

Causes of visual impairment in applications for blindness certificates in a tertiary center of Bihar and its role in health planning

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Purpose: To analyze applications for blindness certificates to find causes of visual impairment (VI), handicap, and blindness in a tertiary hospital of Bihar. **Methods:** Applications for blindness certificates were analyzed over a two-year period. The main cause of blindness, visual handicap, and VI in these applications was ascertained by age group and etiology. VI disability percentages and definitions proposed by Government of India (category 0–4; 20–100%) were used to categorize and give percentage to all applicants. Results were compared with data from studies on blindness certificates and population based studies. **Results:** In total, 203 applicants were reviewed. Mean age was 23.5 ± 7.9 years. Overall, most common cause of visual handicap (40–100% impairment) and blindness (75–100% impairment) was macular pathology ($P < .05$), while most common cause of overall VI (20–100% impairment) was amblyopia. In age group 0–15 years, most common causes of blindness/visual handicap were congenital globe and hereditary retinal or optic nerve disorders ($P = 0.016$). In age group 16–30 years, macular pathology was the most common cause of visual handicap [$P = 0.007$], while amblyopia was the most common cause of VI [$P = 0.00$]. Between 31 and 45 years of age group, corneal scar in one eye was the most common cause of VI, while macular scar in both eyes was the most common cause of visual handicap. Glaucoma and diabetic retinopathy were the most common causes of blindness/visual handicap between 46 and 65 years and above 65 years of age, respectively. Data about causes of VI such as amblyopia, complicated cataract surgery, and one eyed blindness could not be ascertained by analyzing blindness certificate alone. **Conclusion:** Data from applications for blindness certificates provide valuable information regarding different causes of VI that might otherwise not be eligible for blindness certification and provide an insight into the overall trends in disease profile and service delivery.

Key words: Blindness certificates, visual handicap, visual impairment

Blindness registers are an important tool for public eye health programs and have been used as data sources for population-based research, mostly in the developed world.^[1] In India, this methodology has not been used, mostly because of the poor reporting and record keeping.^[2] Only few studies in India have analyzed blindness certificates to know causes of blindness and visual handicap.^[3,4] However, analyzing blindness certificates does not inform regarding different causes of visual impairment (VI) and hence, can overlook conditions such as amblyopia, surgical outcome of cataract surgery, and causes of one eyed blindness that are of public eye health importance and which would help in public eye health planning. We suggest that analyzing applications for blindness certificates can help in determining causes of VI in addition to blindness. It can also complement findings from different surveys. Although such an exercise cannot be taken as an estimate of the disease prevalence, it can be used as an indicator of the prevailing trends in the region and service delivery. Although the specific findings may be local in scope, the overall principles can also be applied to different regions too. Therefore, in this study, we aimed to analyze applications for blindness certificates to find causes of VI, handicap, and

blindness in a tertiary hospital of Bihar, and discuss how it provides more information than blindness certificates and its usefulness in the context of public eye health.

Methods

A cross-sectional study by secondary data analysis of medical records of 203 people who applied for blindness certificate was performed at Regional Institute of Ophthalmology (RIO) Patna. All applicants were examined here, and final diagnosis was made after excluding avoidable causes of blindness before being sent to disability certification board of the hospital. For purpose of certification, Government of India guidelines were followed which says that, disability should be assessed when the specialist is satisfied that further medical treatment/intervention is not likely to reduce the extent of impairment.^[5] In this study, blindness/handicap certificate would mean certificates with 40% and above of percentage VI,

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who are entitled to government benefits.^[5,6] We analyzed all applications for blindness certifications from April 2016 to March 2018 to know causes of VI, visual handicap, and blindness in different age groups. In our study, we considered a person to be visually impaired if his eyesight could not be corrected to a “normal level” (Centers for Disease Control and Prevention, CDC). In this study, analysis was performed according to VI disability categories and percentages proposed by Government of India (category 0–4; 20–100%)^[6] [Table 1]. Category 1 [40% disability; best corrected visual acuity (BCVA) 6/18 -6/36 in better eye] was considered as moderate VI. Blindness was considered to be BCVA less than 6/60 or field of vision less than 20 degree in better eye. Hence, categories 2–4 (75–100% disability) were considered blind. Categories 1–4 (40–100% disability) came under visual handicap. One eye were given 30% disability percentage (vision in better eye – 6/6, worse eye – finger counting 1 foot to no perception of light). Category 0 included those with 20% VI (BCVA 6/9 to 6/18 in better eye).

