients diagnosed with cataract and having operable opacification were brought to the base hospital, evaluated and operated.

In this cross-sectional study, purposive sampling was followed. All individuals presenting to eye camps, aged 40 years and above with impaired vision due to cataract were included. Patients having cataract with visual impairment of acute onset either of infective or traumatic etiology were excluded. Patients having any co-morbid conditions or chronic diseases that can impair the mobility, self-care, social or mental functions were also excluded from the study. The sample size was calculated, based on 50% prevalence rate of cataract at 95% confidence interval, 10% allowable error and 90% power of study. It was calculated to be 324 using the formula \[ Z_{\alpha/2} \frac{p(1-p)}{d^2} \] (where \( Z = 1.96 \) for 95% confidence interval, \( p = \) prevalence in decimals, here \( 50\% = 0.5 \), and \( q = 1-p = 0.5 \), \( d = \) allowable error). Non-random, incidental (convenience) sampling was used to recruit patients for the study. The prospective participants were explained about the purpose and methodology of the study and a
written informed consent was taken. Then the visual function and QOL questionnaire was administered by the investigator. Visual acuity was assessed using Snellen’s vision chart in a well illuminated room at a distance of six meters. This was followed by a basic eye examination done by an Ophthalmology resident and Ophthalmologist.

The operational definitions considered for the purpose of this work are mentioned below. Visual impairment for this study is defined and classified as per World Health Organization classification. No visual impairment in the study is defined as vision of 6/18 or better, while grade 1 is vision of 6/18 to 6/60 in the better eye. Visual acuity of 6/60 to 4/60 is defined as grade 2 while grade 3 refers to vision of 4/60 to 2/60. Grade 4 represents vision of counting finger or worse, while grade 5 represents no perception of light. Socio economic classification of respondents was calculated as per Kuppuswamy’s modified classification criteria.7

Study tools used were visual functioning (VF) and Quality of Life (QOL) Questionnaires developed at the Aravind Eye Hospital, Madurai, India.6 These two questionnaires have been validated for use in India and have been extensively used in developing countries in Asia.3,5 The VF and QOL were scored as per the protocol and instructions given by the authors of the instruments. A four-point rating scale was scored and cumulative total of individual item responses expressed as percentages was calculated for each subscale. The overall VF and QOL scale scores were calculated by aggregating across all items in each scale. Scales were calibrated between 100 (‘best’ possible score) and 0 (‘worst’ possible score).

Data was tabulated using Microsoft excel and statistical analysis was done using SPSS version 11.5. Test of significance using the chi square test was carried out to determine the association between various factors and VF and QOL. P value <0.05 was considered significant. One way Anova with Bonferroni multiple comparison test was used to find association between mean vision function and quality of life score and age, gender and socio economic class.

Result
A total of 324 patients (201 males and 123 females) were interviewed. The mean age of respondents was 54.33 years (SD=8.99), with age ranging from 40 to 80 years. Majority of them were illiterate (41.7%), 30.6% were not currently employed and 94.1% of respondents were married. The participants who were belonging to upper lower class as per Kuppuswamy’s classification were 67.6%.

Nearly half (46.9%) of the patients has severe or grade IV visual impairment³ as per WHO criteria of visual impairment, followed by category 1 impairment seen amongst 26% patients. 61(18.8%) presented with vision of 6/60 to 4/60, while 27 (8.3%) of those interviewed had vision of 4/60 to 2/60.

The gender distribution of visual impairment of various age groups was almost equal. Mean age differed significantly (p=.021) between visual category 2 and 4. There is no significant difference between mean ages in other visual impairment groups. There is no significant difference between age (p=.064) and gender (p=.568) as per category of visual impairment. (Table 1)

The responses to questions on Visual Function questionnaire are tabulated in Table 2. Overall greater than one third admitted that their impaired vision has adversely affected activities of daily living with most of them requiring help to perform these activities. More than half (55%) the respondents felt that their vision was not good. More than two third of respondents admitted that their daily activities were limited due to poor sight. One third of respondents had unacceptable peripheral vision. Nearly 43% of patients had difficulty in depth perception leading to difficulties in day to day life activities.

