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Vision Related Quality of Life of Adult Patients Undergoing Cataract Surgery at A Tertiary Hospital in Dar es Salaam

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Abstract

Background

Cataract is the leading cause of visual impairment in adults, and it is the overall leading cause of blindness worldwide. Health-related quality of life of patients with poor vision due to cataract is reported to be low. Cataract surgery is aimed to restore vision and as a result, is expected to improve visual function and quality of life. The purpose of this study was to determine the visual outcome and changes in the quality of life of patients undergoing cataract surgery at Comprehensive Community-Based Rehabilitation in Tanzania (CCBRT) hospital.

Method

A quantitative prospective longitudinal hospital-based study which recruited 153 adult participants scheduled for cataract surgery at CCBRT hospital was conducted. All patients were interviewed before and two months after surgery using the Visual Function Questionnaire-25(VFQ-25). Pre and post-operative standard visual acuity assessment was done. We analyzed data by the use of SPSS version 23.

Results

One hundred forty-three participants were analyzed. The mean age (SD) was 66.47 ±10.25 years. There was a significant increase in the visual acuity post cataract surgery (p=0.001) with a good outcome of 82% as per WHO criteria. The Quality-of-life assessment was low before surgery, it however significantly improved after surgery (p <0.002) with a 19.3 points increment in overall composite scores. All subscale scores had improved and were statistically significant. Most patients, who had difficulty doing different activities due to poor vision, were able to resume their activities two months after surgery.

Conclusion

Poor vision due to cataract leads to reduced vision-related quality of life. Consequently, patients fail to participate in daily social and economic activities. We have noted a significant improvement in the visual acuity and vision-related quality of life post cataract surgery.

Recommendations

As the population ages, there is an increase in backloading of cataract and hence there is a need to increase cataract surgical uptake and parallelly make the services easily available over the whole country. Since the good outcome of cataract surgery was associated with good quality of life, monitoring of surgical outcomes of cataract should be made regularly and routinely. This will help to identify and address any shortcomings related to visual outcome to improve the quality of cataract surgery and hence the quality of life of patients undergoing cataract surgery.

Keywords: *Visual Outcome, Quality of Life, Cataract Surgery.*

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Introduction

Cataract is the leading cause of visual impairment in adults, and it is the overall leading cause of blindness worldwide (1). In 2014 World Health Organization (WHO) estimated that, there were 95million cases of visual impairment and around 17 million people were blind due to cataract. Cataract blindness constitutes 39% of cases of blindness globally (2) and the majority of patients with un-operated cataract live in low-income countries (3). In some African countries, cataract is responsible for 50% of avoidable blindness (4). In Tanzania blindness due to cataract was reported to be 51% and 67% in Kilimanjaro and Zanzibar respectively (5,6). The burden of blindness and visual impairment due to cataract are expected to increase as the population ages.

Cataract has been reported to negatively affect the quality of life of an individual (7)**.** This is largely since visual impairment and blindness caused by cataract are associated with increased difficulties in daily social and economic activities, increased depression, social isolation, increased risk of falls and fractures, poor general heath, lower social status and increased mortality (7). Management of cataract is mainly surgical removal of the opacified crystalline lens with implantation of the artificial intraocular lens (3). Currently, Phacoemulsification and Manual Small Incision Cataract Surgery (MSICS) are the commonly employed techniques during cataract surgery (3).

The goal of cataract extraction is to restore vision which will improve performance in daily living activities (8). To be effective and to attain this goal, evaluation of surgical outcomes is mandatory (9). Cataract surgery outcome has been commonly evaluated objectively by assessing changes in the visual acuity (10) with little emphasis on the patient's feelings on his or her well-being and reduced limitations on performing daily activities (11). These subjectively reported changes following cataract surgery are also vital and have an influence on the quality of life of an individual (3,12). Recently, however, there has been an increased use of patient-reported outcomes as an additional measure of surgical outcome following cataract surgery. It has also been recommended by WHO that, vision-related quality of life (VRQoL) be part of the assessment and evaluation of interventions in eye health (13, 14). Different tools have been developed to directly measure and quantify the subjective outcome of cataract surgery. VFQ-25 is a validated tool and has been used in different countries including Ghana (4) and was adopted and used in this study due to its reliability and reproducibility.