We also determined the most common causes of VI overall (category 0–4; 20–100% disability). Through this, we could also know of other conditions in the eye that have become a public health problem apart from causes of blindness and visual handicap such as amblyopia, one eyed corneal blindness, and cataract surgical outcome.

Percentage of VI was given after excluding avoidable causes of decreased vision at presentation. Diseases such as cataract and correctable refractive errors were excluded and advised treatment. After-cataracts (posterior capsular opacification) were included under complicated cataract surgery. Amblyopia following cataract surgery in children below 15 years was considered remediable and hence excluded.^[7] In applicants above 15 years, it was included under complicated cataract surgery. The main cause of blindness, visual handicap, and VI was ascertained wherever possible for all applicants during study period and tabulated by age group and etiology.

Statistical analysis was done using Epi info 7 (CDC, Atlanta, GA). Continuous variables were analyzed using one sample goodness-of-fit test or Pearson Chi-square goodness-of-fit test.

Results

The total number of applicants in our study were 203. Mean age was 23.5 ± 7.9 (range 12 to 65 years). Males were 64%, and females were 36%. Maximum numbers of applicants were between 15–45 years (43%). Overall, most common cause of visual handicap and blindness was macular pathology, mostly

hereditary macular degeneration ($P < .05$). Amblyopia which was mostly anisometropic was the most common cause of VI ($P < .05$) [Tables 2 and 3].

The most common causes of visual handicap and blindness were similar among all age groups. In age group 0–15 years, most common causes of blindness/visual handicap were congenital globe and hereditary retinal or optic nerve disorders ($P = 0.016$). Complicated aphakia and pseudophakia were the most common and significant avoidable cause of blindness/visual handicap in this age group ($P = 0.016$). In 16–30 year age group, macular pathology ($P = .007$) was the most common and significant cause of blindness/visual handicap, and amblyopia was the most common avoidable and significant cause of VI ($P = 0.00$). Most Amblyopes have been given percentage impairment between 20–40% (category 0 to 1). However, on combining the two groups, (Between 0–30 years) most common cause of visual handicap came to be complicated cataract surgery, while amblyopia was the most common cause of VI, both being avoidable causes. Between 31–45 years of age group, corneal scar in one eye, mostly healed keratitis was the most common cause of VI in current study, while both eyes macular scar was the most common cause of blindness/visual handicap. Glaucoma and diabetic retinopathy (DR) were the most common causes of blindness/visual handicap between 46 and 65 years and above 65 years of age, respectively.

Discussion

Disability certificates such as those for blindness/visual handicap offer lot of benefits to the recipients and help them to get reservation in colleges and jobs. They get travel concessions, income tax benefits, and disability allowances.^[5,6] Hence, there are many applicants for these certificates.^[8] Here, we compare results of analysis of blindness/handicap certificates with different studies on blind certifications and population based studies.

People with disability percentage of 40% (BCVA in better eye- 6/18 -6/36) are considered as handicapped and entitled to government benefits.^[5,6] There was a male predominance in applications for certification that could be because of their traditional role of bread earners and more mobility in our society, and hence, more need for employment and other benefits.^[8]

Overall, the most common cause of blindness/visual handicap was macular scar across all age groups. However,

Table 1: Categories of visual disability (classification currently in use)

Category	All with best corrected visual acuity		
	Better eye	Worse eye	Percentage impairment
0	6/9 to 6/18	6/24-6/36	20%
I	6/18-6/6	6/60 to PL	40%
II	6/60 to 4/60 or Field of vision 10° to 20°	3/60 to No PL	75%
III	6/60 to 4/60 or Field of vision <10°	FC 1 feet to No PL	100%
IV	FC 1 feet to No PL or Field of vision <10°	FC 1 feet to No PL or Field of vision <10°	100%
One eyed person	6/6	FC 1 feet to No PL	30%
Category I-IV	Visually handicapped person		

