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RESEARCH ARTICLE

POST OPERATIVE VISUAL OUTCOMES AND COMPLICATIONS OF CATARACT SURGERY AT BORUMEDA HOSPITAL, NORTHEAST ETHIOPIA: RETROSPECTIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction: Cataract is the leading cause of blindness globally, particularly in developing countries. Cataract surgery with implantation of an intraocular lens is a sophisticated technological procedure. Despite improvements in cataract surgical services in many parts of the world, cataract remains responsible for half of the global blindness burden.

Objective: The aim of this study was to determine the visual outcomes and complications of patients who had cataract surgery at Borumeda hospital, Northeast Ethiopia.

Method: A facility-based retrospective cross-sectional study was employed. The data was collected from 306 cataract operated patient cards and systematic random sampling technique was used to select the patient cards. The data collection tool was adopted from WHO guidelines for monitoring the outcome of cataract surgery. The data was entered and analyzed by using SPSS version 20. Descriptive statistics were used to describe socio-demographic characteristics, postoperative cataract surgery visual outcomes, intra and postoperative complications. The result was displayed in text, table and different form of graphs.

Result: The findings of this study had shown that out of the study participants examined after one day, five weeks and six weeks of surgery 19.3%, 43.6% and 49.3% of patients had good visual acuity and had successful surgical outcome respectively. From all study participants undergoing cataract surgery 2.9% had developed complications.

Conclusion: The result of this study had shown that from all study participants after 6 weeks of cataract surgery, half of them had no good visual acuity. Out of all 306 study participants 2.9% of them had complication of cataract surgery. Therefore recommendations forwarded for health care personnel's, academic higher education s', researchers, family members and friends to improve outcome of cataract surgery and to prevent post operative complications.

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INTRODUCTION

Cataract is the opacification of the eye's natural lens and can develop in a few months or take several years (COSCSCPG, 2008). Cataract surgery is a removal of an opaque lens and replacement with an artificial intraocular lens implantation and rates of this surgery are likely to continue increasing as access improves in developing countries (Schein et al., 2012). Cataract is the leading cause of blindness globally, particularly in developing countries. It accounts for 51% of 39 million blind people worldwide (WHO, 2012).

China not only possesses the largest population in the world but also the largest with cataract estimated 2.5 million with cataract and incidence of 400 thousand per year (Pascolini et al., 2012). In the Caribbean, non-operated cataract is the most prevalent cause of blindness (WHO, 2000). According to the Barbados eye studies, visual impairment occurs in 12% of the people 40–84 years old and 3% suffer from severe visual impairment. Furthermore, age-related cataract alongside open-angle glaucoma (OAG) accounts for 73.2% of blindness (Leske et al., 2010). The prevalence of blindness in Ethiopia is 1.6%; there are 6 million people with blindness of all causes and 3.7 million people with low vision. Cataract and trachoma account for more than 60% of all blindness (FDRE Ministry of Health, 2010). Poor surgical outcomes and inadequate access to surgery are major impediments to the reduction of blindness from cataract, particularly in low-resource settings

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(Zhao *et al.*, 2010). Poor transportation of infrastructure, costs to patients and failure to communicate the benefits of returning contribute to low cataract surgery coverage and outcome (Huang *et al.*, 2012). In developing countries, difficulties in accessing eye care both due to individual and environmental factors as well problematic set up by the health system itself restrict the full utilization of the surgical procedure (Ellwein *et al.*, 1995). Study conducted in Trinidad and Tobago shown that upon first visit to the clinic, preoperative VA showed that 114 eyes (22%) had good VA, 140 eyes (27%) had borderline VA and 271 eyes (51%) had poor VA. Post-operative cataract VA resulted in 350 eyes (67%) having good VA, 110 eyes (21%) borderline VA and 65 eyes (12%) poor VA (Sonron E-a *et al.*, 2015). Study conducted in Gondar showed that of 218 cataract-operated visually impaired eyes (<6/60), 26.6% of them achieved good visual acuity ($\geq 6/18$), 28.9% of them had borderline acuity (<6/18–6/60), and the remaining of 44.5% were remained as poor visual acuity (<6/60) (Hussen *et al.*, 2017).

