Original Article

The Impact of Cataract Surgery on Subjective Visual Functions and Quality of Life in Patients with Cataract in Northwestern Nigeria

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Abstract

Purpose: To determine the impact of cataract surgery on visual functions (VFs) and quality of life (QoL) in patients with cataract at the National Eye Center, Kaduna. **Methods:** VFs and QoL questionnaires were administered to the patients preoperatively and 6 weeks postoperatively. Correlation was assessed among subjective VF, QoL, and visual acuity (VA). The preoperative and sixth-week postoperative VA, VF scores, and QoL scores were compared. A paired *t*-test was used for comparison between before and after surgery. **Results:** Two hundred and seventy-one patients were studied. The age range of the patients was 45 to 85 years with a mean age of 64.2 years (SD ± 6.51). There was significant improvement in overall VF and QoL following cataract surgery ($P < 0.0001$). Mean VF scores preoperatively and at 6 weeks postoperatively were 28.6 (SD ± 7.9) and 15.1 (SD ± 3.5), respectively. The overall mean QoL scores were 23.7 (SD ± 9.0.) preoperatively and 13.5 (SD ± 1.1) postoperatively. This difference was statistically significant $P < 0.0001$. Bilateral cataract surgery patients had greater gain in VF and QoL than those that had uniocular surgery. **Conclusion:** This study demonstrated that cataract surgery is effective in improving overall VF and vision-related QoL, which resulted in functional independence. The second eye surgery confers additional gains in terms of VF and QoL in patients with bilateral cataract.

Keywords: Cataract surgery, quality of life, visual function

Introduction

Worldwide, cataract is the leading cause of avoidable blindness and low vision; it is estimated to be responsible for 48% of the global cause of blindness.[1] In Nigeria, cataract is the most common cause of severe visual impairment and blindness.[2-7] According to Nigerian National Blindness and Visual Impairment Survey, cataract accounts for 43% of avoidable blindness.[8]

The gains from cataract extraction are traditionally demonstrated clinically by change in Snellen's visual acuity (VA) in the eye that had the surgery.[9] The impact on function in everyday life with respect to vision-dependent activities or quality of life (QoL) has not often been considered as a separate issue, partly because of assumption of inevitability of the improvement in VA, and also because the methods and instruments required to make these type of assessments have not been readily available for use in patients with visual disorders.[9]

Only few studies have been conducted in Nigeria and other developing countries to assess the impact of cataract surgery on subjective visual function (VF) and QoL of our patients.[10-12] Most similar studies were done in the developed countries.[13-15] Therefore, there is need for more local studies to assess the functional benefits of cataract surgery in cataract patients.

The purpose of this study was to assess gains of cataract surgery in terms of subjective visual functioning assessment from patients' point of view.

Materials and Methods

The ethical approval for this study was obtained from Human Research and Ethical Committee of the National Eye Centre,

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Kaduna and all patients gave informed consent with their signature before enrolment into the study. The study adhered to the tenets of Helsinki declaration.

This was a prospective, observational study carried out at the National Eye Center, Kaduna, the largest public eye hospital in Nigeria. All cataract patients aged 40 years and above, who presented to the hospital from January 6th, 2013 to August 30th, 2013 with VA of <6/60 in either eye in the absence of other ocular comorbidities such as glaucoma, optic atrophy, and trauma, were consecutively recruited into the study. Excluded were patients with ocular comorbidity and those who could not give consent. Two hundred and seventy-one consecutives patients were recruited into the study after meeting the inclusion criteria.

Visual functions/quality of life questionnaires

The interviewer-administered VF/QoL questionnaires were initially developed, validated, and used in a clinical trial of cataract surgery in India[16] and had subsequently been used in other studies in Kenya,[17] Mali,[18] Pakistan,[19] and in Nigerian National Blindness and Visual Impairment Survey.[20] The English version of the questionnaire was translated into the local Hausa language and back-translated into English language for validation by a trained linguist. The questionnaires were pilot tested among 25 cataract patients awaiting cataract surgery in Barau Dikko Specialist Hospital, Kaduna, which is about 15 km away from the National Eye Center. The patients recruited for the pilot study were not included in final data collected in this study. All the pilot study patients had small incision cataract surgery performed on them.

Visual function questionnaire

The VF questionnaire measured an individual's visual capabilities and had five subscales:
1 – General vision, a single question that assessed overall VF (question 1),
2 – Visual perception (four questions dealing with limitation in everyday activities, near vision, intermediate vision, and distant vision, i.e., questions 2-5),
3 – Peripheral vision (question 6),
4 – Sensory adaptation (six questions dealing with light/dark adaptation, visual search, color discrimination, and glare disability) (questions 7a, 7b, 8, 9, 11a, and 11b), and
5 – Depth perception, a single-question subscale.

