

Quality of life and visual impairment from cataract in Satkhira district, Bangladesh

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Accepted 11 May 2008

ABSTRACT

Aims: To evaluate a vision-related quality of life (QOL) scale (World Health Organization Prevention of Blindness and Deafness Visual Function 20—WHO/PBD VF20) and explore the impact of cataract visual impairment on vision- and health-related QOL in people ≥ 50 years from Satkhira district, Bangladesh.

Method: 217 cases visually impaired from cataract and 280 controls with normal vision were interviewed about vision-related QOL (WHO/PBD VF20), generic health-related QOL (EuroQol generic health instrument, EQ-5D) and socio-demographic information. The validity and reliability of the WHO/PBD VF20 were evaluated using standard psychometric tests and criteria.

Results: Evidence for validity and reliability of the WHO/PBD VF20 was found. Worsening general functioning, psychosocial and overall eyesight scores were associated with increased visual loss (p for trend < 0.001). Cases were more likely to report problems with each EQ-5D descriptive domain and had poorer self-rated health than controls with normal vision ($p < 0.001$).

Conclusion: Demonstration of the validity and reliability of the WHO/PBD VF20 in this population supports its suitability as a tool for assessing vision-related QOL in low-income settings. The poorer health-related QOL in cases compared with controls suggests an impact of cataract visual impairment on perceived health and well-being, beyond vision-specific experience.

psychometric evaluation.¹⁰ In response to a recommendation by WHO/PBD for a need for cross-cultural methods to assess VRQOL in low-income settings, this tool was reviewed, and the WHO/PBD-VF20 scale was proposed.¹¹ A study in Kenya found this to be a valid and reliable tool for assessing the impact of cataract on VRQOL.⁷ However, field testing in different low-income settings is required to determine whether this scale is appropriate cross-culturally.

The aim of this study was to evaluate the validity and reliability of WHO/PBD-VF20 in a district in Bangladesh and to explore the impact of visual impairment from cataract on both vision- and generic health-related quality of life.

METHODS

This study was conducted in Satkhira District, Bangladesh in November to December 2005 as the baseline of a study to assess the impact of cataract surgery on health-related QOL and poverty. Satkhira is a predominantly rural district in south-west Bangladesh.

Study subjects

Cases and controls were identified through a district-wide population based cluster survey of visual impairment which included 5300 people ≥ 50 years.³ Clusters were selected using systematic cluster sampling with probability proportionate to size, and within clusters, households were selected through compact segment sampling.¹²

People aged ≥ 50 years living in Satkhira district, with best corrected visual acuity (VA) $< 6/24$ in the better eye due to cataract were eligible to be cases. Controls were defined as people aged ≥ 50 years living in Satkhira that were not visually impaired from cataract. VA was assessed by doctors using a tumbling "E" chart. Clinical examinations were made by ophthalmologists, using a direct ophthalmoscope.³

Sample size calculations were based on previous studies showing a 33% improvement in VRQOL scores following surgery.^{13 14} To detect this difference, a sample of 133 cases and 133 controls was required, with an alpha of 0.01 and 80% power. One-hundred and sixty-two cases were identified from the population based survey. A further 54 cases were identified through case detection conducted simultaneously and in the same clusters as the population-based survey. Two age- and sex-cluster-matched controls were selected for each case in the population-based survey, although 44 were excluded from the current analysis, as they did not have normal vision. This gave a total of 280 controls with normal vision.

Global estimates suggest that cataract is responsible for nearly half of the 37 million cases of blindness.¹ In Bangladesh, cataract was the leading cause of blindness in adults in two recent population based surveys.^{2 3}

The value of patient-based assessments of the impact of visual impairment on aspects of quality of life (QOL) has gained increasing recognition.⁴ By describing the impact of a condition on daily life and well-being, QOL measures provide additional, potentially more meaningful information about the personal impact of a condition compared with traditional clinical tests. Patient-based assessments include disease or organ-specific instruments, in this instance vision-related QOL (VRQOL), and instruments that measure generic health-related QOL (HRQOL). A number of studies have shown an impact of cataract visual impairment on VRQOL.⁵⁻⁹ However, less attention has been given to the impact on generic HRQOL particularly in low-income settings.

