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Original Research Article

The visual outcomes after cataract surgery in urban slums of Raipur, Chhattisgarh, India: a cross sectional study

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ABSTRACT

Background: Poor outcomes of cataract surgery are a major problem in developing countries, including India which affects the demand and uptake of cataract surgical services. The present study was aimed to assess the visual outcomes after cataract surgery and identify factors associated with it, among persons aged 50 year and above in urban slums of Raipur.
Methods: A community-based, cross-sectional study was conducted in15 randomly selected clusters (urban slums) of Raipur from June 2012 to March 2013. Interviews, Visual Acuity measurements and ocular examinations were performed on all persons aged 50 year and above through house to house visits. Details about surgical intervention i.e. date, setting, type of cataract surgery were obtained from cataract operated persons, for each eye that had cataract surgery. Collected data were analyzed by using both descriptive and inferential statistics. The chi- square test was used to determine the associations of different cataract related parameters with visual outcomes in cataract operated eyes.
Results: Of the 870 participants, 203 persons (329 eyes) had undergone cataract surgery. Among all operated eyes, visual outcome was good (VA ≥6/18) in 84.5%, borderline (VA <6/18 and ≥6/60) in 12.5%, and poor (VA <6/60) in 3% of eyes with available correction. Visual outcome of cataract surgery was significantly associated with age at time of surgery, literacy, type of surgery, place of surgery and time since surgery.
Conclusions: The visual outcomes of cataract surgery were excellent in study area; it can be further improved by appropriate refractive correction, provision of glasses and adequate follow up after cataract surgery.

Keywords: Visual outcomes, Cataract surgery, Urban slums, Raipur, Chhattisgarh

INTRODUCTION

Cataract is the world's leading cause of blindness, affecting an estimated 20 million people. Because of population growth and increased longevity, this figure is expected to increase to 50 million by the year 2020 if no additional interventions are implemented.[1] One third of the world's blindness caused by cataract occurs in India.[2] Each year about 3.8 million in India are blinded by cataract.[3] The National Program for Control of Blindness in India aimed at controlling cataract induced blindness to reduce the prevalence of blindness from 1.4% to 0.3%.[4] Cataract surgery aims to rehabilitate blind or visually impaired persons by restoring their eyesight so that their quality of life and ability to function are returned to normal or as near normal as possible.[5]

Several studies have indicated that poor outcomes of cataract surgery is a major problem in developing countries.[6,7, 8,] This can be due to concurrent sight impairing eye diseases, surgical complications, inadequate optical correction, or long term

complications.[9,10] Poor visual acuity following surgery will affect the demand and uptake of cataract surgical services.[3,11] The most important factor to motivate person to utilize cataract surgical services, is the visual outcome of past operated persons in community. In order to improve quality of cataract surgery, the surgical outcome in a population based study must be analyzed at a regular interval. To monitor the visual outcomes of cataract surgery, WHO has recommended values of ≥85%, <10% and <5% with good (VA=6/6-6/18), borderline (VA <6/18-6/60), and poor outcome (VA <6/60) with available correction respectively, as adequate outcome results.[12]

Previous population based studies reported that there are some socio-demographic factors (age, sex and literacy) and surgical variables (place of surgery, type of the surgery and time since surgery) play an important role in the final outcome of cataract surgery. Poor visual outcomes after cataract surgery were associated with older age, female gender and illiteracy, non- IOL surgery, surgery performed at an eye camp or government hospital and year of surgery.[13,14]

Reliable population based data regarding visual outcomes of cataract surgery were lacking in Chhattisgarh. Community-based study is of great importance to assess the quality of cataract surgery. Hospital or camp based study may not be representative of community to assess outcome. Baseline data about quality cataract surgical services in a population based study are important for effective planning of services. The National Survey on Blindness, India, indicated that of all age-related cataract blindness, 95% occurs in the age group of 50 years and older and to facilitate comparison with other population based surveys, this study focused on 50 years and older people.[15] Keeping in view the above points, the present study was conducted with aim to assess the visual outcomes of cataract surgery and associated factors that influenced visual outcomes in study population.

