ORIGINAL ARTICLE

A Study of Causes of Visual Disability and Applications for Blindness Certificates at a Tertiary Care Centre in Central Maharashtra

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Abstract:

Background and Objectives: As there was no data regarding the causes of visual impairment and blindness in adults and children in the local population, a study was undertaken to analyze the causes of visual impairment (VI) and blindness in adults and children through applications for blindness certificates at a large government hospital in Central Maharashtra. *Material and Methods:* All applications for blindness certificates received from January 2018 to December 2019 were analyzed to identify the main causes of VI and blindness in adults and children separately. In the process of categorization of the applicants while ascertaining the percentage of disability, the guidelines given by Government of India (category 0-4; 20-100%) were followed. *Results:* We analyzed data from 310 patients with a mean age of 33.5 ± 19.7 years (range = 2 – 82 years) with maximum patients between the 16-30 years age group. Males (n=189, 61%) were more common. The commonest cause of VI was phthisis bulbi which counted for 13% of the causes while Retinitis pigmentosa (11%) and microphthalmos (10%) were the second and third commonest causes of VI in patients applying for blindness certificates. In children aged 15 years or younger, microphthalmos (14%) and amblyopia (14%) were by far the commonest cause of VI. In terms of categories of blindness, majority were in Category 3 (n=214, 69%) while Category 2 had 49 (16%) patients and category 1 had 47 (15%) patients. In the younger age group of 0-15 years, patients had overall lower percentage of disability and fell in category 1 more often (42%) as compared to category 2 and 3 (16% each). *Conclusion:* Data from applications of blindness disability certificates provides an important source of information regarding the different causes of VI and blindness.

Keywords: Blindness, Visual impairment, Applications, Categorization

Introduction:

Visual impairment (VI) is a global issue and it has a significant socioeconomic impact [1]. The effect of blindness on neurobehavioral development is of major concern, and the psychological and financial impact on families, institutional support systems, and health care providers cannot be overrated [2].

Although childhood blindness is uncommon, they are considered a priority group as blindness in children can affect their development, mobility, education, and employment opportunities, which in turn affects quality of their life and family [3, 4]. Visually handicapped children are recommended to a particular primary school based on their actual visual acuity and additional disabilities, as well as on their socioeconomic conditions [5]. As the impact of visual impairment is significant, its prevention is an international priority. To identify priorities, data regarding incidence and causes of blindness is needed. However, blindness under-registration is a worldwide problem [6, 7].

The purpose of blindness certification is to provide a reliable route for the visually handicapped to be brought to the attention of social care [8, 9]. When we define disability it is difficult to satisfy the expectations of all disabled groups. As per the guidelines of Ministry of social justice and empowerment of the Government of India, 40% disability is the minimum for an individual to be eligible for any concessions or benefits [10]. The process of blindness certification involves coordination between social services which are meant for the visually disabled [11]. Visual handicap registration in India is voluntary and is carried out by a duly constituted board

that includes an ophthalmologist [12]. Blindness registers are crucial for public eye health programs and they have been used as data sources for conducting population-based research, mostly in developed world [6]. In India, this methodology has not been used extensively, mostly because of the poor reporting and record keeping [13]. The objective of our study is to identify causes of visual disability by analyzing applications for blindness certificates, as there was no data regarding the causes of visual impairment and blindness in adults and children in the local population. This study also aims to identify causes of blindness and severe visual impairment in children.

Material and Methods:

This was a hospital based cross-sectional study and was approved by the Institutional Ethical Committee. We analysed data from medical records of 310 patients who applied for blindness certificate, between January 2018 to December 2019 at the Disability Certification board of a tertiary care Government Medical College in central Maharashtra. All the applicants were thoroughly examined and final diagnosis was based on medical history, clinical examination and investigations such as B-scan, automated perimetry and other investigations as and when necessary. We recorded the age, gender, percentage of disability and causative factor of visual disability in each eye from the patient's case files.

Visual disability certificates were issued to those with VI of 40% and above, thus entitled for government benefits [10, 14]. In this study analysis was performed according to Visual disability categories and percentages proposed by government of India (Table 1). Category 1 was considered as moderate VI and individuals in categories 2- 4 (75–100% disability) were considered blind. Categories 1- 4 (40-100% disability) came under visual handicap. One eyed patients were given 30% disability percentage [15].

In this study we determined the causes of visual disability through applications for blindness certificates. We also determined causes of blindness and severe visual impairment in children. Preventable diseases such as cataract and correctable refractive errors were advised treatment and excluded from the study. One eyed patients were also excluded from the study. After-cataracts were included under the group of complicated cataract surgery. Children below 15 years having amblyopia following cataract surgery were considered remediable and excluded from study and applicants above 15 years were included under complicated cataract surgery. The principal cause of blindness/ visual impairment was determined for all applicants and tabulated as per the age group and etiology.