Different studies documented that presence of intra-operative and post-operative cataract surgery complications. Study done in Nepal shows that intra-operative and post-operative surgical complications were extremely low at both settings 8 of 221 (3.62%) at the base hospital and 3 of 224 (1.34%) at surgical eye camps. Capsule rupture with vitreous loss occurred in 2 cases and capsule rupture without vitreous loss in one case at the hospital whereas it was one each at the surgical camps. One case at the hospital group found retinal detachment on 4-6 weeks of follow-up (Bhatta *et al.*, 2011). Study conducted in Ghana shows that early surgical complications occurred in 130 (10.1%) eyes. The most common early post operative complication that occurred in 44 (3.4%) eyes was cornea edema. Hyphema was the second most common early complication which occurred in 28(2.2%) eyes. Late surgical complications occurred in 36 (2.8%) eyes with posterior capsule opacification as the most common late surgical which occurred in 18 eyes (1.4%). Following posterior capsule opacification was vitreous loss which occurred in 6 (0.5%) eyes (Ilechie *et al.*, 2012). Study conducted in Jimma shows that out of the 200 eyes operated, 182 (91%) were completed without significant intra-operative complications. However, the most frequent complication encountered was posterior capsular rupture which occurred in 10 eyes (5%). The commonest immediate postoperative complication was striate keratopathy (Addisu *et al.*, 2011). HSDP III is aimed to increase the cataract surgical rate (CSR) from 350 to 600 per million populations per year and further importance of eye health services (FDRE Ministry of Health, 2010), limited information is documented about the cataract surgery outcome in Northeast Ethiopia particularly in the study area. Therefore, the purpose of this study is to assess cataract surgery outcome in Borumeda hospital, Northeast Ethiopia.

Objectives

- To assess post operative visual outcomes of cataract surgery at Borumeda hospital
- To assess the complications of cataract surgery at Borumeda hospital

METHODS AND MATERIALS

Study area: This study was conducted in Borumeda hospital, South Wollo Zone, Amhara regional government. Borumeda

hospital is situated 410 Km and 10 Km from Addis Ababa and Dessie (capital town of south Wollo zone) respectively. Borumeda hospital served people found in South Wollo zone, North Wollo zone, Oromia special zone, Waguhumira zone, Afar region and South Tigray zone.

Study design and data collection period: Institution-based retrospective cross-sectional study was employed from September 4 to October 3, 2018.

Study population: Patients aged 5 years and above who underwent cataract surgery from September 2017 to August 2017

Inclusion criteria: Patients who had cataract surgery and only had cataract without concomitant ocular diseases were included in actual study.

Exclusion criteria: Patients who had concomitant ocular disease like DM, Glaucoma and Corneal Opacity etc were excluded in actual study.

Sample size determination: The sample size was calculated by using estimation of single proportion formula as follows: By considering 44.5% proportion of poor visual outcome in Gondar previous study (Hussen *et al.*, 2017), 95% confidence level ($Z=1.96$); 5% marginal error ($d=0.05$). Based on this assumption, the sample size for the study was 380. Since the study population is less than 10,000 we used population correction formula, we got 306.

Sampling technique: Systematic random sampling technique was used to capture the study participants. The medical record book was taken as a sampling frame. The K value was determined by dividing $N/n = 1578/306=5$, Where $N=1578$, the number of patients who had conducted cataract surgery from September 2017 to August 2017 and n =the total sample size (306). The first patient record was selected by lottery method and the next patient record was obtained every 5th interval.

Operational definition and terms

- **Visual acuity:** a measure of ability of eye to distinguish shapes and the details of objects at a given distance.
- **6/6**—ability to see letters of a given size at 6 meter
- **6/9**--- what a normal person can see at 9 meter distance this person can see at 6 meter distance
- **6/18**--what a normal person can see at 18 meter distance this person can see at 6 meter distance
- **6/60**--what a normal person can see at 60 meter distance this person can see at 6 meter distance
- **Good visual acuity:** After cataract surgery and following the final follow up a patient who scored (6/6–6/18) were considered as good visual acuity.
- **Borderline visual acuity:** After cataract surgery and following the final follow up a patient who scored (<6/18–6/60) were considered as borderline visual acuity.
- **Poor visual acuity:** After cataract surgery and following the final follow up a patient who scored (<6/60) were considered as poor visual acuity.