FC: Finger counting

Table 2: Age distribution of causes of blindness and visual handicap

Diseases	Age distribution (in years)					Total (n=151)
	0-15 (n=41)	16-30 (n=60)	31-45 (n=27)	46-60 (n=19)	>60 (n=4)	
Corneal scar bilateral corneal scar	3 (7.3%)	4 (6.67%)	2 (7.4%)	0	0	9
Optic atrophy	7 (17.0%)	9 (15.1%)	5 (18.5%)	3 (15.7%)	0	24
Macular pathology	5 (12.1%)	19 (31.6%)	6 (22.2%)	4 (21%)	0	34
Coloboma/hereditary retinal/globe conditions	12 (29.2%)	5 (8.3%)	3 (11.1%)	0	0	20
Congenital glaucoma	2 (4.8%)	0	0	0	0	2
Complicated pseudophakia	12 (29.2%)	14 (23.3%)	3 (11.1%)	0	0	29
Retinitis pigmentosa	0	9 (15%)	2 (7.4%)	0	0	11
Glaucoma	0	0	1 (3.7%)	6 (31.5%)	1 (25%)	8
ARMD [†]	0	0	0	0	1 (25%)	1
Chronic uveitis	0	0	3 (11.1%)	2 (10.5%)	0	5
Pathological myopia	0	0	2 (7.4%)	4 (21.1%)	0	6
Diabetic retinopathy	0	0	0	0	2 (50%)	2
P value	0.016	0.007	0.353	0.678	1	

[†]Age related macular degeneration

Table 3: Age distribution of causes of visual impairment

	Age distribution (in years)					Total n=203
	0-15 n=46	16-30 n=100	31-45 n=37	46-60 n=20	>60 n=4	
Retinal detachment	0	6 (6%)	1 (2.7%)	1 (5%)	0	8
Amblyopia	0	31 (31%)	5 (13.5%)	0	0	36
Corneal scar	8 (17.3%)	7 (7%)	6 (16.2%)	0	0	21
Optic atrophy	7 (15.2%)	9 (9%)	5 (13.5%)	3 (15%)	0	24
Macular pathology	5 (10.8%)	19 (19%)	6 (16.2%)	4 (20%)	0	34
Coloboma/congenital retinal/globe conditions	12 (26.1%)	5 (5%)	3 (8.1%)	0	0	20
Congenital glaucoma	2 (4.3%)	0	0	0	0	2
Complicated pseudophakia	12 (26.1%)	14 (14%)	3 (8.1%)	0	0	29
Retinitis pigmentosa	0	9 (9%)	2 (5.4%)	0	0	11
Glaucoma	0	0	1 (2.7%)	6 (30%)	1 (25%)	8
ARMD [†]	0	0	0	0	1 (25%)	1
Chronic uveitis	0	0	3 (8.1%)	2 (10%)	0	5
Pathological myopia	0	0	2 (5.4%)	4 (20%)	0	6
Diabetic retinopathy	0	0	0	0	2 (50%)	2
P value	0.07	0.00	0.41	0.46	1.00	

[†]Age related macular degeneration

a study of registered visually disabled people in Bengal showed phthisis bulbi followed by microphthalmia to be the most common cause of blindness or partial sight.^[8] This was explained by them to be because of the fact that they studied predominantly young patients.

In the current study, the most common diagnosis among applicants was amblyopia. Most people applying for certification and diagnosed with amblyopia were between 15 and 45 years (43%). They were given disability percentage between 20–40%. Most were ineligible for government benefits as they obtained percentage impairment less than 40%, which was not considered as visual handicap.^[5,6] This age group had maximum number of applicants for certification, probably because this is the job seeking age group, and they can avail reservations in government jobs on this basis.^[8] Successful school eye screening program in Bihar is needed to tackle this problem.