All continuous variables were presented as means with standard deviation or median with interquartile range (IQR) while categorical variables were presented as proportions (n, %). Group differences between continuous variables were analyzed using the student t test or the Wilcoxon's rank sum test for non-parametric distributions, whereas differences in categorical variables was analyzed using the chi square or the Fischer's exact test.

All data was stored in Microsoft excel and analyzed using STATA 12.1 I/c (Stata Corp, Fort Worth, Texas, USA). All p values <0.05 were considered statistically significant.

Table No. 1: Categories of visual disability [10]

Category	Better eye	Worse eye	Impairment(%)
0	6/9 to 6/18	6/24 - 6/36	20%
I	6/18-6/36	6/60 to PL	40%
II	6/60 to 4/60 or Field of vision 10^o to 20^o	3/60 to No PL	75%
III	3/60 to 1/60 or Field of vision $<10^o$	FC 1 feet to No PL	100%
IV	FC 1 feet to No PL or Field of vision $<10^o$	FC 1 feet to No PL or Field of vision $<10^o$	100%
One eyed person Category I-IV	6/6	FC 1 feet to No PL Field of vision $<10^o$ Visually handicapped person	30%

FC- Finger counting; PL-Perception of light

Results:

Table No.2: Age distribution of causes of Visual Disability

Diseases	0-15(n=63)	16 -30(n=91)	31-45(n=68)	46-60(n=46)	>60 (n=42)	Total (n=310)	P Value
Phthisis bulbi	1 (1.5%)	6 (6.5%)	10 (14.7%)	10 (21.7%)	15 (35.7%)	42 (13.5%)	<0.001
Retinitis Pigmentosa	6 (9.5 %)	10 (10.9%)	7 (10.2%)	8 (17.3%)	4 (9.5 %)	35 (11.2%)	0.71
Microphthalmos	9 (14.2 %)	19 (20.8%)	5 (7.3 %)	1 (2.17%)	0	34 (10.9%)	0.001
Total Leucomatous corneal opacity	3 (4.7 %)	3 (3.2 %)	7 (10.2%)	6 (13.04%)	10 (23.8 %)	29 (9.3 %)	0.002
Coloboma	1 (1.5 %)	7 (7.6 %)	2 (2.9 %)	0	1 (2.3 %)	11 (3.5 %)	0.002
Hereditary retinal conditions	7 (11.1 %)	11 (12.08%)	4 (5.8 %)	1 (2.17 %)	0	23 (7.4 %)	
Optic atrophy	3 (4.7 %)	6 (6.5 %)	9 (13.2 %)	9 (19.5 %)	3 (7.1 %)	30 (9.6 %)	0.06
Pathological myopia	6 (9.5 %)	6 (6.5 %)	10 (14.7 %)	5 (10.8 %)	1(2.3 %)	28 (9.03 %)	0.22
Amblyopia	9 (14.2 %)	5 (5.4 %)	2 (2.9 %)	0	1 (2.3 %)	17 (5.4 %)	0.008
Retinal Detachment	2 (3.1 %)	2 (2.1 %)	0	0	2 (4.7 %)	6 (1.9 %)	0.34
Anophthalmos	2 (3.1 %)	5 (5.4 %)	0	1 (2.17 %)	0	8 (2.5 %)	0.19
Glaucoma	1 (1.5 %)	0	1 (1.4 %)	3 (6.5 %)	1 (2.3 %)	6 (1.9 %)	0.13
Macular Pathology	2 (3.1 %)	2 (2.1 %)	1 (1.4 %)	1 (2.17 %)	1 (2.3 %)	7 (2.2 %)	0.97
Cone dystrophy	4 (6.3 %)	1 (1.09 %)	0	0	0	5 (1.6 %)	0.02
Microcornea	4 (6.3 %)	4 (4.4 %)	3 (4.4 %)	0	0	11 (3.5 %)	-
Megalocornea	0	0	0	1 (2.17 %)	0	1 (0.3 %)	-
Complicated cataract	1(1.5 %)	0	0	0	1(2.3 %)	2 (0.6 %)	0.38
Anterior Staphyloma	0	0	2 (2.9 %)	0	0	2 (0.6 %)	0.12
Diabetic Retinopathy	0	0	0	0	1(2.3 %)	1 (0.3 %)	0.17
Cortical blindness	2 (3.1 %)	1 (1.09 %)	0	0	0	3 (0.9 %)	0.32
Adherent Leucoma	0	0	3 (4.4 %)	0	0	3 (0.9 %)	0.03
Keratoconjunctivitis sicca with Symblepharon	0	0	2 (2.9 %)	0	0	2 (0.6 %)	0.12
Recurrent Toxoplasmosis	0	1 (1.09 %)	0	0	0	1 (0.3 %)	0.66
Aphakic Bullous Keratopathy	0	0	0	0	1 (2.3 %)	1 (0.3 %)	0.17
Keratoconus	0	1 (1.09 %)	0	0	0	1 (0.3 %)	0.66
Severe Dry eye (SJS)	0	1 (1.09 %)	0	0	0	1 (0.3 %)	0.66