Several studies have been conducted that have shown significant improvement in clinical, functional and perceived vision as well as significantly improvement in the vision- related quality of life (VRQoL) (17). However, majority of these studies have been conducted in developed countries where visual impairment before cataract surgery is less severe and social circumstances differ considerably from low-income countries (7). In our locality, the impact of cataract surgery on different domains of the quality-of-life measures has rarely been done and therefore, less is known on this aspect. Hence, we conducted this study to evaluate both, visual outcomes and quality of life changes from patients' perspectives. This study evaluated the visual outcome of cataract surgery in terms of gain in vision-related quality of life of patients before and after cataract surgery at CCBRT hospital in Dar es Salaam.

Methodology

Study design

A quantitative prospective longitudinal hospital-based study was conducted for a period of six months from November 2019 to February 2020.

Study setting

The study was conducted at a Comprehensive Community-Based Rehabilitation in Tanzania (CCBRT) hospital situated in Dar es Salaam city. Data were collected at the eye clinic which has an average of 62,000 consultations and about 3,000 cases of cataract surgeries per year.

Study population

All patients diagnosed with pre-senile and senile cataract attending eye clinic and scheduled for cataract surgery during the study period were eligible for the study. Patients with a diagnosis of psychological disorders and wheelchair-bound (due to other systemic co-morbidity) were excluded from the study.

Sampling and sample size

The formula for matched samples was used to estimate the sample size. A consecutive sampling technique was used to select 153 study participants (Fig 1). Patients were recruited after diagnosis and scheduled for surgery within two weeks or during their waiting time when patients are in the preparation room for surgery and before the pupil is dilated.

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The second interview was done two months after cataract surgery during the patient follow-up visits