Most VRQOL scales are designed for use in high-income countries and include items that may not be relevant to lower-income settings. Recently the Indian VF33, a new vision function scale, was developed through focus-group discussion and

Quality of life

The WHO/PBD-VF20 includes items on general functioning, visual symptoms and psychosocial factors and an overall eyesight rating item. In the evaluation of the scale in Kenya,⁷ one visual symptom item was removed based on pilot testing, because it caused difficulties for respondents (“how much difficulty do you have seeing because of glare from bright lights?”). Since the current study in Bangladesh and the study in Kenya form part of a wider multi-centre study, we used the same version with this item removed (i.e a total of 19 items).

The scale was translated into Bengali by two independent translators. Differences in the translations were discussed and an agreed single version developed. The scale was back-translated into English. Differences in the translated and original version were discussed and modified accordingly. Small modifications to the wording of some items were made to ensure local understanding based on pilot testing of the questionnaire on 10 people.

Generic health-related quality of life was evaluated using the questions from the European Quality of Life questionnaire (EQ-5D). This scale consists of two parts. The first (five descriptive domains) asks respondents whether they have no problem, some problems or extreme problems with mobility, self-care, usual activity, pain/discomfort and anxiety/depression. The second component assesses self-reported health by asking respondents to “rate their own health state today” from 0 (worst possible state) to 100 (best possible state) using a Visual Analogue Scale. The validity and reliability of the EQ-5D has been shown in a number of high- and low-income countries.¹⁵⁻¹⁷ Because study cases were visually impaired, the scale was described verbally to all study members. Translation was conducted as for the vision-related quality of life scale. However, because of time restrictions, this was carried out independently from the Euroqol group, and the translated version used in this study has therefore *not* been approved by the Euroqol group.

All cases and controls were interviewed in their homes. Interviews were conducted by 10 interviewers who were trained for 1 week, and interviews were periodically observed.

Data analysis

All analyses were conducted using STATA.

For this study, categories of presenting visual acuity in the better eye were defined as follows:

- ▶ 6/6 to 6/18: normal (controls only);
- ▶ <6/24 to 6/60: moderate visual impairment;
- ▶ <6/60 to 3/60: severe visual impairment;
- ▶ <3/60>PL: blind;
- ▶ PL: perception of light only.

WHO/PBD VF20

Standard psychometric methods were used to assess the validity and reliability of the modified WHO/PBD VF20 with criteria specified by Laming *et al.*¹⁸ Item acceptability including missing data, endorsement frequencies and subscale skewness values was assessed. Validity was evaluated by factor analysis (see below) as well as known-group differences, convergent and discriminant validity. For reliability, cronbach alpha coefficients and item-total correlations were calculated to check internal consistency. Analyses were conducted on data from cases only, except for testing the known-group differences, which compared cases and controls. It was originally proposed that the scale items be grouped as follows: visual symptoms (three

items), general functioning (12 items), psychosocial (four items) and one overall eyesight rating item. Since the original version has been modified and not previously used in this population, an exploratory factor analysis was conducted to determine appropriate groupings of items for subscales. The number of distinct factors in the scale was taken as those with eigenvalues >1.¹⁹

Covariates

Standard socio-demographic information was collected. In addition, information was collected about household ownership of assets and building materials of the house, and this was used to create a socio-economic-status (SES) index for each household using principal-components analysis.²⁰ The index was divided into quartiles from poorest (lowest SES) to the least poor (highest SES) for analysis.