Data collection method: The data collection tool was adapted from WHO guidelines for monitoring the outcome of cataract surgery. The adapted questionnaire is modified and contextualized to fit the local situation and the research objective. The data was collected retrospectively by referring medical records through structured questionnaires. The pre-testing was conducted in 5% of the sample size of patients' card in Dessie referral hospital who had done cataract surgery in campaign. During pre-testing an effort was made to check for consistency in the interpretation of questions and to identify ambiguous items. After review of the instruments all suggested revisions were made before the actual study.

Data quality assurance: Training was given for data collectors to ensure the completeness and consistency of information during data collection. The questionnaire was pre-tested before data collection. The supervisors were made a thorough check and in the mean time they were randomly select the questionnaire to cross check its completeness and errors on spot was corrected and there was meeting at the end of data collection time for discussion every day.

Data processing and analysis: Data was entered in to epidata and export to SPSS Version 23 for analysis. Data cleaning was performed by running simple frequency. Descriptive statistics were used to describe socio-demographic characteristics of the study participants, intra and postoperative complication and the cataract postoperative visual outcome. Results were displayed in text, table and graphs.

Ethical Consideration: Ethical clearance was taken from Wollo University, school of nursing and midwifery, department of adult health nursing research committee. Official letter was written to Borumeda hospital from department of adult health nursing. Anonymous data was taken and the confidentiality of participant's information was secured.

RESULTS

Socio demographic characteristics: Out of the total sample size (306) cataract patients undergoing surgery 144(47.1 %) of them were females and 162 (52.9 %) were males. The mean age of respondents was 59.4 years with standard deviation of ± 15.3 . From all study participants 100 (32.7%) of them were within age 61-70 years. Out of the total study participants 158(51.6%) of them were came from urban and the remaining 48.4 % of them were came from rural areas of the population. From all study subjects who came to Borumeda hospital for treatment of ocular disorders 301 (98.4%) of them came from the Amhara region (Table 1).

Preoperative visual conditions of study participants: The findings of this study had shown that out of all 306 study participants, 121(39.5%) of patients visualizes only light perception, 145 (47.4%) of them were came by cataract with visualize of hand movement and 40(13.1%) of them came for cataract surgery with able to count finger through visualization.

Post operative visual status: All of surgical technique were SICS with IOL and all were done through local anesthesia. The findings of this study had shown that out of all 306 study participants, 59(19.3%) of patients had good visual acuity and had successful surgical outcome, 19 (6.2%) of them had border

line visual acuity and 228(74.5%) of them had poor visual acuity at day one. Among 172 study participants examined after 5 weeks of cataract surgery 75(43.6%) of patients had good visual acuity and had successful surgical outcome, 12(7%) of them had border line visual acuity and 85(49.4%) of them had poor visual acuity. Among all 67 patients examined after 6 weeks of cataract surgery at Borumeda hospital 33 (49.3%) of them had good visual acuity and had successful surgical outcome, 8 (11.9%) of them had border line visual acuity and 26(38.8%) of them had poor visual acuity.

Cataract surgery intra and Post operative complications: From all 306 study participants undergoing cataract surgery 9 patients (2.9%) had developed complications, out of them 4(1.3%) of participants had developed corneal edema and 5(1.6%) of them had developed other ocular complications. The study had shown that there were no any intra-operative complications from 306 cataract surgeries.

DISCUSSION

This study was conducted with the intention to determine the visual outcome and post operative complications of patients who had cataract surgery at Borumeda hospital. All of surgical technique were SICS (Small Incision Cataract Surgery) with IOL and all were done through local anesthesia. But the study conducted in Ghana revealed that SICS with intraocular lens implant (83.8%) was the major surgical technique (Ilechie *et al.*, 2012) and study conducted in Western Nigeria showed that the commonest type of surgery performed was ECCE (51.9%) cases (Isawumi *et al.*, 2009). These differences might be due to the presence of variation of cataract surgery protocol across different countries. Among all 306 patients examined after one day surgery at Borumeda hospital for surgical treatment of cataract 59 (19.3%) of them had good visual acuity and had successful surgical outcome, 19 (6.2%) of them had border line visual acuity and 228 (74.5%) of them had poor visual acuity.