Responses regarding Quality of life questionnaire are presented in Table 3. The various sub scales studied were regarding self care, mobility, social and mental problems due to impaired vision. All of these were almost equally affected due to cataract.

Table 4 represents the mean Visual function and quality of life score and sub scales scores in different categories of visual impairment. In the study the visual function and quality of life have a significant linear relationship with visual impairment, meaning that greater visual impairment was associated with lower visual functioning.

Total Visual function score differs significantly (p<0.0005) for various visual impairment categories, except between category 2 and 3, where there is no significant difference (p=.695).

In the Quality of life score there exists significant difference (p<0.0005) between group 1 with respect to other groups of visual impairment. There was an inverse linear relationship between age and Quality of life score (R= -0.025) but was not statistically significant.

The distribution of the mean Visual function and quality of life score and sub scales scores amongst various age groups and gender is depicted in Tables 5 and 6 respectively.

Visual function and quality of life score had no statistically significant association with age (p=0.998 and p=0.787 respectively) and gender (p=0.703 and p=0.523 respectively). Anova for Socioeconomic class shows total visual function score do not differ significantly with respect to the class (p=0.5). Quality of life score also does not differ significantly (p=.334) with respect to Socioeconomic class.
Table 1: Age and gender wise distribution of Visual impairment among the study population

| Age(years)/Visual Impairment | Total |
|------------------------------|-------|
| 40-50                        | 40    |
| 51-65                        | 66    |
| 66-80                        | 114   |
| Total                        | 143   |

Table 2: Response to visual function questionnaire (n=324)

| Q No | Question                                                                 | Responses |
|------|--------------------------------------------------------------------------|-----------|
| 1.   | In general would you say your vision(with glasses if you wear them)is:    |           |
|      | Very Good 58(17.9)                                                       |           |
|      | Good 88(27.2)                                                            |           |
|      | Fair 99(30.6)                                                            |           |
|      | Poor 79(24.4)                                                            |           |
| 2.   | To what extent your sight limits you in your daily activities?            |           |
|      | Not at all 39(12)                                                        |           |
|      | A little 66(20.4)                                                         |           |
|      | Quite a lot 115(35.5)                                                    |           |
|      | A lot 104(32.1)                                                           |           |
| 3.   | How much problem do you have recognizing people across the street?        |           |
|      | Not at all 32(9.9)                                                        |           |
|      | A little 69(21.3)                                                         |           |
|      | Quite a lot 105(32.4)                                                    |           |
|      | A lot 118(36.4)                                                           |           |
| 4.   | How much problem do you have recognizing the face of the person standing near you? |           |
|      | Not at all 16(4.9)                                                        |           |
|      | A little 106(32.7)                                                        |           |
|      | Quite a lot 104(32.1)                                                    |           |
|      | A lot 98(30.2)                                                            |           |
| 5.   | How much problem do you have recognizing smaller minute objects (such as grains or the lines in your hand)? |           |
|      | Not at all 42(13)                                                         |           |
|      | A little 75(23.1)                                                         |           |
|      | Quite a lot 116(35.8)                                                    |           |
|      | A lot 90(27.8)                                                            |           |
| 6.   | When you are walking along how much problem do you have noticing objects off to the side? |           |
|      | Not at all 92(28.4)                                                       |           |
|      | A little 119(36.7)                                                        |           |
|      | Quite a lot 68(21)                                                       |           |
|      | A lot 45(13.9)                                                            |           |
| 7a.  | How much problem do you have adjusting to darkness after being in bright light? |           |
|      | Not at all 121(37.3)                                                      |           |
|      | A little 108(33.3)                                                        |           |
|      | Quite a lot 76(23.5)                                                      |           |
|      | A lot 19(5.9)                                                             |           |
| 7b.  | How much problem do you have adjusting to brightness after being in dark place? |           |
|      | Not at all 102(31.5)                                                      |           |
|      | A little 100(30.9)                                                        |           |
|      | Quite a lot 97(29.9)                                                      |           |
|      | A lot 25(7.7)                                                             |           |
| 8.   | How much problem do you have locating something when it is surrounded by a lot of other things (like finding a specific food item on your plate) |           |
|      | Not at all 32(9.9)                                                        |           |
|      | A little 163(50.3)                                                        |           |
|      | Quite a lot 71(21.9)                                                      |           |
|      | A lot 58(17.9)                                                            |           |
| 9.   | How much problem do you have in recognizing colors?                      |           |
|      | Not at all 73(22.5)                                                       |           |
|      | A little 106(32.7)                                                        |           |
|      | Quite a lot 74(22.8)                                                      |           |
|      | A lot 71(21.9)                                                            |           |
| 10.  | When you reach for an object (example to take a glass) how much problem do you have in finding it, because it is further away or closer than you thought? |           |
|      | Not at all 35(10.8)                                                       |           |
|      | A little 149(46)                                                          |           |
|      | Quite a lot 103(31.8)                                                    |           |
|      | A lot 37(11.4)                                                            |           |
| 11a. | How much problem do you have in recognizing a person when you are in a bright light? |           |
|      | Not at all 80(24.7)                                                       |           |
|      | A little 107(33)$                                                        |           |
|      | Quite a lot 123(38)                                                      |           |
|      | A lot 14(4.3)                                                             |           |
| 11b. | How much problem do you have seeing with bright light shining on your face (such as from a oncoming bus or car)? |           |
|      | Not at all 66(20.4)                                                       |           |
|      | A little 101(31.2)                                                        |           |
|      | Quite a lot 110(34.0)                                                    |           |
|      | A lot 47(14.5)                                                            |           |

