International Journal of Community Medicine and Public Health
Dhawan B et al. Int J Community Med Public Health. 2020 Jul;7(7):2656-2660
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20202993

Original Research Article

Rapid assessment of avoidable blindness in a district in central India: the survey findings

Bodhraj Dhawan[1]*, Vaishali B. Dhawan[2], Ajay Kumar Shukla[3]

[1]Department of Ophthalmology, NKP Salve Institute of Medical Sciences, Nagpur, Maharastra, India
[2]Department of Radiology, [3]Department of Ophthalmology, MGIMS, Sevagram, Wardha, Maharastra, India

Received: 20 April 2020
Revised: 06 June 2020
Accepted: 09 June 2020

***Correspondence:**
Dr. Bodhraj Dhawan,
E-mail: bodhrajdhawan@gmail.com

ABSTRACT

Background: Rapid assessment of avoidable blindness gives an estimate of burden of blindness and causes thereof. Aim of the study was to estimate prevalence of blindness and trends and outcome of cataract surgery in rural India using cluster sample survey.
Methods: 30 clusters of 100 people aged above 50 years were selected by stratified cluster sampling. Participants were evaluated for history, vision and dilated fundus examination as per pre designed proforma.
Results: Of the 3000 people listed severe visual impairment (visual acuity <3/60) was noted in 134 (4.5%) individuals (361 (6.02%) eyes). Blindness was noted in 107 (3.5%) individuals (483 (8.05%) eyes). Cataract was the most common cause of visual impairement in 18.57% eyes. Pseudophakia was present in 551 (9.2%) eyes and 179 (3.0%) eyes had aphakia. Grade III and Grade IV PCO was noted in 52 (9.4%) and 14 (2.5%) eyes respectively.
Conclusions: Untreated cataract continues to be the leading cause of avoidable blindness. Startegies are required to manage blindness following cataract while we plan to combat cataract related blindness.

Keywords: Avoidable blindness, Cataract, Pseudophakia, Visual acuity

INTRODUCTION

Every year 3.8 million Indian eyes are presumed to go blind due to Cataract.[1] This blindness is avoidable. Rapid assessment of avoidable blindness surveys have standardised methodologies which are useful to assess the prevalance of the blindness and cataract surgery related information at community level to have a practical knowledge of the magnitude of the causes, and to plan strategy to manage.[2,3] Over the years, with increase in the number of cataract surgeries to combat the cataract related blindness, these surveys provide us with information on the outcome of the Surgery and related outcomes also. Aim of the study was to estimate prevalence of blindness, causes of blindness and visual impairement and trends and outcome of cataract surgery in Rural India using Cluster Sample Survey.

METHODS

Observational population based study using stratified cluster sampling strategy (rapid assessment of avoidable blindness survey) was done for 3 months (May 2019 to July 2019) in Disttrict Wardha, cordinated at Mahatma Gandhi Institute of Medical Sciences, Sevagram.

The sampling universe consisted of all those aged 50+ years and who were habitual residents (staying in the village for at least previous 6 months) were included in the study.

Ethical approval and approval of local disttrict authorities was sought.

A population based survey was carried out in the district to study prevalence of avoidable blindness in people aged >50 years and to assess the part attributable to PCO. For determining the sample size estimated prevalence of avoidable blindness among 50+ was taken to be 8.0%.[4] Among the statistical criteria 80% power, 20% relative precision, 95% confidence interval and design effect of two for clustering effect were considered.

Based on the criteria, sample size came out to be 2500 and 3000 individual aged 50+, were taken as survey population. Stratification of population of the district in to rural and urban strata was done. Stratified cluster sampling was adopted to select 30 clusters (22 rural and 8 urban) depending upon their total population. Listing of the names of villages/wards block wise was done from census 2001 report. Villages with a population less than 800 were clubbed together to yield a cluster where 100 individuals aged 50+ were available.

The team performed door to door enumeration and examination of 100 people aged +50 years, in each cluster (Figure 1). A standardized survey record was filled in for each eligible person. Demographic information (name, age, sex and occupation etc.), past history of ocular surgery, history of place of surgery, time since surgery, cost of surgery, condition of glasses and past history of laser capsulotomy was recorded.