The relationship between QOL, VA and socio-demographic variables was assessed initially using ANOVA (VRQOL subscales and self-rated health) and chi-square (EQ5D domains). As matching was incomplete, conditional regression analyses were not appropriate, and so data analyses were adjusted for matching variables (age and gender). Forward selection multivariate linear (VRQOL and self-rated health) or logistic (EQ-5D domains) regression analysis were conducted (using $p = 0.05$ for retention) to adjust for socio-demographic variables, with forced entry of VA, age and gender.

Ethical considerations

Ethical approval was granted by the Bangladesh Medical Research Council, and the London School of Hygiene & Tropical Medicine. Informed written/thumb-printed consent was obtained from all study members. Cases were offered free cataract surgery. Visually impaired people not eligible to be study cases were also examined and referred.

RESULTS

A total of 217 cases visually impaired ($VA < 6/24$) from cataract, and 280 normal vision controls (presenting $VA \geq 6/18$) were included in the study.

Cases and controls

Controls were significantly younger, more likely to be married, literate, have had formal education and be of higher socio-economic status than cases (table 1). A quarter of cases had moderate visual impairment, while 40% had perception of light.

Case types

Cases from case detection had poorer vision than those from the survey (p for trend < 0.001). There were no significant differences in age, gender, education, literacy, socio-economic status and marital status between cases from the survey or case detection (data not shown).

Vision-related QOL

Psychometric properties

Item acceptability

Missing data was <0.4% for all items. Maximum endorsement frequencies (the proportion of people choosing each response option) met the acceptable criteria of <80% except for two items (difficulty “recognising people at distance of 20 m” and “doing activities that require you to see close up”) where more than 85% endorsed an “extreme problem.” However, the majority of items had aggregate adjacent endorsement frequencies below

Global issues

Table 1 Characteristics of cases visually impaired from cataract and control subjects with normal vision

	Cases, n (%)	Controls, n (%)	Age- and gender-adjusted odds ratio (95% CI)
Age			
50 to 59	20 (9%)	38 (14%)	1.0
69 to 69	52 (24%)	102 (36%)	0.9 (0.5 to 1.9)
70 to 79	92 (43%)	116 (41%)	1.6 (0.9 to 3.0)
≥80	52 (24%)	24 (9%)	4.6 (2.2 to 9.7)
Gender			
Male	88 (41%)	124 (44%)	1.0
Female	128 (59%)	156 (56%)	1.4 (0.5 to 1.9)
Literacy			
Can't read	198 (91%)	196 (70%)	1.0
Can read	19 (9%)	84 (30%)	0.2 (0.1 to 0.3)
Marital status			
Single/widowed	121 (56%)	114 (41%)	1.0
Married	95 (44%)	166 (59%)	0.6 (0.4 to 0.9)
Socio-economic status			
1 (poorest)	68 (31%)	61 (22%)	1.0
2	59 (27%)	64 (23%)	0.8 (0.5 to 1.4)
3	51 (24%)	73 (26%)	0.6 (0.4 to 1.0)
4 (least poor)	39 (18%)	82 (29%)	0.4 (0.2 to 0.7)
Presenting visual acuity in the better eye			
6/6 to 6/18	0 (0%)	280 (100%)	NA (NA)
<6/24 to 6/60	56 (26%)	0 (0%)	
<6/60 to 3/60	41 (19%)	0 (0%)	
<3/60>PL	31 (14%)	0 (0%)	
PL	88 (41%)	0 (0%)	
Vision-related quality of life*			
	Mean (95% CI)	Mean (95% CI)	Age- and gender-adjusted p value†
Overall eyesight	4.5 (4.4 to 4.6)	2.4 (2.3 to 2.5)	<0.001
General functioning	56.6 (55.5 to 57.7)	20.5 (19.4 to 21.5)	<0.001
Psychosocial	14.7 (14.2 to 15.3)	5.8 (5.5 to 6.2)	<0.001
Pain/discomfort	1.80 (1.6 to 1.9)	2.7 (2.6 to 2.9)	<0.001
Self-rated health‡	47.20 (44.1 to 50.3)	60.50 (57.9 to 63.1)	<0.001

Data on age, gender and visual acuity were missing for one case.