Quality of life questionnaire

The following areas were assessed by the QoL questionnaire:
1 – Self-care (bathing, eating, dressing and toileting),
2 – Mobility (walking to the home of neighbours, walking to shops, and doing household chores),
3 – Social skills (attending social functions and meeting with friends), and
4 – Mental feelings (feelings of being a burden to others, dejection, and loss of confidence).

Overall, the QoL questionnaire measured the difficulties individuals encountered in everyday life because of visual loss.

Scoring of visual function and quality of life questionnaire

For both the VF and QoL questionnaires, the subscales were defined on the basis of best judgment. Simple scoring scheme was used for both questionnaires. For each response, the 4-point rating scale was scored from 1 (no problem) through 4 (maximum problems), with 2 and 3 for the intermediate ranking. For each subscale, the score was calculated as the cumulative total of individual item responses expressed as a percentage of the maximum score possible. For questions 7a, 7b, 11a, and 11b in the VF questionnaire, the subscale score was based on response to either a or b, depending on which response represented greater degree of a problem. The overall VF and QoL scale scores were calculated by aggregating across all items in each scale. The scores were inverse scores with higher value meaning poorer VF or QoL. Conversely, lower value meant better QoL or VF as the case may be. Improvement in VF or QoL was therefore demonstrated by decreased scores from baseline.

Data collection

The study instruments were administered on two occasions by the principal investigator: preoperatively in the clinic before admission into the wards for surgery and at 6 weeks follow-up. Postoperatively, patients were interviewed after full clinical examination including slit lamp examination by the principal investigator.

Data analysis and statistical method

During analysis, the Snellen's VA values were converted into LogMAR VA. This was done to facilitate calculation of VA change (visual acuity change = Logarithm of Minimum Angle of Resolution (Log MAR) acuity before surgery–LogMAR acuity after surgery). The score value of LogMAR VA was inversely proportional to the Snellen's VA. The levels of VA that were classified as counting fingers, hand motion, and light perception were assigned VA values of 2.3, 2.6, and 2.9, respectively. These values were assigned based on similar validated scoring in a previous study in southern India.[16] The data were entered to be analyzed by the Statistical Package for the Social Sciences version 16.0 software statistical package.

Analysis was done using simple frequency proportion and paired *t*-test was used to compare pre- and postoperative findings. Correlation coefficient was used to examine the association of LogMAR score with VF and QoL score prior to cataract surgery and association between change in LogMAR scores 6 weeks postoperatively with the change in the VF and QoL scale score.

Table 1: Socio-demographic characteristics of the patients

Demographic characteristic	No (%)
Age (years)	
40–49	10 (3.7)
50–59	73 (27.0)
60–69	128 (47.2)
70–79	45 (16.6)
≥80	15 (5.5)
Total	271 (100.0)
Gender	
Male	168 (62.0)
Female	103 (38.0)
Total	271 (100.0)
Occupation	
Artisan	60 (22.1)
Civil servant	35 (13.0)
Farmer	102 (37.6)
Trader	15 (5.5)
Others	59 (21.8)
Total	271 (100.0)
Level of education	
Primary	73 (26.9)
Secondary	41 (15.1)
Tertiary	25 (9.2)
Qur'an	53 (19.6)
No formal education	79 (29.2)
Total	271 (100.0)

Results

Patients baseline characteristics

A total of 271 patients were studied. Forty-six patients (17%) had surgery in both eyes while 225 (83%) patients had surgery in one eye only. Table 1 shows the sociodemographic characteristics of the patients. Majority of the respondents (62.0%) were males, about one-third had no formal education (29.2%), and most of the respondents (37.6%) were farmers [Table 1].

Visual functions score before and after cataract surgery

Mean VF scores preoperatively and at 6 weeks postoperatively were 28.6 (SD ± 7.9) and 15.1 (SD ± 3.5), respectively; this difference was statistically significant as shown by paired *t* test ($t = 32.3$, df = 270, $P = 0.00$) and as demonstrated in Table 2.

Visual function and visual acuity

A positive correlation was observed between change in VA of the operated eye and improvement in VF ($r = 0.64$, $P < 0.01$) as shown in Figure 1.

Quality of life before and after cataract surgery

The overall mean QoL scores were 23.7 (SD ± 9.0.) preoperatively and 13.5 (SD ± 1.1) postoperatively. This difference was statistically significant, $P < 0.0001$ [Table 3]. The mobility function was worst affected (Mean score 48.2) preoperatively while mental function was least affected (69.7) postoperatively.

Table 2: Preoperative and 6 weeks postoperative mean visual function score

Visual functions subscale	Preoperative Mean ± SD	Postoperative Mean ± SD	*P*-value*
General	85.7 (15.0)	39.7 (14.0)	0.00
Visual perception	72.2 (17.0)	37.1 (12.0)	0.00
Peripheral vision	70.0 (20.0)	40.7 (12.0)	0.00
Sensory	72.3 (21.6)	40.0 (10.1)	0.00
Depth	66.0 (27.0)	37.0 (12.5)	0.00
Total VF	28.6 (7.9)	15.1 (3.5)	0.00

*Paired *t* test.