Table 3: Responses of quality of life questionnaire (n=324)

| Activity                      | Response | Not at all | A little | Quite a bit | A lot |
|-------------------------------|----------|------------|----------|-------------|-------|
| Self care                     |          |            |          |             |       |
| How much problem do you have because of your vision in | Bathing   | 36(11.1)   | 152(46.9) | 89(27.5)   | 47(14.5) |
|                              | Eating   | 126(38.9)  | 124(38.3) | 54(16.7)   | 20(6.2)  |
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| doing the following activities unaided? | Dressing | Toileting | Walking to neighbors | Walking to shops | Doing your usual household chores |
|----------------------------------------|----------|-----------|----------------------|------------------|-----------------------------------|
| 93(28.7)                               | 141(43.5)| 80(24.7)  | 72(22.2)             | 90(27.8)         |

| Mobility | How much problem do you have because of your vision in doing the following activities unaided? |
|----------|--------------------------------------------------------------------------------------------------|
| 12(3.7)  | 93(28.7)                                                                                       |
| 11(3.4)  | 97(29.9)                                                                                       |
| 11(3.4)  | 97(29.9)                                                                                       |

| Social | Because of your usual problem do you feel less inclined to participate in the following? |
|--------|------------------------------------------------------------------------------------------|
| 32(9.9)| 130(40.1)                                                                                 |
| 329(9.9)|130(40.1)                                                                                 |

| Mental | Because of your vision problems do you feel any of following? |
|--------|----------------------------------------------------------------|
| 69(21.3)|143(44.1)                                                        |

| Table 4: Vision function and Quality of life scale scores by category of visual impairment |
|-----------------------------------------------|----------------|----------------|----------------|----------------|
| Visual impairment category | 1 n = 84 | 2 n = 61 | 3 n=27 | 4 n=152 |
| General | 34.82 (13.45) | 65.98(21.91) | 67.59 (20.59) | 81.58 (17.439) |
| Visual perception | 54.54 (15.32) | 72.85(16.53) | 69.21 (14.70) | 81.54 (11.128) |
| Peripheral vision | 33.04 (14.08) | 53.28(21.64) | 62.96 (17.50) | 66.61 (24.234) |
| Sensory adaptation | 39.51 (8.79) | 61.58(10.88) | 61.81 (14.01) | 72.66 (11.437) |
| Depth perception | 55.95 (21.12) | 57.38(17.88) | 54.63 (20.84) | 66.28 (20.599) |
| Total | 45.76 (7.8) | 61.27(10.42) | 62.15 (10.53) | 71.77 (10.41) |

| VISION FUNCTION   | General                  | Visual perception | Peripheral vision | Sensory adaptation | Depth perception |
|-------------------|--------------------------|-------------------|-------------------|--------------------|------------------|
| Total             | 45.76 (7.8)              | 61.27(10.42)      | 62.15 (10.53)     | 71.77 (10.41)      |