*Higher score denotes a poorer quality of life.

†p Value from factorial ANOVA adjusted for age and gender.

‡Higher score denotes better self-rated health.

PL, perception of light.

the acceptable criteria of <10%; these items were negatively skewed, with few cases reporting "no difficulty." It should be noted that the majority of control subjects (>70%) reported "none or mild difficulty" with all items, and when they were included in the analysis all item acceptability criteria were in fact met. In an unrotated factor analysis, all items loaded onto the first factor with a loading of >0.3, except the item about pain/discomfort in the eye. This suggests that all items apart from "pain/discomfort" measure the same broad concept.

Validity

The exploratory factor analysis indicated that two subscales and one overall eyesight rating item were appropriate. All originally proposed general functioning plus one visual symptom item were grouped to form the general functioning subscale, and all originally proposed psychosocial items were grouped to form the psychosocial subscale. The pain/discomfort item was analysed separately. The psychosocial subscale skewness value was within the acceptable criteria of -1 to +1, but the general functioning subscale was negatively skewed (-1.1) reflecting the fact that few cases reported "no difficulty" with any of the items.

The scale showed good construct validity. Cases had poorer mean overall eyesight, general functioning and psychosocial scores than controls ($p < 0.001$) satisfying the known-groups differences criteria (ie comparison of two specified groups which are expected to differ) (table 1). Worsening VA was associated with poorer mean overall eyesight, general functioning and psychosocial scores (p for trend <0.001) providing support for good convergent validity (table 3). This trend was driven largely by the significantly poorer scores in cases with blindness and perception of light. Pain/discomfort in the eye was not associated with VA. There was no significant association between socio-demographic covariates and overall eyesight or psychosocial score providing evidence for discriminant validity (ie that the scale does not correlate with measures of other constructs). Being illiterate was the only socio-demographic variable associated with having poorer general functioning ($p = 0.01$). Females and single/widowed cases had worse pain/discomfort scores ($p = 0.04$). In multivariate analyses, VA was the only significant predictor of overall eyesight, general functioning and psychosocial scores (p for trend <0.001). Gender (but not VA) was the only significant predictor of pain/discomfort ($p = 0.002$) (table 3).

Reliability

Good internal consistency, tested to assess reliability, was demonstrated by high alpha-correlation coefficients (>0.70), inter-item correlations <0.75 and item total correlations above the accepted criteria of >0.3 (table 2).

Health-related QOL**EQ5D domains**

Cases were significantly more likely to report problem with mobility, self-care, usual activities and anxiety than controls, after adjustment for covariates (table 4). Among cases, there was no significant association between VA and the EQ5D domains except for self-care which showed a borderline association (p for trend = 0.05) (data not shown).

Self-rated health score

Cases had significantly poorer mean self-rated health than controls after adjustment for covariates ($p < 0.001$) (table 1). In a

Table 2 Internal consistency and skewness values for WHO/PBD VF20 summary scores

	Inter-item range (mean)	Item-total range (mean)	Cronbach alpha	Skewness
Overall eyesight	-	-	-	-0.4
General functioning	0.26 to 0.66 (0.46)	0.51 to 0.81 (0.70)	0.90	-1.1
Psychosocial	0.34 to 0.69 (0.45)	0.62 to 0.83 (0.76)	0.77	-0.5
Pain/discomfort in eye	-	-	-	0.1

Table 3 Linear regression model of variables associated with vision-related quality of life in cases visually impaired from cataract