METHODS

A community- based, cross-sectional study was conducted in15 randomly selected urban slums of Raipur, from June 2012 to March 2013. All people aged 50 years and above residing for at least 6 months in study area were interviewed along with visual acuity testing and eye examination, through house to house visits, by a survey team consisting of 2 ophthalmic assistants and 1 Doctor.

Sample size was calculated by taking the prevalence rate of 10% for blindness (presenting vision<6/60) among those aged 50 years and above with relative error of 25%, confidence level of 95% and design effect of 1.5.[16] In present study, sample size calculated was 864 subjects with taking cluster of 15 urban slums and each slum with 58 person per cluster.

In present study, survey population was selected by cluster random sampling. Sampling frame consisting of the list of 281 slums of Raipur city with their populations which was obtained from the office of Nagar Nigam and 15 clusters were randomly selected from the list. To select household random walk method was used.

The selected households were visited by the survey team. All eligible persons in the households were explained the purpose of the study and verbal informed consent was obtained before interview and eye examination. All information was recorded in a pre-designed and pre-tested proforma. For each selected subject the presenting visual acuity (VA) of each eye was measured with a Snellen chart with "E" or English alphabet optotypes in the vicinity of the households, outdoors in front of the house during the full daylight. Presenting visual acuity of all the eligible persons was recorded. The aided VA was considering as presenting VA, if a subject was using spectacles and unaided VA was considered as presenting VA, if a subject had no spectacles.

After measuring visual acuity, the examinee is taken inside the house, into the shaded dark area. Both eyes of all eligible subjects in the selected households were examined with a torch to assess lens status. The lens in each eye is examined and graded as normal lens, obvious lens opacity present, lens absent (aphakia), IOL implanted (pseudophakia). In cataract operated persons for each eye that had cataract surgery, details about cataract surgical intervention were obtained. These details were included subject's age at the time of surgery; the place of surgery, the type of the surgery, use of spectacles and reasons for not using spectacles. If an eligible person was not available after two visits the person was labeled as a no responder.

Data analysis

Collected data was entered in the Microsoft excel sheet and were analyzed. Visual outcomes after cataract surgery were categorized according to WHO criteria as "Good outcome" was defined as a visual acuity of ≥6/18" borderline outcome" as 6/24 to 6/60; and "poor outcome" as <6/60 with the available correction. The association of age at time of surgery, sex, education, type of surgery, place of surgery and time since surgery with visual outcome of surgery was investigated by chi-square test. P≤0.05 were considered statistically significant.

RESULTS

Out of 870 examined persons, 203 persons (329 eyes) had undergone cataract surgery. Majority of cataract operated persons (49.3%) belong to 60-69 years age group and only 19.2% were aged between 50-59 years. Most of them were males (59.1%) and illiterate (63.5%). Of all cataract operated persons 126 (62.1%) had bilateral surgery. Only 36% of cataract operated persons were using spectacles at the time of survey (Table 1). Among

130 cataract operated persons who were not using spectacles, the main reasons for not using spectacles were that 95 (73%) persons were not provided spectacles after operation, 29 (22.3%) persons felt no need to use spectacle after operation while 2 (1.5%) persons had lost, 3 (2.3%) had broken spectacles and remaining 1 (0.8%) subjects reported that spectacle available but they don't use (Figure 1).

Table 1: Characteristics of cataract operated persons (n=203).