Analyzing the causes of VI, handicap, and blindness revealed different causes in different age groups. Since a study of this nature has not been done before, we compared our findings with different studies on blind certification and population based studies. In age group 0–15 year, most common cause of blindness/visual handicap was congenital and hereditary disorders, which was in line with other studies.^[8,9] Complicated aphakia and pseudophakia was the second most common cause in this age group. This has not been seen in different studies of blindness certificates.^[8,10] However, in a population based survey by Dandona *et al.*,^[11] amblyopia after cataract surgery accounted for 8.3% of all childhood blindness, while a study in a blind school put complicated pseudophakia as cause of blindness in 6.6% of the children.^[12] High incidence of this preventable cause of blindness in our study could be because of inadequate dedicated pediatric units in Bihar, and

poor follow-up of patients because of high level of illiteracy. Presence of dedicated pediatric units with trained surgeons and ensuring better follow-up can help mitigate this problem in the state. In 16–30 years age group, macular scar (20%) was the most common cause of VI, mostly hereditary macular dystrophy. Literature search did not reveal causes of blindness from 15–45 years of age to compare with. Most data available is for childhood blindness and for those above 50 year of age. Analysis of studies on blindness certificates in India and outside did not reveal age specific causes of VI but only the most common causes across all age groups.^[2,3,8,9,13] Between the age group 31 and 45 years, corneal scar was the most common cause of VI in current study, while macular scar was the most common cause of blindness/visual handicap. The data about the former which is the most common cause of one eye blindness in our study could not have been elicited by analyzing blindness certificate alone as 20–30% VI is not included in visual handicap or blindness that many suffering from corneal scar were awarded. This may be because of more incidence of keratitis in this age group as this group is active in economic activities such as farming and also susceptible to trauma. This has not been commented upon by any study on blindness certificate, but this is in line with other population-based studies.^[14] Between 46–65 years, glaucoma (30%) was the most common cause of VI and blindness/handicap; while in patients above 65 years of age, DR was the most common cause of VI and blindness/handicap in our study. In a national rapid assessment of avoidable blindness survey of respondents above 50 years of age, prevalence of DR and glaucoma was 0.2% and 3%, respectively.^[15] The difference could be because our study excluded avoidable causes of blindness. Another study by Bunce C *et al.* noted that the most commonly recorded cause of certifications in the older age group for both blindness and partial sight in United Kingdom (UK) was degeneration of the macula and posterior pole that largely comprised age-related macular degeneration.^[13] Although our data is bound to be imprecise considering the fewer applicants in age group 45 years and above in our study and cannot compare with a population based study, it does give an indication of an increasing incidence of blindness due to DR in this part of the country and the need for screening, early diagnosis, and better management of DR.

Data from application for blindness certificates should be used judiciously as it is not representative of the whole population. Bias exists in that many people who are eligible for certification are not applying for it. Under-registration of eligible blind and partially sighted individuals is a global problem. In one cross-sectional survey of certification at the Moorfields Eye Hospital in the UK, 51% of the patients identified as eligible for registration as disabled did not have a certificate.^[13,16] In India, no study results with regard to this problem has been available in literature. There is also over representation of applicants in job seeking age group here.^[8] These figures, however, surely give some indication of the burden of vision impairment on the eye health services and provide a degree of insight into the relative burden of different eye diseases. Apart from giving data regarding handicap and blindness as in blindness disability certificates, applications for the same also inform about different causes of VI. Hence, we get important pointers toward trends in conditions such as Amblyopia, one eyed corneal blindness, complicated cataract

surgery, and DR^[17], which are avoidable causes of VI. Thus, analyzing applications for blindness disability certificate can be one of the important modalities to be used in conjunction with data from population based surveys to plan, implement, and monitor eye health services. It can also be used to do trend analysis of different eye diseases and serve as an indicator of service delivery. It is advocated that with increased use of technology, region specific data from applications for blind certifications can be collated for better utilization of data for epidemiological purposes.

Conclusion

Data from applications for blindness certificates apart from guiding in issuing them provide valuable information regarding different causes of visual impairment that might otherwise not be certifiable but have an impact on the quality of life of the sight impaired. It can also provide an insight into the overall trends in disease profile and service delivery so that health care strategies can be planned and monitored.

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Conflicts of interest

There are no conflicts of interest.

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