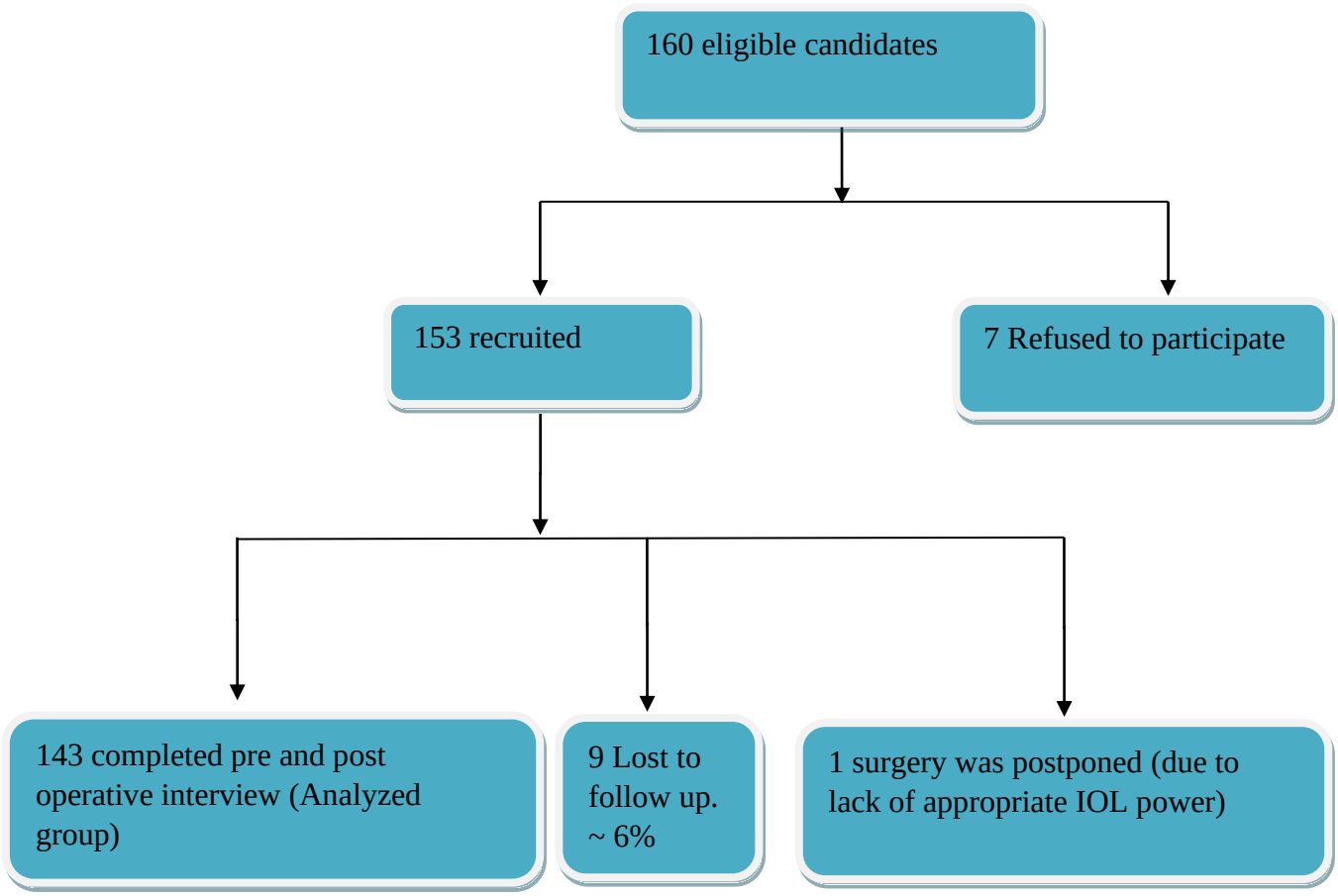

Figure 1. Flow diagram of study participants

Data collection

Adult patients diagnosed by ophthalmologists to have senile cataract and scheduled for cataract surgery were requested to participate. Patients were examined for visual acuity, intraocular pressure, slit lamp biomicroscopy and dilated fundus examination for those with visible retina. B-scan sonography was done to patients with dense cataract obscuring retina visualization.

Those who consented were interviewed to collect demographic and baseline information. A VFQ-25 questionnaire was then administered to all participants. This tool has 12 subscales which are general health, general vision, ocular pain, near vision activities, distance vision activities, social function, mental health, role limitations, dependency, driving, colour vision

and peripheral vision. VFQ-25 has been tested and validated with Rasch analysis and has been found to have strong internal homogeneity. Cronbach's α for the overall scale ranges between 0.89 to 0.97 and subscales range from 0.78 to 0.94 in different studies (15,30). The basis and design of this questionnaire is freely available online (15).

Participants were interviewed two weeks before surgery and two months after surgery. The two months was chosen as a reasonable period since most participants are expected to have recovered from discomforts due to surgery and have attained stable refractive status. Presenting visual acuity, corrected distance visual acuity (CDVA) of the operated eye (here defined as vision of the operated eye after refraction) and best corrected visual acuity (BCVA), (which in this context is referred to best vision a patient has after refraction regardless of which eye has been operated) were recorded before and after surgery.

Patients were categorized in terms of visual impairment according to WHO criteria that is, BCVA of 6/18 or higher was regarded as normal, while visual acuity less than 6/18 to 6/60 was moderate visual impairment. BCVA less than 6/60 to 3/60 is regarded as severe visual impairment and less than 3/60 is regarded as blind.

Data analysis and management

Statistical package for social sciences (SPSS) version 23.0 (31) was used to analyze the data. Continuous variables were expressed as mean ± standard deviation (M ±SD) (at 95% confidence interval). The statistical test (t-test) of the paired samples was used to compare data (mean) before and after surgery for participants who completed both assessments. A Chi-square test was used to compare proportions. A p-value less than 0.05 ($p< 0.05$) was regarded to be statistically significant.