Characteristics	No.	%
Age group (in years)		
50-59	39	19.2
60-69	100	49.3
≥70	64	31.5
Sex		
Male	120	59.1
Female	83	40.9
Education status		
Primary	27	13.3
Middle	31	15.3
High School	9	4.4
Higher Secondary	6	2.9
Graduate and above	1	0.5
Illiterate	129	63.5
Cataract surgery		
Bilateral	126	62.1
Unilateral	77	37.9
Spectacle use		
Yes	73	36
No	130	64

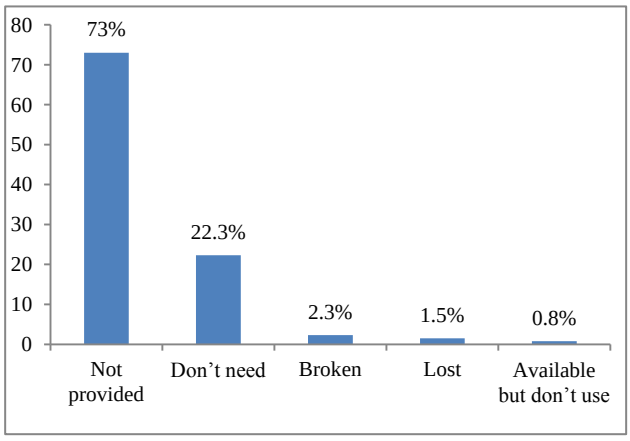

Figure 1: Main reason for not using spectacle among cataract operated persons who were not using spectacles.

Majority of eyes (66%) were operated between 60 and 69 years of age. Only 3.6% of eyes were operated before 50 years of age. Most of the cataract surgeries were performed in males (62.3%) and illiterates (60.8%). Of all cataract operated eyes, 90% had intra ocular lens (IOL) implant. Most of the surgeries were performed in Charitable/NGO hospitals (31.3%) and private hospitals (29.8%) and only 18.5% of surgeries were performed in the eye camps. Most of the eyes (37.1%) were operated within 1 year prior to survey (Table 2).

Table 2: Cataract related parameters of cataract operated eyes (n=329).

Variables	No.	%
Age at time of surgery (in years)		
<50	12	3.6
50-59	72	21.9
60-69	217	66
≥70	28	8.5
Sex of operated persons		
Male	205	62.3
Female	124	37.7
Literacy of operated persons		
Literate	129	39.2
Illiterate	200	60.8
Type of surgery		
IOL	296	90
Non-IOL	33	10
Place of surgery		
Eye camps	61	18.5
Charitable/NGO hospitals	103	31.3
Govt. hospitals	67	20.4
Private hospital	98	29.8
Duration since surgery		
≤ 1 year	122	37.1
2-4 years	114	34.6
5-10 years	58	17.6
>10 years	35	10.6

Among all cataract operated eyes, visual outcome was good (VA ≥6/18) in 84.5%, borderline (VA <6/18 and ≥6/60) in12.5%, and poor (VA <6/60) in 3% of eyes with available correction (Table 3).

Table 3: Visual outcomes of cataract operated eyes (n=329).

Visual outcome	No.	%
Good (PVA ≥6/18)	278	84.5
Borderline (PVA <6/18 and ≥6/60)	41	12.5
Poor (PVA <6/60)	10	3.0
Total	329	100

PVA: Presenting visual acuity.

Majority of cataract operated eyes had attained good outcome where surgeries were performed at 50-59 years age group (87.5%) and 60-69 years age group (88%) whereas only 53.6% of eyes attained good outcome where surgeries performed at age 70 years and above. Visual outcome was significantly associated with age ($p<0.0001$).

More male eyes attained good visual outcomes compared to females (87.3% versus 79.8%) but visual outcome was not statistically associated with sex (p=0.07).

Majority of eyes of literate persons (95.3%) had attained good visual outcome compared to illiterates (77.5%) and association between visual outcomes and education status of operated persons was found to be statistically significant (p=0.0001).

Majority of eyes (89.2%) that had undergone IOL surgery (pseudophakic eyes) had attained good outcomes compared to the eyes with non IOL surgery/aphakic eyes (42.4%). In case of non IOL surgery, 18.2% of aphakic eyes presented with poor outcome and an additional 39.4% of eye presented with borderline outcome whereas among pseudophakic eyes, the presentation of poor outcome and borderline outcome was 1.3% and 9.5% of eyes respectively. Visual outcomes was statistically associated with type of surgery (p<0.0001).