Visual assessment

Presenting distance visual acuity (with or without available glasses) was tested separately for each eye using an ETDRS chart cut out with "E" optotypes. The 'E's on one side correspond to 6/60 equivalent of Snellen's chart while the 'E's on the reverse correspond to 6/18 on the Snellen's chart at 4-m distance (Figure 1). This was done in full day light in courtyard or on the street. Participants who read the largest letter (confirms VA 6/60) were then shown the other side of chart showing small size letter E (VA 6/18), those who read small size letter E, there visual acuity was recorded as 6/18 or better for each eye. Participants failing to read the largest letter at 4m were retested at 2-m and visual acuity was recorded as 3/60. When necessary, testing included the ability to count fingers, to detect hand movements, or to perceive light. Participants were deemed to have sufficient visual acuity to read a particular line if a minimum of four of five letters in a line was identified correctly. Participants who could not read 6/18 from either eye had their visual acuity checked again with pin hole and improvement if any was recorded for each eye separately.

Anterior segment examination and lens status

The lens status was assessed by torch light examination. All individuals with VA <6/18 in either eye and al/l those who had been operated for cataract in either eye were examined at clinics set up in the village/cluster. In the clinic basic eye examination (Figure 1) consisted of reconfirmation of visual acuity, torch light examination, Those with history of previous cataract surgery in either eye were examined for type of surgery (recorded as ICCE, ECCE, ECCE+IOL, SICS/PHACO). Placement of IOL (in the bag / decentered) and presence of uveitis. Distant Direct Ophthalmoscopy (DDO) was done after dilating pupil with mydriatric eye drops. PCO (posterior capsular opacification) was specifically noted and graded.

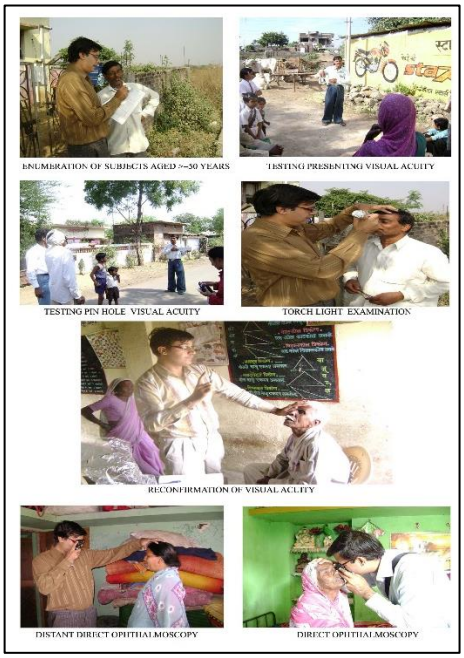

Figure 1: Survey methodology.

RESULTS

Age and sex distribution

Mean age of study population was 62.3±7.9 years (range 50-92 years). Out of 3000 persons included in the study 1467 (48.9%) were males and 1533 (51.1%) were females.

Table 1: Visual status of survey population (persons).

Visual status (WHO) (best corrected visual acuity)	No. of persons	%
Near normal (≥6/18)	2238	74.6
Visual impairment (<6/18 - ≥6/60)	521	17.4
Severe visual impairment (<6/60 - ≥3/60)	134	4.5
Blindness (<3/60 – PL +)	95	3.1
Absolute blindness PL negative	12	0.4
Total	3000	100

Out of 3000 persons surveyed 2238 (74.6%) had normal/near normal vision. Visual impairment was seen in 521 (17.4%) persons with vision of (<6/18 - >6/60). Severe visual impairment (visual acuity <3/60) was noted in 134 (4.5%) individuals. Blindness was noted in 107 (3.5%) individuals including 12 (0.4%) who were suffering from absolute blindness (PL negative).

Table 2: Visual status of eyes in survey population.

Visual status	Number of eyes (%)
≥6/18	4249 (70.81)
<6/18 - ≥6/60	907 (15.12)
<6/60 - ≥3/60	361 (6.02)
<3/60 – PL +	397 (6.62)
PL Negative	86 (1.43)
Total	6000

Of the 6000 eyes of 3000 persons included in this survey 4249 (70.81%) eyes had pinhole visual acuity normal/near normal, 907 (15.12%) eyes had visual impairment. Severe visual impairment was noted in 361 (6.02%) eyes and 483 (8.05%) eyes were blind which includes 86 (1.43%) eyes which were PL negative.

