

Impact of Cataract Surgery on Visual Functions and Quality of Life in Yola, Adamawa State, NigeriaDahiru Y Ribadu,¹ Bala H Askira,² Kehinde F Monsudi,³ Abdulraheem O Mahmoud⁴**Abstract**

Background: Cataracts are responsible for 50% of blindness in sub-Saharan Africa, and visual impairment from cataracts greatly affects the quality of life and psychology of the affected individual, their family, and their community. The efficacy of vision-restoring cataract surgery in improving quality of life needs to be demonstrated with facts in order to convincingly mobilize resources for an accessible and affordable cataract surgery program.

Aim: To determine the impact of cataract surgery on visual functions (VFs) and quality of life (QoL) in patients operated on at Specialist Hospital Yola, Adamawa State.

Methods: QoL and VF questionnaires were administered to the participants preoperatively and 6 weeks post cataract surgery. The QoL, visual acuity (VA), and VF of the participants were compared at preoperative and 6-week postoperative visits. Correlations of VA, VF, and QoL of the participants were also done before and post cataract surgery. SPSS version 18 was used to analyze the data.

Results: A total of 432 participants participated in the study. There were 206 (47.7%) males and 226 (52.3%) females, with a mean of 58.0 years. There was a positive correlation between a patient's preoperative and postoperative visual acuity and visual function. Changes in subscales of quality of life and visual functions comparing preoperative with postoperative results were more remarkable in patients' mobility and sensory, respectively.

Conclusion: There was improvement in visual function and quality of life following cataract surgery in this study. Hence, it is advised that surgeons should assess the VF and QoL of the patient before and after cataract surgery.

Keywords: Impact of cataract surgery, Quality of Life, Visual Functions, Visual Acuity, Yola, Nigeria

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Introduction

Cataract refers to a clouding of the crystalline lens of the eye. It is the leading cause of blindness worldwide.¹ Cataracts are responsible for 50% of blindness in sub-Saharan Africa.²

In Nigeria, the national blindness and visual impairment survey indicated a blindness prevalence of 4.2% and that cataract is the cause of 50% of the blindness among adults aged 40 years and above in Nigeria.³ Several hospital-based studies and community-based blindness surveys previously done showed cataracts as the leading cause of blindness.^{1,4-8}

Cataract extraction is one of the most cost-effective medical interventions;⁹ it is safe, highly effective in reversing vision impairment and is the most commonly performed surgical procedure in ophthalmology. There is also very clear and persuasive evidence that cataract surgery enhances quality of life among community-dwelling adults.^{1,11-14}

The purpose of cataract surgery is to improve visual acuity with the hope of improving visual function.

In ophthalmology, it is a common practice to assess the gain in vision in the operated eye using Snellen visual acuity (VA); however, recently it's believed that assessment of the eye post operatively gives better results using quality of life (QoL) instruments and visual function (VF) questionnaires.^{1, 15-17} This lead to World Health Organization (WHO) recommendation, which emphasize the assessment of VF and vision-related QoL in people with visual impairment.¹⁸

In the literature, most of the articles on the impact of cataract surgeries on VF and QoL were from the developed countries and a few from Nigeria. To the best of the author's knowledge, there is no study report on the impact of cataract surgeries on VF and QoL in Yola Specialist Hospital.

Therefore, this study is to assess the impact of cataract surgeries on VF and QoL in Yola Specialist Hospital in order to guide in improving the quality of cataract surgical services in the state.

Materials and Methods

This is a hospital-based prospective cross-sectional study conducted in Yola Specialist Hospital, Adamawa State, from 1st February to 30th June 2011. Five hundred and nineteen patients who had visually impaired cataracts and were within the inclusion criteria were recruited consecutively for the study.