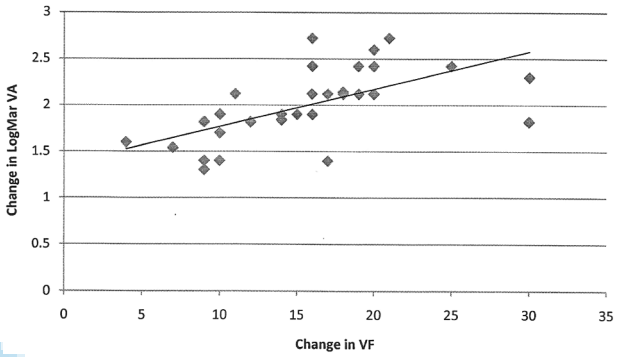

Figure 1: Visual function versus visual acuity

Table 3: Preoperative and 6 weeks postoperative mean quality of life score

QoL Subscales	Preoperative Mean ± SD	Postoperative Mean ± SD	*P*-value*
Self-care	48.4 (21.7)	25.6 (1.8)	0.00
Mobility	69.7 (21.8)	30.2 (5.8)	0.00
Social	58.2 (21.2)	27.3 (7.2)	0.00
Mental	43.9 (16.6)	21.8 (2.1)	0.00
Total	23.7 (9.0)	13.5 (1.1)	0.00

*Paired *t* test.

Quality of life and visual acuity

A strong positive correlation between change in VA of the operated eye and change in QoL was observed ($r = 0.76$, $P < 0.01$) as shown in Figure 2.

Discussion

Patients' characteristics

The higher number of male patients in the study could be due to gender bias in seeking healthcare, high cost of surgery, lack of household economic control by the women, or may just be that there was more male attendance in the

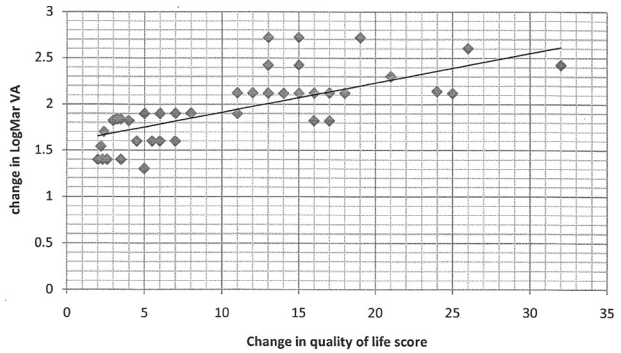

Figure 2: Quality of life versus visual acuity

hospital. A similar finding was also reported in other studies in Nigeria.[21-23]

Visual functions before and after cataract surgery

The visual impairment from cataract was associated with decreased overall VF and all other subscales of VF were also depressed with cataract visual loss. Activities of daily living were mostly affected, as self-assessed by the patient. This was reported in Nigeria's National blindness and low vision survey[20] where VF scores and all VF subscales were lower with increasing levels of vision loss. This revealed the level of visual disability cataract patients cope with and this is enough justification for intervention. Bilateral cataract patients had poorer VF than unilateral cataract patients.

Following cataract surgery, there was steady improvement in overall VF ($P < 0.0001$). This implies that cataract surgery is effective in improving not only overall VFs but also VA. Furthermore, it was found that patients who had bilateral eye surgeries had better gains than those who had one eye surgery (Mean difference of 23.07 versus 17.78, $P < 0.0001$). The reason could be due to binocular enhancement of VA.

There was a correlation between change in VA and change in VF ($r = 0.64$, $P < 0.01$). Patients with good outcome had better VFs whereas patients with poor outcome had poorer VF postoperatively.

Quality of life before and after cataract surgery

The study demonstrated declining daily activities in terms of self-care, mobility, and social and mental functions due to cataract blindness. However, following cataract surgery, there was significant improvement in overall QoL score (Preoperative QoL 23.7 versus Postoperative QoL 13.5, $P < 0.0001$). Additionally, it was found in this study that greater improvement was found in mobility and social functions. This might be due to improvement in VA. There was also significant improvement in self-care and mental functions. They were more amenable to participate in social functions such as weddings, funerals, festivals, and meeting with friends and relatives, and less likely to have feelings of being a burden to others or feeling of loss of confidence. In a study in Hong Kong,[24] it was observed that QoL depreciated with visual impairment and all subscales of QoL were also affected as reported in the present study. Other studies in Nigeria and among Mexican-Americans corroborated our findings.[25,26]

Therefore, patients with cataract should be encouraged to have cataract surgery done so as to restore their functional independence and improve their QoL.

Conclusion

It can be concluded that cataract surgery is effective not only in improving VA but also overall VFs and QoL and that subjective assessment of VF and QoL should be encouraged in routine clinical practice.

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Conflicts of interest

There are no conflicts of interest.

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