Ethical consideration

Ethical approval was granted by the Ethics and Research Committee of Muhimbili University of Health and Allied Sciences (MUHAS). Permission to conduct the study was sought from CCBRT Hospital management. Participants were free to discontinue from the study at any stage without affecting their plan of management. There was no added benefit for participation in this study, neither any harm nor delay of treatment was caused as a result of participation. Informed consent was obtained before each participant was recruited for the study. Privacy and confidentiality were maintained throughout, and data was used for the study purposes only.

Results

Majority, 112 (78.3%) of the participants were aged 60 years and above with overall mean age and standard deviation of 66.47 ±10.25 years. There were more PHACO surgeries done, 64.3% compared to SICS and 62.2% of participants were operated on the first eye. Few participants (16.8%) had some form of ocular co-morbidities with glaucoma being the leading ocular co-morbidity (Table 1).

Table 1: Socio-demographic and baseline characteristics of the study population (n=143)

Characteristics		Frequency	%
Sex	Male	72	**50.3**
	female	71	49.7
Age group	40-49	11	7.7
	50-59	20	14.0
	60+	**112**	**78.3**
Occupation	Employed	17	11.9
	Self-employed/business	20	14.0
	Peasant	41	28.7
	Un employed	21	14.7
	Retired	**44**	**30.8**
Education	No formal education	27	18.9
	Primary	**53**	**37.1**
	Secondary	42	29.4
	College/university	21	14.7
Living status	Living alone	7	4.9
	Living with other people	**136**	**95.1**
Ocular co-morbidity	Glaucoma	12	8.4
	Diabetic Retinopathy	8	5.6
	Optic neuropathy/ atrophy	2	1.4
	Maculopathy	2	1.4
	No ocular commobidity	**119**	**83.2**
Type of surgery	**PHACO**	**92**	**64.3**
	MSICS	51	35.7
First or Second eye	**First eye**	**89**	**62.2**
	Second eye	54	37.8

Before surgery about half of the participants had visual impairment (visual acuity less than 6/18 on the better eye). This proportion significantly reduced to 13.3% after surgery, p-value 0.001 (figure 2). Note that, the significant proportion of participants (49.0%) with normal Best

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Corrected Visual Acuity (BCVA) noted before surgery is because most of these had cataract surgery in the first eye before and they were to undergo surgery for the second eye.

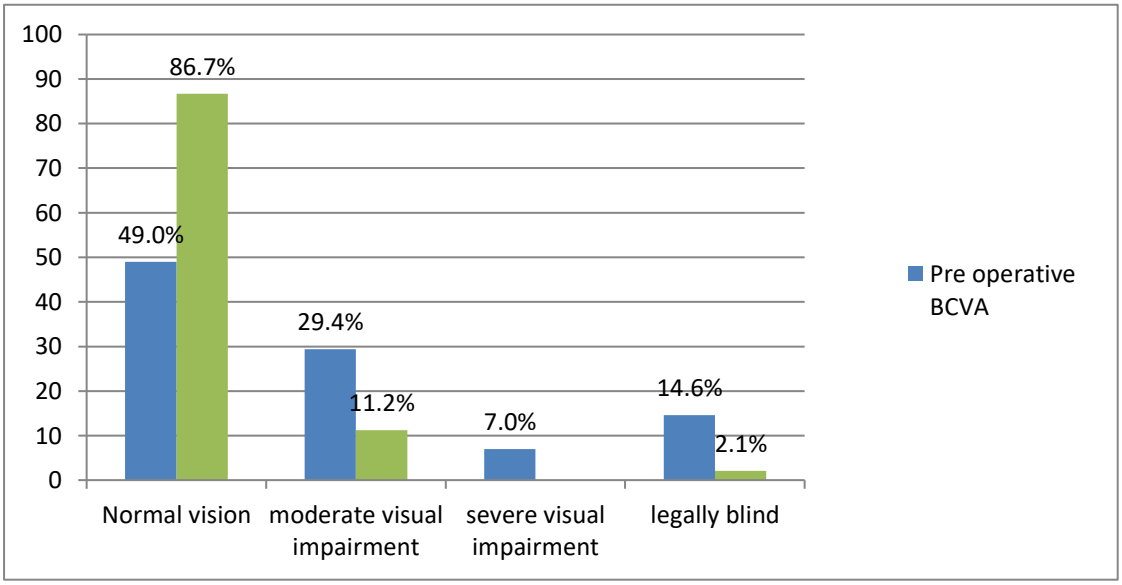

Figure 2. Pre-operative and two months post-operative best corrected visual acuity distribution of the participants (WHO criteria) (N= 143)

There was a statistically significant improvement on the corrected distance visual acuity (CDVA) on operated eyes following cataract surgery (p-value 0.001 paired sample statistics). (Figure 3).