This indicates a need of eye care by different disciplines of health care providers post operatively in order to get good visual outcomes. Among all 67 patients examined after 6 weeks of surgery at Borumeda hospital for surgical treatment of cataract 33 (49.3%) of them had good visual acuity and had successful surgical outcome, 8 (11.9%) of them had border line visual acuity and 26 (38.8%) of them had poor visual acuity. But the study conducted among the following countries had shown in the following way, Good visual acuity in china 906(64%), India 334(71%), Vietnam 218(62%), Indonesia 95(50%), Latin America 471(68%) and Africa 174 (58%). Borderline outcome (<6/18–6/60) in china 446(31%), India 115(24%), Vietnam 55(16%), Indonesia 39 (21%), Latin America 160(23%) and Africa 82(27%). The poor outcome (<6/60) in china 74(5%), India 24(5%), Vietnam 78(22%), Indonesia 55(29%), Latin America 59(9%) and Africa 45(15%) (Congdon *et al.*, 2013). This might be due to difference in countries economic status of the population, sample size, place of the study conducted and health service coverage of the countries. This is the fact that if the study was conducted in advanced and specialized hospital, there might have sophisticated materials which increases successful surgical outcome. In other point of view if the study hospital was specialized there might be presence of advanced and specialized health care professionals which has great contribution for successful outcome. Study conducted in Gondar documented that of 218 cataract-operated visually impaired eyes (<6/60), 26.6% of them achieved good visual acuity ($\geq 6/18$), 28.9% of them had borderline acuity (<6/18–6/60) and the remaining 44.5% were remained as poor visual

Table 1. Socio-demographic characteristics of study participants in Borumeda hospital (n=306)

Variables	Category	Frequency	Percent
Sex	Female	144	47.1
	Male	162	52.9
Age	≤20	10	3.3
	21-30	13	4.2
	31-40	11	3.6
	41-50	45	14.7
	51-60	79	25.8
	61-70	100	32.7
	71-80	42	13.7
Ethnicity	>80	6	2
	Amhara	301	98.4
Resident	Others	5	1.6
	Urban	158	51.6
	Rural	148	48.4