The Adamawa State Eye Care Program is a joint partnership between the Adamawa State government and the Tulsi Chanrai Foundation, which was established in January 2005 to reduce cataract blindness in the state.¹⁹

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Manual Small Incision Cataract Surgery (MSICS) was performed for all patients under local anesthesia by one consultant ophthalmologist. This technique involved making a frown-shaped scleral incision 2 mm from the limbus, creating a sclerocorneal tunnel with a crescent blade, performing an anterior Continuous Curvilinear Capsulorhexis (CCC) after viscoelastic was injected into the anterior chamber, delivering the nucleus by Vectis, aspirating cortical lens matter with a Simcoe cannula, and implanting an IOL.

Inclusion criteria

1. Patients 40 years and above with unilateral and bilateral cataracts who were scheduled for cataract surgery at Specialist Hospital Yola.
2. Patients coming for cataract surgery for the first time (in order to prevent bias from earlier experiences)
3. Ability to complete follow-up at 6 weeks (which is the stabilization period after cataract surgery).

Exclusion criteria

1. Individuals with co-existing ocular conditions (e.g., glaucoma, age-related macular degeneration, uveitis, and cornea disease) and systemic conditions (e.g., diabetes or hypertension).
2. Patients with previous operations in either eye for cataracts.

Study design

This was an observational cross-sectional study designed to determine the impact of cataract surgery on VF and quality of life in Yola, Nigeria.

The study was conducted using the visual function (VF) and quality of life (QoL) questionnaires designed by Ellwein et al.²⁰ It is an instrument for measuring the general health and result of medical intervention. These questionnaires were used in earlier surveys in developing countries.^{14, 18} Both visual function and quality of life questionnaires were administered by the researcher to each patient before cataract surgery and again 6 weeks postoperatively.

Study tools

Visual Function (VF) Questionnaire

The following areas were assessed by the VF questionnaire: general, a single question that assessed overall VF (question 1); visual perception, limitation in everyday activities and visual acuity (questions 2-5); peripheral vision, a single-question scale (question 6); sensory adaptation, light-dark adaptation, visual search, color discrimination, and glare disability (questions 7a, 7b, 8, 9, 11a, 11b); and depth perception, a single-question scale (question 10).

Quality Of Life (QoL) Questionnaire

The following areas were assessed by the QoL questionnaire: Self-care (i.e. bathing, eating, dressing and toileting); mobility (i.e. walking to the homes of neighbors, walking to shop and doing household chores); social (i.e. attending social functions and meeting with friends); and mental (i.e. feeling of a burden on others, dejection and loss of confidence).

Scoring of VF and QoL Questionnaires

For both the VF and QoL questionnaires, the subscales were defined on the basis of best judgment. Simple scoring schemes were used for both questionnaires. For each response, the 4-point rating scale were scored from 1 (no problems) through 4 (maximum problems), with 2 and 3 for the intermediate rankings. For each subscale, the scores were 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 the response to either a or b, depending on which response represented the greater degree of a problem. The overall VF and QoL scale scores were calculated by aggregating across all items in each scale. The higher scores in the VF and QoL questionnaires indicate worse visual function/quality of life and the reverse for lower score.

Sample size was determined by Fisher's formula

$$N = \frac{z^2 pq}{d^2}$$

When N= minimum sample size

P=best estimate of population prevalence (not known in this case therefore=50%)

$$q=1-p$$

$$d=\text{degree of accuracy desired}=0.05$$

$$z=\text{standard normal deviation at 95\% confidence}$$

$$N = \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.05^2}$$

$$= 348$$

The minimum sample size was 422 (384 + 10% of 384 attrition value)

Training of Assistants and pilot test

Two assistants were trained for 1 week for visual acuity assessment. A 2-day pilot testing was conducted at nearby community Fufore Local Government Area, of Adamawa State. The questionnaire was administered to 20 patients to determine the feasibility and timing of the examination, the appropriateness of the questionnaire and the inter-observer error, such that modifications were made as necessary. The kappa coefficient calculated for the assistants was 0.97 for visual acuity testing for acceptability, timing and comprehension prior to the study.

The kappa coefficient 0.97 indicates excellent agreement. Attempts were made to minimize measurement bias by emphasizing the need for consistency in data collection. These 20 patients were not part of the main study.