| Table 5: Vision function and Quality of life scale scores by category of age |
|-----------------------------------------------|----------------|----------------|----------------|----------------|
| Category | 40-50 years n = 114 | 51-65 years n= 177 | 66-80 years n=33 | Overall mean |
| Vision function | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) |
| General | 66.23(25.543) | 65.54(26.492) | 61.36(25.838) | 65.35(26.053) |
| Visual perception | 72.70(16.573) | 71.93(17.891) | 68.75(19.453) | 71.87(17.585) |
| Peripheral vision | 56.14(25.883) | 53.39(24.624) | 60.61(25.024) | 55.09(25.137) |
| Sensory adaptation | 61.24(17.003) | 60.95(17.759) | 61.17(17.382) | 61.07(17.406) |
| Depth perception | 59.21(21.622) | 62.57(20.318) | 58.33(20.412) | 60.96(20.808) |
| Total | 62.322(14.1777) | 62.209(14.5000) | 62.216(15.0654) | 62.249(14.4005) |

| Quality of life |
|-----------------|----------------|----------------|----------------|----------------|
| Self care | 55.9211 (10.24594) | 56.2853 (13.51519) | 60.6061 (14.01771) | 56.59 (12.55) |
| Mobility | 76.5045 (17.71626) | 75.8171 (15.71211) | 73.9603 (17.51747) | 75.86 (16.59) |
| Social | 77.85 (23.224) | 74.72 (22.454) | 74.24 (23.787) | 75.57 (22.84) |
| Mental | 53.7066 (13.16352) | 53.8862 (13.72899) | 50.7373 (13.71349) | 53.41 (13.52) |
| Total | 65.9957 (11.077492) | 65.17653 (10.626588) | 64.88652 (12.252580) | 65.43 (10.93) |
Table 6: Vision function and Quality of life score by gender

| Category      | Male n = 201 | Female n = 123 |
|---------------|-------------|---------------|
| Vision Function | Mean(SD)    | Mean(SD)      |
| General       | 65.55(25.327) | 65.04(27.300) |
| Visual perception | 70.93(17.841) | 73.42(17.118) |
| Peripheral vision | 53.61(24.926) | 57.52(25.393) |
| Sensory adaptation | 61.94(17.878) | 59.65(16.579) |
| Depth perception | 61.57(21.935) | 59.96(18.866) |
| Total          | 62.010(14.7585) | 62.640(13.8460) |
| Quality of life |             |               |
| Self care     | 56.8719(13.31712) | 56.1484(11.23131) |
| Mobility      | 76.5448(17.48125) | 74.7668(15.02520) |
| Social        | 76.49(23.670) | 74.59(21.469) |
| Mental        | 53.0468(13.56993) | 54.2466(13.46411) |
| Total         | 65.73900(11.507979) | 64.93882(9.945368) |

Discussion

This study provides a description of vision impairment due to cataract and its effect on visual functioning and vision related quality of life in a coastal district in Karnataka. The study population comprised of patients attending cataract screening camps. Previous such studies have been carried out as population based study. However, this study has employed incidental (convenience) sampling whereas similar such studies previously conducted have used cluster sampling. A study on Vision-Specific Instruments for the Assessment of Health-Related Quality of Life and Visual Functioning concluded that many vision-specific self-report instruments have been developed since 1998 in response to the numerous research activities in Ophthalmology. Three instruments, the ADVS, VFQ-25, and VF-14, have been well validated and widely used among patients with various ocular disorders. The importance of assessing the impact of visual impairment on patient functioning and HR-QOL has gained acceptance in recent years. There is growing awareness that the full benefits of new treatments may go undetected unless visual instruments are carefully designed to measure appropriate and relevant patient outcomes.

The questionnaires used in the present study has been developed and validated for a clinical trial of cataract surgery at the Aravind Eye Hospital in the context of large volume surgery in a developing country. Both of these questionnaire have been successfully used in Andhra Pradesh in assessing impact of visual impairment and eye disease on visual function and in evaluating cataract outcome survey in Nepal, China and Hong Kong.