Lens status

Lens status of eyes in survey population

Out of the 6000 eyes included in this survey 4120 (68.7%) had normal clear lens. History of cataract surgery was noted for 730 (12.2%) eyes. On examination pseudophakia was present in 551 (9.2%) eyes and 179 (3.0%) eyes had Aphakia. Cataract was noted in 1102 (18.4%) eyes. In 48 (0.8%) eyes lens status could not be determined because of hazy media? Absent globe/pthisis bulbi?

Distribution of pseudophakia in survey population

Out of 3000 persons included in this survey 408 (13.6%) had pseudophakia. Out of which 143 (35.0%) had pseudophakia in both eyes and 265 (65.0%) had unilateral pseudophakia.

Distribution of place of surgery

Out of total 551 pseudophakic eyes 140 (25.4%) eyes were operated at Governmet hospital, 296 (53.8%) were operated at NGO hospital. 84 (15.2%) eyes got operated at Private Hospitals and 31 (5.6%) eyes were operated in eye camps.

Distribution of cost of surgery

Out of a total 551 surgeries, 453 (82.2%) were done camp free and 98 (17.8%) were operated at the paid centres.

Visual status of pseudophakic eyes

Out of 551 pseudophakic eyes 241 (43.7%) eyes had presenting visual acuity >6/18 with available glass and 179 (32.5%) eyes had presenting visual acuity <6/18 - >6/60. Presenting visual acuity <6/60 was noted in 131 (23.7%) eyes including 10 (1.8%) eyes with visual acuity of PL negative.

Pinhole visual acuity of >6/18 was noted in 276 (50.1%) eyes and 147 (26.7%) eyes had visual acuity <6/18 - >6/60. Pinhole visual acuity <6/60 was noted in 128 (23.2%) eyes including 10 (1.8%) eyes with visual acuity of PL negative.

Prevalence of posterior capsular opacification in pseudophakic eyes

Out of 551 eyes with pseudophakia posterior capsule was clear in 261 (47.4%) eyes and 290 (52.6%) eyes had PCO. Grade I PCO was noted in 73 (13.2%) eyes and Grade II PCO was noted in 142 (25.8%) eyes. Grade III and Grade IV PCO was noted in 52 (9.4%) and 14 (2.5%) eyes respectively. Only 9 (1.6%) eyes were noted to have undergone laser capsulotomy in the past.

Causes of visual impairement in survey eyes

Table 3: Causes of pinhole visual acuity <6/18 in survey population – eyes.

Cause	Total eyes		Pseudophakic eyes	
	Number (n=6000)	%	Number (n=551)	%
Cataract	1114	18.57	-	-
Uncorrected aphakia	41	0.68	-	-
Cataract complications	250	4.17	209	37.9
Pthisis Bulbi	39	0.65	-	-
Corneal scar/opacity/ulcer	68	1.13		
Globe abnormalities	5	0.08	-	-
Glaucoma	84	1.40	26	4.7
Diabetic retinopathy	09	0.15	03	0.5
Age related macular degeneration	52	0.87	15	2.7
Others / undetermined	88	1.47	22	4.0
Total	1751	29.17	275	49.8

Cataract was the most common cause of visual impairment nored in 1114 eyes out of 6000 (18.57%). It was distantly followed by cataract surgical complications in 250 eyes (4.17%). Glaucoma, corneal diseases and age related macular degeneration were noted in meagre percentages. Diabetic retinopathy was present in 9 eyes (0.15%). In the pseudophakic eyes major cause of pinhole visual acuity <6/18 was cataract surgical complications, recorded in 209 out of 551 eyes (37.9).

Table 4: Other causes of pinhole visual acuity <6/18 in survey population - eyes.