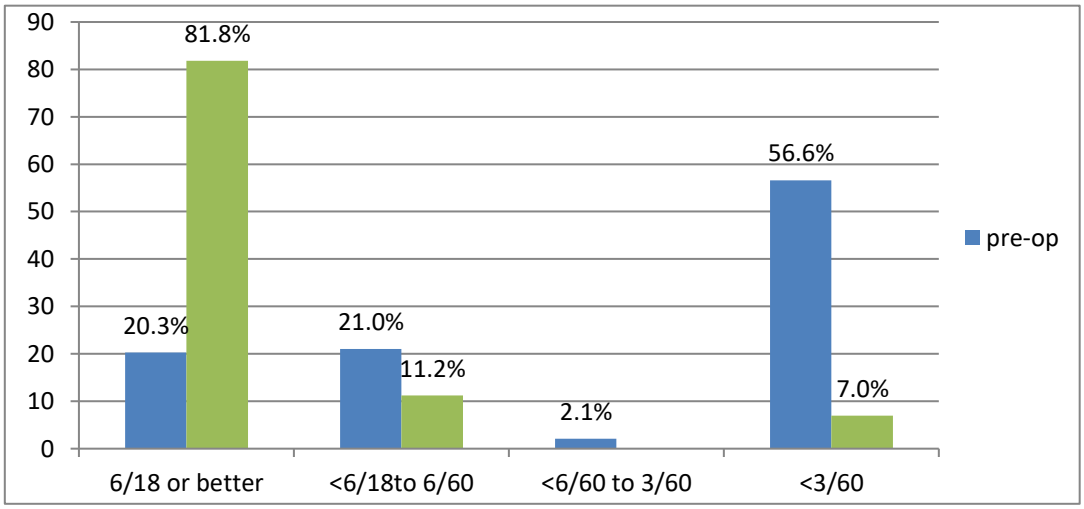

Figure 3. CDVA distribution of the operated eye, before surgery and 2 months after cataract surgery (N=143)

CDVA= corrected distance visual acuity

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The majority (81.8%) of the study participants had a good outcome of cataract surgery (figure 4).