Our study demonstrates that visual function and quality of life seem to have a linear relationship with visual impairment. This finding is consistent with previous reports. This study did not show marked variation amongst various age groups and gender. While in another study done on patients operated for cataract, visual function had statistically significant association with gender (p=0.02), but not with age (p=0.09) and education (p=0.52). This could be because of small sample size as compared to large population based studies which have been done earlier.

As the study population reports to camps voluntarily and the surgery which is done for them is free or at a subsidized rate, hence there is a possibility of these patients misreporting the extent of their disability.

In a study in Andhra Pradesh, regarding relationship between visual impairment and eye diseases and visual function, the Visual Function Questionnaire was shown to be a measure of vision function across a range of visual problems among older adults in Andhra Pradesh. Presenting visual acuity in the better eye was associated with functional vision in this populations. Decrease in functional vision was associated with the presence of Glaucoma, Corneal disease, or Retinal disease independent of visual acuity and with cataract as a function of visual acuity.

Another study on Measurement of vision function and Quality of life in patients with cataracts in Southern India concluded that the functional and psychological impacts described by visually impaired participants in India are similar to those reported in other population settings although the context and impact of problems vary.

In a study conducted in Nepal on, Visual functioning and quality of life outcomes among cataract operated and un-operated blind populations, it was concluded that, Cataract surgery outcomes, whether measured by traditional visual acuity or by patient reported VF/QOL, are at levels many would consider unacceptably low.

In a study in China on Visual acuity and quality of life outcomes in patients with cataract in Shunyi...
County, it was reported that both clinical and patient-reported cataract surgery outcomes are below what should be achievable.\(^5\)

A study in Hong Kong on visual acuity and quality of life outcomes in cataract surgery patients concluded that although vision outcomes were consistently correlated with all VF/QOL subscale scores, there was a differential impact with VF subscales usually being affected more by reduced acuity than the more general QOL subscales.\(^5\)

**Conclusions**

In this study Visual function score and Quality of Life questionnaire developed by Aravind eye institute have been used to assess the extent of visual disability, seen in cataract patients. In the present study it was found that the visual function and quality of life was quite poor among the respondents. It was also noted that the visual function score and the quality of life score worsen as the visual acuity deteriorates. This questionnaire can be used while screening a cataract patient as a baseline to evaluate the functional vision. This may act as a guide in selecting patient for surgery. This tool may also be used to educate and motivate patients to undergo cataract surgery as these criteria are better understood by patients then mere visual acuity on Snellen’s chart.

**References**

1. Nutheti R, Keeffe JE, Shamanna BR, Nirmalan PK, Krishnaiah S, Thomas R. Relationship between visual impairment and eye diseases and visual function in Andhra Pradesh. Ophthalmology. 2007 Aug; 114(8):1552-7.
2. Shamanna B R, Dandona L, Rao G N. Economic burden of blindness in India. Indian J Ophthalmol 1998;46:169-72.
3. Pokharel GP, Selvaraj S, Ellwein LB. Visual functioning and quality of life outcomes among cataract operated and unoperated blind populations in Nepal. Br J Ophthalmol 1998;82:606-10.
4. Zhao J, Sui R, Jia L, Fletcher AE, Ellwein LB. Visual acuity and quality of life outcomes in patients with cataract in Shunyi County, China. Am J Ophthalmol. 1998 Oct;126(4):515-23.
5. Lau J, Michon JJ, Chan WS, Ellwein LB. Visual acuity and quality of life outcomes in cataract surgery patients in Hong Kong. Br J Ophthalmol 2002 Jan;86(1):12-7.
6. Fletcher AE, Ellwein LB, Selvaraj S et al. Measurement of vision function and quality of life in patients with cataracts in southern India. Arch Ophthalmol 1997;115:767–74.
7. N. Kumar, C. Shekhar, P. Kumar, A.S. Kundu. Kuppuswamy's Socioeconomic Status Scale-Updating for 2007. Indian J Pediatr 2007; 74(12).
8. Margolis MK, Coyne K, Kennedy-Martin T, Baker T, Schein O, Revicki DA. Vision-specific instruments for the assessment of health-related quality of life and visual functioning: a literature review. Pharmacoeconomics 2002; 20(12):791-812.