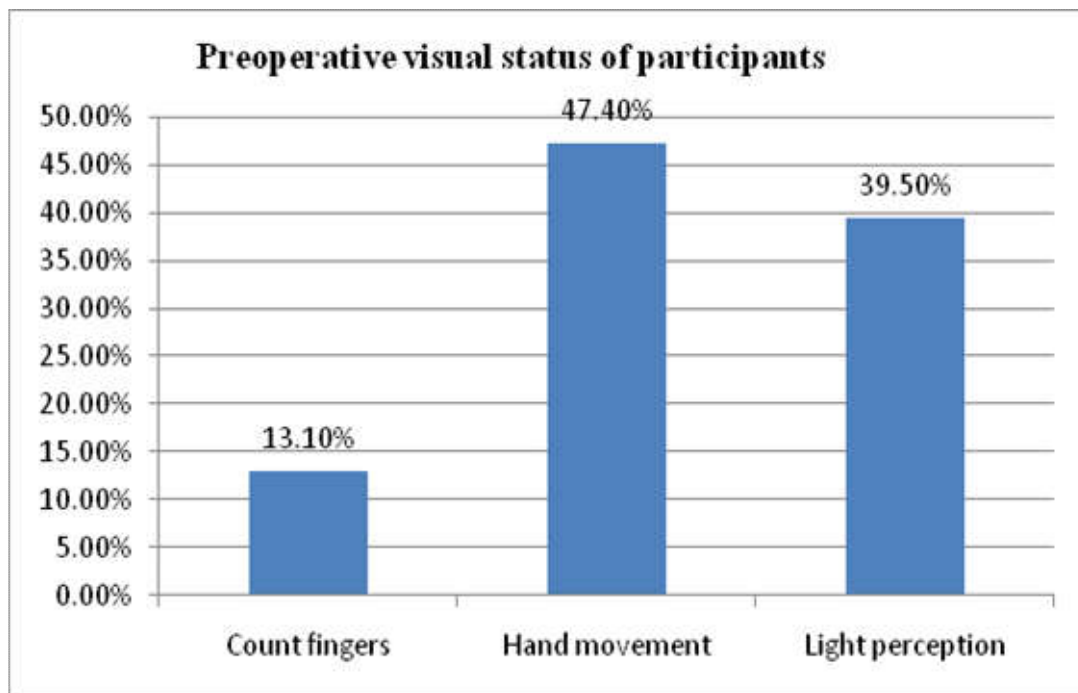


Figure 1. Preoperative visual status of participants in Borumeda hospital eye clinic (n=306)

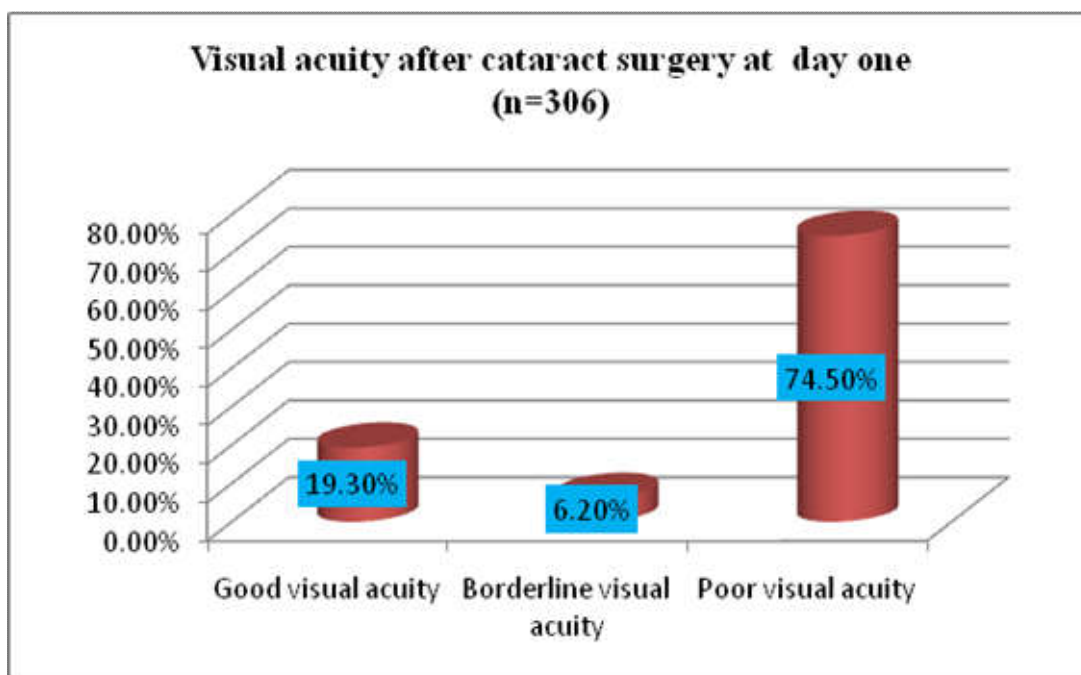


Figure 2. Post-operative visual status of participants in Borumeda hospital at day one (n=306)