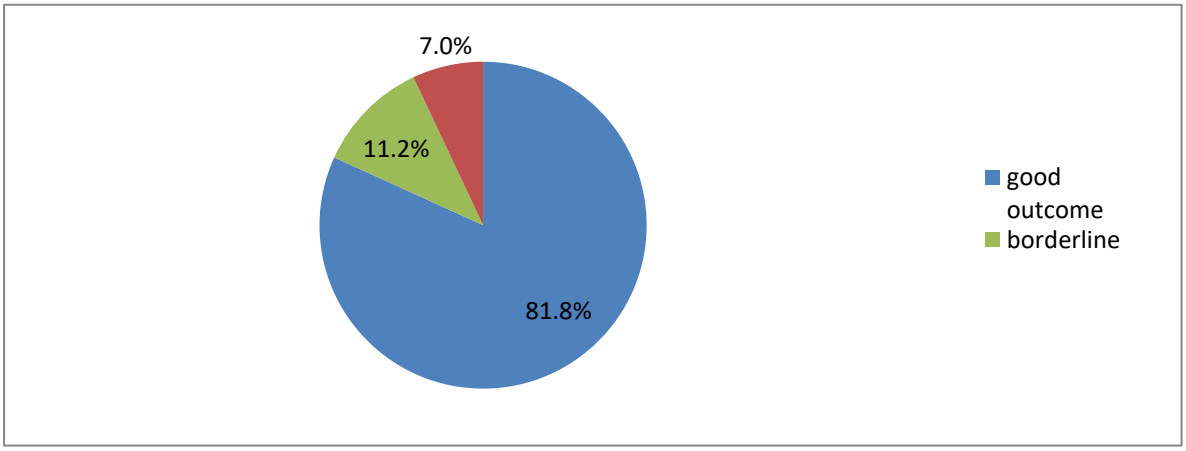

Figure 4. Visual outcome of operated eyes, according to WHO categorization

There was statistically significant improvement in both overall and all subscale Vision Related Quality of Life (VRQOL) scores post operatively with near activities showing the most significant change (Table 2).

Table 2: Pre-operative and 2-Months post-operative VFQ-25 Scores (N=143)

VFQ-25	Pre-operative)	2-Months post-operative	Mean change	*p-value*
Overall score	69.23	88.61	19.38	0.002
General Health	47.03	56.47	9.44	< 0.001
General vision	51.89	75.24	**23.35**	< 0.001
Ocular pain	74.56	82.08	7.52	< 0.001
Near activities	60.26	86.27	**26.01**	< 0.001
Distance activities	70.63	93.36	**22.73**	< 0.001
Social functioning	74.65	94.58	19.93	< 0.001
Mental health	68.53	84.53	16.00	< 0.001
Role difficulties	62.85	85.92	**23.07**	< 0.001
Dependency	72.55	87.82	15.27	< 0.001
Driving	76.47	94.55	18.08	0.002
Colour vision	80.07	95.63	15.5	< 0.001
Peripheral vision	69.23	80.56	**24.23**	< 0.001

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Discussion

This study aimed at assessing vision-related quality of life of cataract patients before and after cataract surgery. Males and females equally have access to participate in cataract surgery different from what has been found in many parts of Africa, which showed male predominance (18). Although women have a slightly increased age-adjusted risk of cataract, in the past, they did not receive cataract surgery at the same rate as men due to barriers women suffered to access eye health including family social responsibilities, financial constraints, culture and beliefs (19). Also, the finding of an equal number in this study may reflect our population profile which has more females than males resulting in an increased number of women participating in cataract surgery. Increased coverage of national health insurance has also reduced an economic barrier and hence women can equally access eye health services. Trivedy et al found female predominance in patients treated for cataract surgery (20).

The results show that majority of the participants were aged 60 years with a mean age of 66.4years. This is the age when the senile cataract is common as its prevalence increases as one ages. Similar age range have also been reported in different parts of Africa (21) and Asia (22).

Cataract surgery aims to improve vision that was compromised by the presence of cataract. In our study, we noted that the majority of the participants had good visual outcome post cataract surgery. Similar results were found in UK National Cataract Surgery Survey which reported nearly the same rate of good outcomes (above 80% good outcome), but theoretically, their outcome is likely to be higher than this study keeping in mind that, the UK has sharpened the cut-off point for a good outcome to visual acuity of 6/12 as compared to 6/18 for the WHO criterion used in this study (23). Sudhir et al similarly found approximately the same rate of good outcomes in India (24). However, many developing countries report low rates of good outcome of cataract surgery. Amedo et al (2016) in Ghana reported a 30% good outcome (4) which is much lower compared to our study.

The rate of poor visual outcomes varies from place to place across the world (8). In our study, 7% had a poor visual outcome on the operated eye two months after surgery. The majority of those eyes had pre-operative ocular co-morbidities like glaucoma, diabetic retinopathy, and optic neuropathy or atrophy. These patients were well counselled before surgery on the probable poor visual prognosis. The remaining one-third of those with poor

outcomes developed intra-operative complications. A similar rate of poor visual outcome in our study has been reported in other studies (15, 20). On the contrary, Amedo et al in Ghana (4) reported a high rate of poor outcomes of 18%. Recent population-based reports from several developing countries had shown that 11-23% of people who have had cataract surgery have poor outcomes (25) Sudhir et al in India, reported a lower poor outcome of only 1.92% (24). Similarly, ocular co-morbidities have been widely documented as among the factors affecting postoperative visual acuity.