Data collection technique

Distance visual acuity was measured using an illuminated Snellen chart at 6 metres. Although the VA was measured with a pinhole and the best-corrected VA was also recorded, neither (pinhole nor best-corrected VA) was included in the final analysis.

The principal investigator administered the questionnaires to all the patients before and 6 weeks after surgery. All the patients also had ocular examination before and 6 weeks after surgery.

Data analysis

All the data were entered into and analyzed using Statistical Package for Social Sciences computer software (SPSS) version 18 (IBM Corporation, SSPS Inc., Chicago, Illinois, USA).

For the purpose of analysis, Snellen's visual acuity (VA) value was converted to Log MAR (logarithm of minimal angle of resolution) VA. This was done to facilitate calculations of visual acuity change (i.e. Log MAR acuity before surgery –log MAR acuity after surgery). The score value of Log MAR VA is inversely proportional to the Snellen's VA. The levels of visual acuity that were classified as counting fingers, hand movements, and light perception were assigned Log MAR values of 2.3, 2.6, and 2.9 respectively. The values were assigned based on similar validated scoring in a previous study in Southern India.²¹

First-eye and second-eye surgeries were analysed together. Data analysis was carried out using simple frequency proportions and chi square test for significance. Spearman correlation coefficients were used to examine the association of Log MAR score with VF and QoL scale score prior to cataract surgery and the association between the change in the Log MAR scores 6 weeks post-operatively with the change in the VF and QoL scale score. The p value < 0.05 was considered as statistically significant.

Ethical considerations

Ethical approval to carry out the research was obtained from the University of Ilorin Teaching Hospital Ethical Review Committee and TCF headquarters in Abuja, Nigeria.

Written permission to carry out the survey was also obtained from the Adamawa State Ministry of Health. Furthermore, informed signed or thumb-printed consent was obtained from all participants following detailed

explanations of the study and the right of the participants to withdraw at any stage of the study.

Results

A total of five hundred and twenty-one cataract patients who were 40 years of age or older were recruited for this study, out of which 432 patients (82.9%) turned up for follow-up and had complete information for postoperative analysis at six weeks. The compliance rate was 82.9%. Eighty-nine patients (17.1%) were lost to follow-up. There were 206 (47.7%) males and 226 (52.3%) females, giving a male to female ratio of 1:1.1; the age range was between 40 and 90 years, with a mean of 58.0 years $\pm$ 10.2 years (std). The majority were farmers, 308 (71.3%), of Fulani ethnic origin, 132 (31.7%), and practiced Islam, 255 (59%). Table 1: Socio-demographic characteristics of the patients.

There were more females in age groups 51-60 years compared to males. Age and sex distribution of the patients is as shown in table 2.

Table 1: Socio-demographic characteristics of the patients

Description	Frequency (%)
Age (years)	
40-50	80(18.5)
51-60	152(35.2)
61-70	140(32.4)
71-80	55(12.7)
91-90	5(1.2)
Total	432(100)
Gender	
Males	206 (47.7)
Females	226 (52.3)
Total	432 (100)
Marital status	
Married	317(73.4)
Single	7(1.6)
Widowed	98(22.7)
Divorced	10(2.3)
Total	432(100)
Education	
Primary	65(15.0)
Secondary	38(8.8)
Tertiary	24(5.6)
Quranic	159(36.8)
None	146(33.8)
Total	432(100)
Occupation	
Farming	308(71.3)
Trading	76 (17.6)
Dependants	4(0.9)
Civil Servants	20 (4.6)
Teaching (Islamic)	6 (1.4)
Students	18 (4.2)
Total	432(100)

Description	Frequency (%)
Ethnicity	
Fulani	137 (31.7)
Hausa	47 9(10.9)
Baba	66 (15.3)
Laka	44 (10.2)
Others	138 (31.9)
Total	432 (100)
Religion	
Islam	255 (59.0)
Christianity	173 (40.1)
Traditional	4 (0.9)
Total	432 (100)