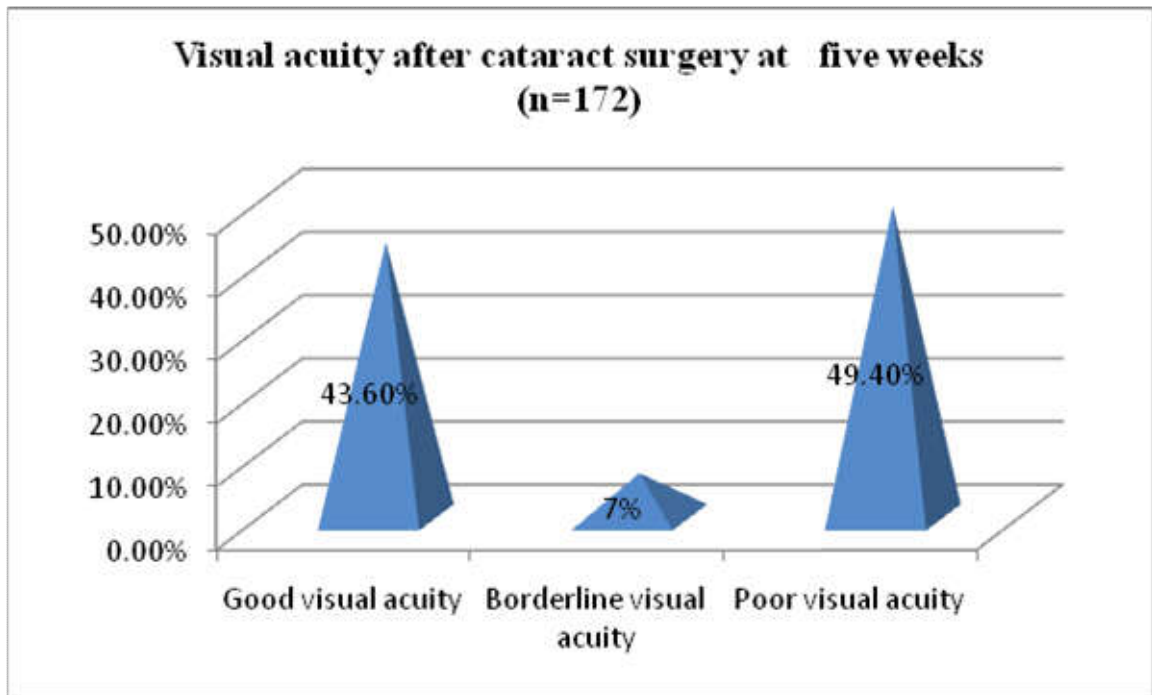


Figure 3. Post-operative visual status of participants in Borumeda hospital eye clinic at week five [n=172]

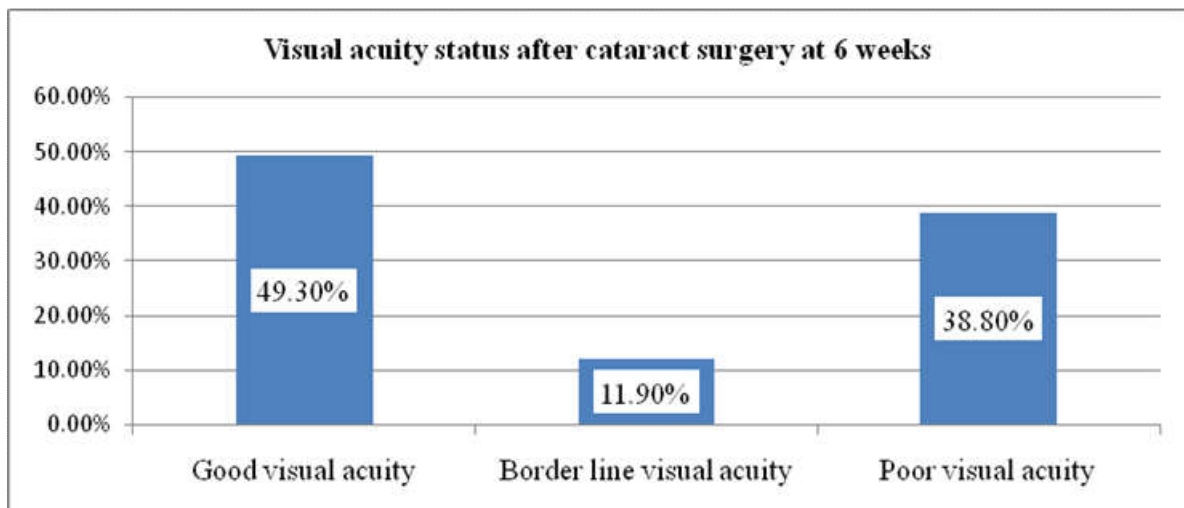


Figure 4. Post operative visual status of participants in Borumeda hospital eye clinic at week six (n=67)