Cause	Total eyes (n=6000)		Pseudophakic eyes (n=551)	
	N	%	N	%
Amblyopia	1	0.02	-	-
Vascular occlusion (BRVO)	3	0.05	3	0.5
Chorioretinal degeneration/ scar	7	0.12	2	0.4
Dislocated / absorbed lens	1	0.02	-	-
Eviscerated socket	2	0.03	-	-
Hypertensive retinopathy	1	0.02	-	-
Gyrate atrophy	2	0.03	-	-
Heredomacular degeneration	2	0.03	-	-
High/ pathological myopia	9	0.15	2	0.4
Macular scar	12	0.2	2	0.4
Optic atrophy	27	0.45	11	2
Retinal Detachment	4	0.07	-	-
Retinitis pigmentosa	8	0.13	2	0.4
Vitreous haemorrhage	1	0.02	-	-
Undetermined	8	0.13	-	-
Total	88	1.47	22	4.1

Out of 1751 eyes with pinhole vision <6/18 optic atrophy was noted in 27 (0.45%) eyes. 12 (0.20%) eyes had macular scar. High / pathological myopia was noted in 9 (0.15%) eyes. Among 551 pseudophakic eyes among the other causes, vascular occlusion was present in 03 (0.5%) of eyes, choreoretinal degeneration in 02 (0.4%) eyes, high/pathological myopia in 02 (0.4%) eyes, optic atrophy was noted in 11 (2.0%) eyes and retinitis pigmentosa in 02 (0.4%) of pseudophakic eyes.

Table 5: Cataract surgical complications in pseudophakic eyes with pinhole visual acuity <6/18 (n=551).

Cause	N (%)
Corneal decompensation	32 (5.8)
Decentered IOL	29 (5.3)
Subluxated IOL	3 (0.5)
Cystoid macular oedema	18 (3.5)
Secondary glaucoma	8 (1.4)
Infection (healed or active)	27 (4.9)
Pseudophakic retinal detachment	3 (0.5)
Occluded / updrawn pupil	12 (2.2)
Posterior caspsular opacification	275 (49.9)

* More than 1 complication was present in some eyes.

Out of a total 6000 eyes of 3000 individuals included in this survey, 551 were pseudophakic. Out of 551 Pseudophakic eyes cataract surgical complications (1 or more) was noted in 407 eyes. Corneal decompensation was present in 32 (7.9) percent eyes, secondary glaucoma was noted in 8 (2%) eyes. Pseudophakic retinal detachment was present in 3 (0.7%) eyes.

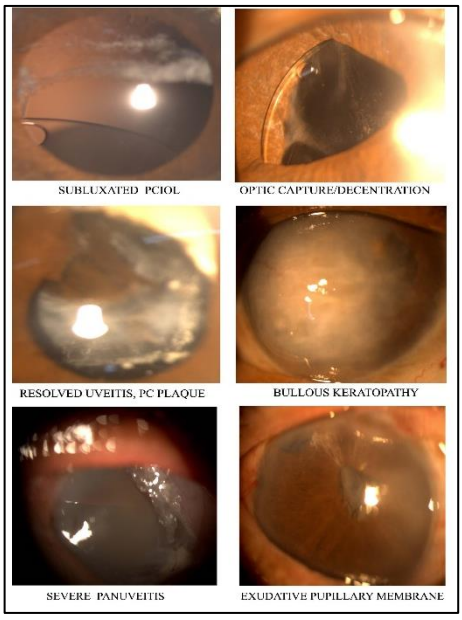

Figure 2: Cataract surgery complications.

DISCUSSION

Total 3000 persons were surveyed across all the rural and urban clusters with Mean age of study population was 62.3±7.9 years. (Range 50-92 years), 1467 (48.9%) were males and 1533 (51.1%) were females. Prevalence of severe visual impairment and blindness (combined together) was observed in 8% of individuals and 14.05% eyes.

Cataract was the most common cause of visual impairment in 18.57% eyes. It was followed by cataract surgery complications in 4% and posterior segment disorders. Similar results are published elsewhere. This is akin to similar population related studies.[5-8] On examination pseudophakia was present in 551 (9.2%) eyes and 179 (3.0%) eyes had Aphakia. Out of total 551 pseudophakic eyes 140 (25.4%) eyes were operated at Govt. hospital, 296 (53.8%) were operated at NGO hospital.

In these pseudophakic eyes, pinhole visual acuity of >6/18 was noted in 276 (50.1%) eyes.147 (26.7%) eyes had visual acuity <6/18 - >6/60. Pinhole Visual Acuity <6/60 was noted in 128 (23.2%) eyes including 10 (1.8%) eyes with visual acuity of PL negative. Therefore 25% of pseudophakic eyes had severe visual impairment and blindness. Similar results have been published by Lalit et al where 21.4% eyes had a very poor outcome after cataract surgery.[9] Prevalence of PCO was 11.9% (This includes Grade III and IV PCO 10). This is similar to prevalence reported in similar studies.[11-13] Only 9 (1.6%) eyes were noted to have undergone laser capsulotomy in the past.