People with poor vision are reported to have a low perceived quality of life because they experience considerable difficulties while performing many self-care activities. In this study, we have found that BCVA in the better eye is the strongest factor that determined the changes in the VRQOL after surgery. Similar findings have been reported by Zhu M et al (26). This can be explained by the fact that visual acuity improvement leads to improved participant ability to perform daily activities, enhanced social interactions, comfortable walking, psychological rebuild up, reduced risk of fall as well as other parameters which in general define the life quality. It is therefore likely that the improvement in visual acuity after surgery had positive impacts on the daily lives of the patients by enabling them to resume their daily activities, especially those activities which mostly depend on vision. Our participants showed higher changes in scores before and after surgery reporting that they could see colours better, live more independently, could see farther than before and perform roles as required. However, Acosta-Rojas[27] and Dattas S (28) have reported that visual acuity has weak association with predicting the changes in the vision-related quality of life as compared to contrast sensitivity.

Vision Related Quality of Life (VRQOL) score was assessed pre and post-cataract surgery and there was a significant improvement in the overall score as well as subscale scores. Studies have documented that, a six-point change in composite score signifies a difference (29) while in this study, we have observed an overall composite score improvement by 19.38 points post-surgery and was statistically significant (p=0.002). Most participants were able to resume their daily activities, such as near-work activities including reading, sewing and different office works, comfortable walking and hence attending to working areas outside their home. Participants who had pre-operative difficulties in social functioning in terms of ability to attend social gatherings, and visit friends and relatives were happily able to do so following vision restoration. The reduction in these limitations shown in this study suggests that, measures should be taken to sensitize and educate people on the impact of cataract-

related visual impairment, and that people might resume their daily activities upon visual restoration. Similar to our findings, Amedo et al (2016) has reported that all participants who failed to do their daily activities because of poor vision due to cataract were able to do so after surgery (4). Other studies that have been done to evaluate change in the quality of life have also shown similar findings (16).

Conclusion and Recommendations

Poor vision due to cataract leads to reduced vision-related quality of life and failure to participate in daily social and economic activities. Cataract surgery has shown to significantly improve visual acuity which consequently has an impact on the participant's ability to perform their daily activities and overall improvement in their quality of life. It is therefore important to ensure that most patients with cataract have access to high-quality surgery to improve their quality of life. Additionally, regular and routine monitoring of cataract surgical outcomes need to be made mandatory in every facility that is providing cataract surgery services to improve the quality of cataract surgery in the country.

Study Limitations

Among the shortcoming of this study is that it was difficult to exactly quantify the responses due to the subjective nature of the information, because the same extent of poor vision might have different impacts on two different persons and they can express the different extent of limitation in their activities depending on the need for each. In addition, the assessment of the cognitive ability of participants before the study was beyond the scope of this study, and this is a well-known confounder in research among the elderly populations.

Loss to follow-up of the patients was expected because many patients with good vision without any complications pay little attention on follow-up clinics. Counselling was done on the importance of completing the second interview. Phone numbers of the patients or relatives were noted and communications were done as appropriate. With all measures taken, still 6% of the study participants had lost to follow up.

Financial and non-financial competing interests

The authors have no competing interest in any materials mentioned in this article.

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Authors' contribution

KR working as a principal author, responsible with conceptualization framework, proposal development, data collection, data analysis and manuscript writing. CM, AJS, SM, JK, MMM supervisors who worked tirelessly with great contributions on proposal development and manuscript formation. CN had significant contributions during manuscript writing.

Abbreviations

BCVA	Best Corrected Visual Acuity
CCBRT	Comprehensive Community Based Rehabilitations in Tanzania
CDVA	Corrected distance visual acuity
MSICS	Manual Small Incision Cataract Surgery
MUHAS	Muhimbili University of Health and Allied Sciences
PHACO	Phacoemulsification
SICS	Small Incision Cataract Surgery
VFQ	Visual Function Questionnaire
VRQoL	Vision Related Quality of Life
WHO	World Health Organization

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