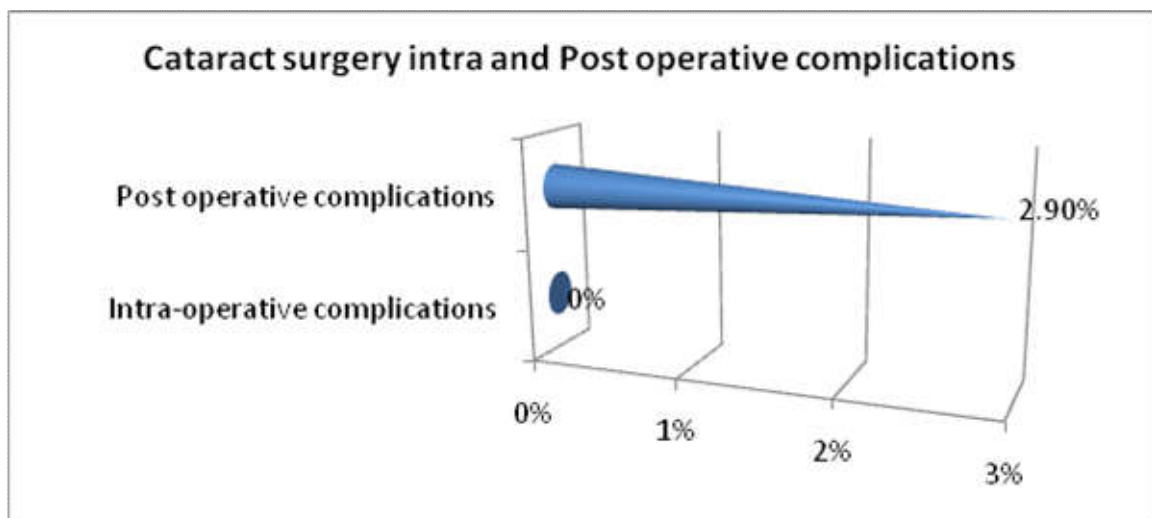


Figure 5. Intra and post operative cataract surgery complications of participants in Borumeda hospital (n=306)

acuity (<6/60) (Hussen *et al.*, 2017). This result was lower than our study result with regard to good visual acuity. This might be due difference in sample size, year of study conducted and presence or absence of advanced materials and advanced health care professionals. The findings of this study had shown that out of all 306 study participants 9(2.9%) of them had complication of cataract surgery, out of them 4(1.3%) had corneal edema and the remaining 5(1.6%) patients had other ocular complications of cataract surgery. Study in Ghana had shown that, the most common early post operative complication that occurred in (3.4%) eyes was cornea edema (Ilechie *et al.*, 2012). Study conducted in Jimma revealed that out of the 200 eyes operated, 182 (91%) were completed without significant intra-operative complications and the remaining 9% of patients face ocular complications (Addisu *et al.*, 2011). This might be due difference in year of study conducted, presence of advanced equipments and specialized professionals in various study area.

Strength of study: There was no respondent error since retrospective cross sectional study design through reviewing previously documented data.

Limitations of study: The possible limitation of this study could be analysis of the study was not completed on the predetermined time plan due to different factors. The authors did not assess factors which affect post-operative visual outcomes of cataract surgery.

Conclusion and Recommendation

The findings of this study had shown that half of the study participants (50.7%) had border line and poor visual acuity together. Out of all study participants 2.9% of them had complication of cataract surgery. Therefore the following recommendations forwarded for the respected responsible bodies.

- Health care personnel must increase patient's awareness toward the importance of early cataract identification and surgical management for cataract disorders.
- All academic higher education and health institutions should work on giving emphasis to different ocular diseases.
- The society particularly family members and friends should support and encourage those patients with cataract to undergo cataract surgery to return their vision.
- Research should be carried out to investigate the outcome of cataract surgery in broader social context.

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Conflicts of Interest: The authors declare that they have no competing interests.

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Abbreviations- CSR: Cataract Surgical Rate; DM: Diabetes mellitus; ECCE: Extra Capsular Cataract Extraction; HSDP: Health Sector Development Program; ICCE: Intra Ocular Cataract Extraction; IOL: Intra Ocular Lens Implantation; OAG: Open Angle Glaucoma; SICS: Small Incision Cataract Surgery; SPSS: Statistical Package for Social Sciences; VA: Visual Acuity; WHO: World Health Organization

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