While evaluating the causes of pinhole visual acuity <6/18 in survey population (eyes), it was striking to observe that amongst the pseudophakic eyes, the cataract surgery complications was the most common cause attributable in 37.9% of the survey eyes. It was distantly followed by Glaucoma in 4.7%, age related macular degeneration in 4% and diabetic retinopathy in 0.5% of the eyes. Common cataract surgery complications included Posterior capsular opacification in 49% (out of which 11.9% were significant, visually) of the operated eyes which had a pinhole visual acuity <6/18. Others were corneal decompensation in 5.8%, decentered IOL in 5.3%.

CONCLUSION

Most of rural individuals received a free cataract surgery at camp or NGO. Prevalence of visual impairment and blindness in the survey population was 14%. 9.2% of the eyes were pseudophakic. Almost 50% of operated pseudophakic eyes were noted to have visual impairment and blindness, most commonly caused by posterior capsule opacification in almost 50 % of these eyes. Most of rural individuals received a free cataract surgery at camp or NGO. Prevalance of PCO was 11.9%. In the total survey population cataract surgery complication was commonest cause of blindness was cataract surgery complications, of note common were PCO, corneal decompensation. Hence cataract and cataract surgery complications are cause of significant proportion of blindness and visual impairment in the survey population.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Minassian DC, Mehra V. 3.8 million blinded by cataract each year: projections from the first epidemiological study of incidence of cataract blindness in India. British J Ophthalmol. 1990;74(6):341-3.
2. Hannah K, Polack S, Hans L. Rapid assessment of avoidable blindness. Community Eye Health. 2006;19(60):68-9.
3. Foster A. Cataract and Vision 2020 the right to sight initiative. British J Ophthalmol. 2001;85(6):635-7.
4. Murthy GV, Gupta SK, Bachani D, Jose R, John N. Current estimates of blindness in India. British J Ophthalmol. 2005;89(3):257-60.
5. Thulasiraj RD, Praveen KN, Ramakrishnan R. Blindness and vision impairment in a rural south Indian population: the aravind comprehensive eye survey. Ophthalmol. 2003;110(8):1491-8.
6. Thulasiraj RD, Rahamathulla R, Saraswati A, Selvaraj S, Ellwein LB. The sivaganga eye survey: blindness and cataract surgery. Ophthalmic Epidemiol. 2002;9(5):299-312.
7. Murthy GVS, Sanjeev G, Leon BE, Sergio RM, Damodar B, Dada VK. A population-based eye survey of older adults in a rural district of Rajasthan: I. Central vision impairment, blindness, and cataract surgery. Ophthalmol. 2001;108(4):679-85.
8. Pokharel GP, Regmi G, Shrestha SK, Negrel AD, Ellwein LB. Prevalence of blindness and cataract surgery in Nepal. British J Ophthalmol. 1998;82(6):600-5.
9. Lalit D, Rakhi D, Thomas JN. Population-based assessment of the outcome of cataract surgery in an urban population in southern India. Am J Ophthalmol. 1999;127(6):650-8.
10. Aslam TM, Dhillon B, Werghi N, Taguri A, Wadood A. Systems of analysis of posterior capsule opacification. British J Ophthalmol. 2002;86(10):1181-6.
11. Prajna NV, Chandrakanth KS, Kim R. The Madurai intraocular lens study II: clinical outcomes. Am J Ophthalmol. 1998;125(1):14-25.
12. Jialiang Z, Ruifang S, Lijan J, Astrid EF, Leon BE. Visual acuity and quality of life outcomes in patients with cataract in Shunyi County, China. Am J Ophthalmol. 1998;126(4):515-23.
13. Schaumberg DA, Dana MR, Christen WG, Glynn RJ. A systematic overview of the incidence of posterior capsule opacification. Ophthalmol. 1998;105(7):1213-21.

Cite this article as: Dhawan B, Dhawan VB, Shukla AK. Rapid assessment of avoidable blindness in a district in central India: the survey findings. Int J Community Med Public Health 2020;7:2656-60.