	Overall eyesight	General functioning	Psychosocial	Pain/discomfort
	Adjusted for age, gender and VA	Adjusted for age gender and VA	Adjusted for age gender and VA	Adjusted for age gender and VA
	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
Presenting VA in the better eye				
<6/24 to 6/60	4.2 (4.1 to 4.3)	51.0 (51.0 to 51.8)	13.1 (12.2 to 14.1)	2.8 (2.4 to 3.1)
<6/60 to 3/60	4.3 (4.1 to 4.4)	51.8 (49.8 to 53.8)	13.1 (12.0 to 14.2)	2.5 (2.1 to 2.9)
<3/60>PL	4.4 (4.2 to 4.6)	56.8 (54.5 to 59.1)	14.7 (13.4 to 16.0)	3.0 (2.5 to 3.4)
PL	4.8 (4.7 to 4.9)	62.8 (60.9 to 63.6)	16.6 (15.8 to 17.4)	2.7 (2.4 to 3.0)
p For trend	<0.001	<0.001	<0.001	0.79
Age				
50 to 59	4.4 (4.1 to 4.6)	54.3 (51.4 to 57.1)	16.0 (14.4 to 17.6)	2.6 (2.1 to 3.2)
69 to 69	4.4 (4.3 to 4.6)	55.7 (54.0 to 57.5)	14.5 (13.5 to 15.5)	2.9 (2.5 to 3.2)
70 to 79	4.5 (4.4 to 4.6)	57.0 (55.7 to 58.4)	14.3 (13.5 to 15.0)	2.8 (2.5 to 3.0)
≥80	4.5 (4.4 to 4.7)	57.4 (55.7 to 59.2)	15.5 (14.5 to 16.4)	2.5 (2.2 to 2.9)
p For trend	0.35	0.14	0.74	0.89
Gender				
Male	4.5 (4.4 to 4.6)	57.1 (55.8 to 58.5)	14.9 (14.1 to 15.6)	2.4 (2.1 to 2.7)
Female	4.4 (4.4 to 4.5)	56.2 (55.0 to 57.3)	14.7 (14.1 to 15.3)	2.9 (2.7 to 3.2)

PL, perception of light; VA, visual acuity.

A higher score denotes a poorer quality of life. Forced retention of age and gender in model. There were no other significant predictors of vision-related quality of life.

multivariate analysis among cases, women had significantly poorer self-rated health than men ($p < 0.02$), but VA was not a significant independent predictor of self-rated health.

DISCUSSION

This study evaluated properties of the WHO/PBD-VF20 (minus one question) and explored the impact of cataract visual impairment on vision- and generic health-related QOL in people ≥ 50 years in a rural district of Bangladesh.

Among cases, response distribution to individual items in the scale (and the resulting general functioning subscale) were skewed, with few cases reporting "no difficulty." This contrasts to application of the same scale in people aged ≥ 50 visually impaired from cataract in Kenya⁷ where responses were more evenly distributed. Previous studies have shown variation in both disease-specific and generic HRQOL by country of residence or ethnic group.²¹⁻²³ This variation may be due to cultural differences in questionnaire interpretation,²⁴ cultural value systems or perception of QOL.²¹ Alternatively, it may reflect real differences in experiences of VA or cataract symptoms perhaps due to living conditions or social support. In either case, it suggests that direct comparisons of patient-based QOL assessment between different geographic areas, even using the same scales, may not always be appropriate or should be interpreted with care.

Despite the skewed item response, the scale discriminated between different degrees of visual loss and showed good internal consistency, suggesting that it is a valid and reliable tool for use in this setting. Further, with the inclusion of control subjects, all psychometric criteria were met, providing additional support for the usefulness of the scale. In accordance with evaluation of the scale in the Kenyan population, two subscales—general functioning and psychosocial—as well as an overall eyesight rating item were appropriate. Also in line with results from Kenya, the item about pain/discomfort in the eye did not perform well. However, this item may have more relevance when other eye conditions are being assessed, and this should be tested.