Majority of eyes operated in private hospital had good visual outcome (91%) followed by Charitable or NGO hospital (88.35%) whereas surgeries performed in government hospital and camp setting good outcome was attained in 73.1% and 80.3% of eyes respectively.

Table 4: Association of visual outcomes of cataract operated eyes with cataract related parameters (n=329).

Variables	Total operated eyes	Good outcome		Borderline outcome		Poor outcome		Statistics
		No.	%	No.	%	No.	%	
Age at time of surgery (years)								
<50	12	09	75	02	16.7	01	8.3	χ^2=24.95, p<0.0001 Significant
50-59	72	63	87.5	07	9.7	02	2.8	
60-69	217	191	88	22	10.1	04	1.8	
≥70	28	15	53.6	10	35.7	03	10.7	
Sex								
Male	205	179	87.3	19	9.3	07	3.4	χ^2 =5.21, p=0.07, Not Significant
Female	124	99	79.8	22	17.7	03	2.4	
Literacy								
Literate	129	123	95.3	04	3.1	02	1.5	χ^2=19.42, p=0.0001 Significant
Illiterate	200	155	77.5	37	18.5	08	4	
Type of surgery								
IOL	296	264	89.2	28	9.5	04	1.3	χ^2=56.70, p<0.0001 Significant
Non-IOL	33	14	42.4	13	39.4	06	18.2	
Place of surgery								
Eye camps	61	49	80.3	07	11.5	05	8.2	χ^2=24.56, p=0.0009 Significant
Charitable/NGO hospitals	103	91	88.3	10	9.7	02	1.9	
Govt. hospitals	67	49	73.1	18	26.9	00	00	
Private hospital	98	89	90.8	06	6.1	03	3.1	
Duration since surgery								
≤ 1 year	122	118	96.7	04	3.3	00	00	χ^2=55.31, p<0.0001 Significant
2-4 years	114	99	86.8	12	10.5	03	2.6	
5-10 years	58	44	75.9	12	20.7	02	3.4	
>10 years	35	17	48.6	13	37.1	05	14.3	

Majority of eyes operated in within 1years prior to the examination (96.7%) had attained good outcome whereas only 48.6% of eyes operated more than 10 years presented with good outcome. Duration since cataract surgery was significantly associated with visual outcome (p<0.0001).

DISCUSSION

The present community-based study was aimed to assess the visual outcomes after cataract surgery among 203 cataract operated persons aged 50 year and above (329 cataract operated eyes). It was carried out using cluster sampling method to eliminate selection bias from study.

Notably, it was observed in present study that only 36% of cataract operated persons were using spectacles at the time of survey. Similar finding was reported in the other community based studies Tirunelveli (35%) and Andhra Pradesh (25.4%).[6,17] Most of cataract operated persons (64%) in current study were not using spectacle after surgery. Of these, 73% were not provided spectacles after operation. In agreement with this finding a study by Odugbo et al reported that 71.2% of study subjects were not using spectacle after surgery. Of these 64.9% were never provided spectacles.[18] It seems that there is inadequate follow up services after surgery, in study area. It was also seen in current study that if the glasses are broken or lost, they do not get replaced. Most of the

cataract operated persons are poor who cannot afford good quality spectacles. Therefore, there is the need of proper post-operative refractions, provision of glasses and adequate follow up after cataract surgery, in study area.