Others Yoruba, Igbo

Table 2: Age and Sex distributions of the patients

Age group (years)	Male (n=206)	Female (n=226)	Total (n=432)
40-50	36 (17.5%)	44 (19.5%)	80 (18.5%)
51-60	67 (32.5%)	85 (37.6%)	152 (35.2%)
61-70	70 (34.0%)	70 (31.0%)	140 (32.4%)
71-80	31 (15.0%)	24 (10.6%)	55(12.7%)
81-90	2 (1.0%)	3(1.3%)	5(1.2%)

Mean preoperative total VF and QoL scores were 43.2 (SD 7.9) and 47.8 (SD 16.2) respectively, while mean

postoperative total VF and QoL scores were 13.11 (SD 1.2) and 20.97 (SD 1.1) respectively. $P < 0.0001$ shows significant changes in both VF and QoL following cataract surgery.

There was a positive Spearman correlation between patient's preoperative visual acuity and visual function, correlation coefficient (r) was 0.48. Similarly, a positive correlation was observed between preoperative VA and QoL; the correlation coefficient (r) was 0.31. Postoperatively, there was a positive correlation between VA and VF ($r = 0.23$) and between VA and QoL ($r = 0.10$).

The mean visual function score postoperatively was 13.11 compared with the preoperative mean of 43.23. Similar observations were reported in the patient's quality of life and improvement in visual acuity, respectively.

The mean changes in the VF (43.2) and QoL (47.8) from baseline (preoperative) to 6 weeks (postoperative) were 30.12 and 26.83, respectively.

Considering changes in subscales of QoL, Changes in subscales of quality of life and visual functions comparing preoperative with postoperative results were more remarkable in patients' mobility and sensory, respectively. Table 3

Table 3: Changes in the subscales of Quality of life and Visual function of the 432 patients.

Parameter	Mean	Standard deviation	Range	
			Minimum	Maximum
QoL self-care change	2.00	0.09	2.00	4.00
QoL mobility change	4.01	0.19	4.00	16.00
QoL social change	3.01	0.14	3.00	6.00
QoL mental change	3.00	0.00	3.00	3.00
VF depth change	1.00	0.05	1.00	2.00
VF peripheral change	1.00	0.07	1.00	2.00
VF sensory change	6.01	0.29	6.00	12.00
VF perception change	4.06	0.37	4.00	8.00
VF general change	1.09	0.29	1.00	3.00

There was marked increase in VF of bilateral cataract blind patients compared to unilateral cases (table 4).

Similarly, QoL improved greatly in patients with bilateral cataract blindness (table 5).

Table 4: The patients' preoperative and 6-week postoperative VF mean changes

VF changes in cataract blindness	Numbers	Mean $\pm$ SD		
		Preoperative	Postoperative	P value
Bilateral	271	48.16 $\pm$ 3.68	35.03 $\pm$ 4.08	<0.001
Unilateral	156	35.67 $\pm$ 6.54	13.08 $\pm$ 0.34	<0.001
Total	432	43.30 $\pm$ 7.94	30.12 $\pm$ 8.01	<0.001

Table 5: The patients' preoperative and 6-week postoperative QoL mean changes

QoL changes in cataract blindness	Numbers	Mean $\pm$ SD		P value
		Preoperative	Postoperative	
Bilateral	271	44.99 $\pm$ 5.25	25.96 $\pm$ 12.55	<0.001
Unilateral	156	13.13 $\pm$ 4.80	20.47 $\pm$ 11.00	<0.001
Total	432	33.35 $\pm$ 16.17	22.95 $\pm$ 12.40	<0.001

The number of participants who required help post-operatively in self-care, mobility and attending social functions reduced significantly. Table 6

Table 6: Proportion of patients who required help with activities preoperatively and postoperatively.