In this study, people visually impaired from cataract were more likely to report problems with mobility, self-care, daily

activities, pain and depression/anxiety and had poorer self-rated health than normal vision controls. This supports findings in Kenya,⁷ India²⁵ and various high-income settings,^{26, 27} of an impact of visual impairment on wider perceived health and well-being in addition to vision-specific experiences. However, the HRQOL tool did not discriminate between different levels of visual loss. For the descriptive domains, this reflects the skewed response distribution, discussed above. The exception was self-care where a greater proportion of cases reported "no problem." This distribution difference has been found in other studies²⁸⁻³⁰ and, according to Misajon *et al*, may be due to the fact that, unlike other domains, people can receive assistance

Table 4 Response distributions to EQ5D domains and adjusted odds ratios in cases visually impaired from cataract and controls with normal vision

EQ5D domain	Cases n (%)	Controls n (%)	Age- and gender-adjusted odds ratio (95% CI)
Mobility			
No problem	18 (8)	146 (52)	1.0
Some problem	190 (88)	133 (48)	11.9 (6.7 to 21.4)*
Confined to bed	9 (4)	1 (0.4)	—
Self-care			
No problems	69 (32)	225 (81)	1.0
Some problems	141 (65)	53 (19)	8.5 (5.5 to 13.1)*
Unable	7 (3)	1 (0.3)	—
Usual activities			
No problems	22 (10)	161 (58)	1.0
Some problems	109 (50)	105 (38)	8 (4.7 to 13.7)
Unable	86 (40)	14 (5)	45.3 (21.2 to 96.8)
Pain/discomfort			
None	32 (15)	53 (19)	1.0
Moderate	119 (55)	188 (67)	1 (0.6 to 1.6)
Extreme	66 (30)	39 (14)	2.4 (1.3 to 4.5)
Anxiety/depression			
None	17 (8)	71 (25)	1.0
Moderate	117 (54)	165 (59)	2.8 (1.5 to 5.2)
Extreme	83 (38)	44 (16)	7.7 (4.0 to 15.1)

*"Some" and "extreme" problem were combined due to small cell sizes ($n < 5$).

Global issues

with self-care, and it is therefore not perceived to cause such problems.²⁹

There were a number of limitations in this study:

1. Two different case recruitment methods were used, although the cases in these groups were similar in terms of socio-demographic characteristics and so were broadly comparable. The analyses were repeated including only survey cases, and findings were essentially unchanged.
2. The EQ-5D translation was not approved or validated by the Euroqol group, but standard translation procedures were followed.
3. We used the version of the WHO/PBD VF20 with one question removed (difficulties associated with glare). Acceptability of this removed item should be tested in future applications of the study.
4. Test-retest and responsiveness of the WHO-PBD VF20 were not assessed. The latter will be measured in the follow-up component of this study.

Strengths of this study include the large sample of population based cases and controls selected through a district-wide survey using random sampling procedures. Findings should therefore be representative of Satkhira, and potentially other rural districts of Bangladesh. Detailed standardised questionnaires were used to collect in-depth information on socio-demographic factors as well as vision and generic health-related QOL.

In conclusion, in this study we found;

1. Evidence of the validity and reliability of the WHO/PBD VF20 (minus one question) in a Bangladeshi population of older adults. Similar findings in a second country suggest that this is suitable as a cross-cultural tool for use in low-income settings.
2. Visual impairment due to cataract not only impacts on vision-related QOL but is associated with a poorer perception of own health and well-being.

Acknowledgements: The authors would like to thank all the participants from Satkhira district who took part in the survey. We thank the ophthalmologists (KA Choudhury, AKM Mamunur Rashid and R Lindfield), the doctors (R Hamid, MD Kamrul, N Iftekhar, R Ullah), the interviewers (G Mainuddin, S K Mondal, NK Roy, TL Majumder, LA Banu, A Bepari, R Alam, N Afrin, Z Begum, S Akhter), and the drivers and data entry clerks (Rasel, S Sen). We are also very grateful to Rishilpi for kindly providing office space and accommodation.

Funding: This study was funded by grants from Sight Savers International, Christian Blind Mission and Orbis International.

Competing interests: None.

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