The visual outcomes of the present study were comparable to the WHO recommended value of ≥85%, <10% and <5% with good, borderline and poor outcome with available correction respectively.[19] The proportion of eyes with good visual outcome (84.5%) as found in present study was much higher than other population based studies Tirunelvelli (64%), Gujarat (50.7%), Andhra Pradesh (68.2%), Nigeria (25.6%) and Bangladesh (43.8%).[6,14,17,18,20] The proportion of eyes with poor visual outcome (3%) in present study was much lower than other population based studies Tirunelvelli (11.8%) and Gujarat (18%), Andhra Pradesh (14.2%), Nigeria (58.3%) and Bangladesh (28.3%).[6,14,17,18,20] This result may be due to that current study was done in urban area with better surgical facilities and majority of cataract operated eyes (90%) had intra ocular lens (IOL) implant in study population. Recent surveys have reported higher success rates following cataract surgery with Intra Ocular Lens implantation as compared to conventional surgery.[21]

In present study, majority of cataract operations (66%) were performed at 60-69 years age and only 3.6% of cataract operations were performed at age less than 50 years. Similarly, a study by Bechani et al also reported that among the examined eyes, more eyes were operated above 70+ years compared to younger ages.[22] This finding shows poor awareness of the public for timely intervention.

In present study, it was observed that majority of cataract operated eyes (90%) had intra ocular lens (IOL) implant which is very impressive finding. The proportion of eyes with intra ocular lens (IOL) implant of present study was higher than other population based studies Tirunelvelli (56.5%), Gujarat (88.1%), Nigeria (34.8%) and Bangladesh (10.2%).[6,14,18,20]

The present study revealed that the Charitable/NGO hospitals (31.3%) and private hospitals (29.8%) were the commonest place of surgery and most surgeries (37.1%) had been performed within 1 year prior to survey. Performance of cataract surgery in Government hospitals is low contributing only 20% of operations. Several other population based studies also reported that the largest provider of surgical services was the NGO sector.[14,23]

In present study, it was found that some socio-demographic factors and surgical variables were most important determinant of visual outcome. Visual outcome of cataract surgery was significantly associated with age at time of surgery, literacy, type of surgery and place of surgery and time since surgery but gender was not important.

Regarding visual outcomes in relation to age at time of surgery, the present study revealed that better visual outcomes were found where surgeries had been performed between age of 50-59 years and 60-69 years compared to age more than 70 years. Similar finding was reported in the other community based studies that the increasing age might have negative influence on visual outcome after cataract surgery.[14,24,25] Possible explanation for this finding may be that the older person are more likely associated with other co-existing ocular morbidities such as retinal pathologies which may limit the effectiveness of cataract surgery and its visual outcome among this population segment.

The present study revealed that more male operated eyes had attained good outcomes compared to female operated eyes (87% vs 80.2%). Although this was not statistically significant (p=0.07). So this finding shows that gender did not influence cataract surgical outcome.

The result of present study showed that significantly more literates eyes attained good outcome after surgery compared to illiterates (95.3% vs 77.5%). Similar finding was reported in the other community based studies.[14,18] This may be due to good awareness and health seeking behavior of cataract surgical services among literates.

Present study revealed that a significantly greater numbers of eyes that had undergone IOL implantation attained good outcomes compared to the Non-IOL (89.2% vs. 42.4%). Many other studies had also reported that visual outcome was better with IOL implantarion than without it.[14,17,18]

Present study reported that that better visual outcomes were found in private hospitals and charitable/ NGO hospitals as opposed to that in government hospitals and camp surgery. This finding was consistent with other studies.[6,17,20]

Current study showed that majority of eyes (96.7%) attained good visual outcome where surgeries had been performed within 1 years or equal (in recent surgeries) before examination whereas only 48.6% of eyes obtained good outcome where surgeries performed 10 year or more prior to examination. Similar finding was also reported in other studies.[14,18] It means that the shorter the duration between the surgery and the survey, the better the visual outcome in all operated eyes. This finding indicates that there was improvement in the quality of recent surgery.

CONCLUSION

The visual outcomes of cataract surgery were excellent in study area; it can be further improved by appropriate refractive correction, provision of glasses and adequate follow up after cataract surgery.

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