Subscale activity	% of participants	
	Baseline (preoperative)	6 weeks (postoperative)
SELF CARE		
Bathing	44.0	0.5
Eating	39.1	0.3
Dressing	41.6	0.8
Toileting	47.4	0.2
MOBILITY		
Walking to the neighbors	64.1	1.3
Walking to shop	66.4	1.3
Doing usual household chores	65.0	1.5
SOCIAL		
Wedding, funerals, festivals	64.3	1.4
Meeting with friends and relatives	63.1	1.8

All preoperative and postoperative changes were significant at $p < 0.001$ or more

Discussion

There were more females than males in this study; this was different from previous studies.^{3, 14, 18, 23-24} The difference might be because the female gender has generally been associated with an increased age-adjusted risk of both nuclear cataract and cortical cataract among all races. Furthermore because of the increase in the level of education and different socioeconomic intervention programs of the state government among the females, which have led to an increase in their earning capacity and hence empowered them to take care of their health problems without depending on their husbands.

The age range in this study (40-90 years) was slightly higher than the previous studies in Nigeria.^{14, 18, 22-24} This might be because an increase in awareness of cataract surgery and the good outcome of cataract surgery services offered have led to an increase in the uptake of cataract surgical services. Furthermore, the fact that some of the participants did not know their exact age despite our attempt to situate their approximate birth dates to previous notable events such as the date of independence of Nigeria might be contributory.

The majority of the participants in this study were farmers; this was not a surprise because Adamawa State

is mainly an agrarian society. Interestingly, most of the patients in this study had non-formal education; this was similar to the previous study in Nigeria.^{14, 18}

At the 6-week follow-up, 89 patients did not turn up for assessment. This high rate of default might be because of the non-availability of their relatives to follow them to the hospital or a poor transportation system. It might also be because they were satisfied with their vision. This poor follow-up concurred with the findings of previous studies in Nigeria.^{14, 18, 23-24}

Preoperatively, there was a decrease in all subscales of VF; this was similar to previous reports in Nigeria.^{3, 14, 18, 22-23} The reason might be because poor visual acuity is needed for good visual function. However, there was improvement in VF in all subscales 6 weeks postoperatively. The most affected was the general vision subscale, and the least affected was depth perception. This was similar to previous studies.^{3, 14, 18, 23-24} This might be due to variation in the visual requirements of various activities and the variation in preferences and abilities from one individual to another. Furthermore, the exclusion of patients with coexisting eye morbidity from the study may also explain this improvement.

The QoL of all the participants improved postoperatively

on all the subscales. The changes in subscales of quality of life that were more remarkable were patients' mobility and minimal in social change. This finding is similar to the Nigerian National Blindness Survey³ but different from previous studies.^{14, 18, 23-24} The possible explanations for this finding might be related to the fact that although blind people have difficulty performing mobility-related activities, they are relatively independent in terms of self-care.

The number of participants who required help post-operatively in self-care, mobility, and attending social functions reduced significantly ($p < 0.001$). The cataract-blind patient benefitted from cataract surgery with improvement in visual function (VF) and quality of life (QoL). Such patients live an independent life postoperatively in terms of mobility and self-care and engage in other social activities of the community. These patients are also mentally motivated. The fact that the absence of co-existing ocular morbidities was an exclusion criterion may have contributed to the observed good outcome. This is similar to what was observed by Mozaffarieh et al.²⁷

The limitation of this study is the high number of patients lost to follow-up despite all precautions taken by the researcher. Furthermore, the study was a hospital-based study and hence the result cannot be generalized to population.

From the study, we recommend that the Adamawa State government should employ more eye care workers, especially ophthalmologists; train and retrain ECWs; increase public awareness on the cataract surgical services through media outlets and social media; establish more eye care hospitals in the state; and set up a good referral system in all the general hospitals for easy referral to the main cataract surgical center in Yola. All these will help in reducing the burden of cataract blindness in the state.

Conclusion

There was improvement in the cataract patients' VF and QoL following cataract surgeries performed at the Specialist Hospital Yola. Hence, it is mandatory for surgeons to evaluate the VF and QoL of all cataract patients before and after surgery.

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