SJS - Steven Johnson syndrome

Table No. 3: Distribution of Visually disabled individuals according to Age, Gender and Percentage of disability

Age(Years)	76-100% Disability(n=214)		41-75%Disability (n=49)		40% Disability (n=47)		Total Cases(n=310)	P value
	Male	Female	Male	Female	Male	Female		
0-15	16	19	4	4	11	9	63 (20.3 %)	<0.001
16-30	42	21	5	6	14	3	91 (29.3 %)	0.34
31-45	24	24	10	6	1	3	68 (21.9 %)	0.02
46-60	23	11	7	2	1	2	46 (14.8 %)	0.19
> 60	25	9	3	2	3	0	42 (13.5 %)	0.17
Total Cases	130	84	29	20	30	17	310 (100 %)	-

We analyzed data from 310 patients who had applied for blindness certificate at our Institution. The mean age of patients was 33.5 ± 19.7 years (median age=31 years, IQR= 17-48 years) and it ranged from 2 – 82 years with maximum patients lying between the 16-30 years age group. Males (n=189, 61%) were more common in our cohort. The commonest cause of VI was Phthisis Bulbi (13%) followed by Retinitis Pigmentosa (11%) and Microphthalmos (10%) (Table 2). In children aged 15 years or younger, Microphthalmos (14%) and amblyopia (14%) were by far the commonest causes of VI (table 2), followed by Coloboma and hereditary retinal conditions (12%). Similar trends were seen in young adults between 16 and 30 years of age. In older adults between 45-60 years of age, the causes of VI were much different with phthisis bulbi being the commonest followed by optic atrophy, retinitis pigmentosa and leucomatous corneal opacities. There were significant differences in causes of VI between younger and older individuals. (Table 2).

In terms of categories of blindness, majority of patients were in Category 3 (n=214, 69%) while Category 2 had 49 (16%) patients and category 1 had 47 (15%) patients. Table 3 shows the distribution of visually disabled individuals according to age, gender and % of disability. In the younger age group of 0-15 years, patients had overall lower percentage of disability and fell in category 1 more often (42%) as compared to category 2 and 3 (16% each). Similarly, in the age group of 31 - 45 years, blindness of category 2 was common and significantly greater than the other categories.

Discussion:

A Certificate of Blindness/Visual Impairment grants its holders rehabilitation services, rights and various benefits such as travel concessions, income tax exemptions, reservations in colleges and jobs, disability allowances and many more. In our hospital based cross sectional study we analyzed data of 310 patients who had applied for blindness certificate at our institution and found phthisis bulbi to be the commonest cause overall while in children, the primary etiologies for blindness were microphthalmos and amblyopia.

In terms of categories of visual disability, patients in categories III and IV have 100 % visual impairment. In our study, we found that patients belonging to category III most commonly approached for blindness certificates. Similar finding was noted in a study of registered visually disabled individuals in a district of West Bengal, India done by Ghosh et al. [11]. In our cohort, the most common cause of blindness/visual handicap was phthisis bulbi which accounted for 13% of the causes of VI. This was followed by retinitis pigmentosa (11%) and microphthalmos (10%). In a study by Ambastha A et al on the causes of visual impairment in applications for blindness certificates in a tertiary center of Bihar, macular scar (22%) was identified as the most common cause of blindness/visual handicap [15]. In a study of registered visually disabled individuals in a district of West Bengal, Ghosh S et al found phthisis bulbi (17%) followed by microphthalmos (13%) to be the most common cause of blindness or partial sight [11].

The causes of VI, handicap and blindness were different in different age groups in our study.

The commonest cause of VI in patients less than 30 years of age was developmental globe anomalies whereas in age groups more than 30 years of age causes like phthisis bulbi, optic atrophy and corneal opacities dominated. In age group of 0-15 years, most common cause of blindness/visual handicap was microphthalmos (14%) and amblyopia (14%), while chorioretinal coloboma and hereditary retinal conditions (12%) were second most common causes. In a study on the causes of visual impairment in applicants for blindness certificates in a tertiary center of Bihar done by Ambastha A et al, with a methodology similar to ours, Coloboma and hereditary retinal conditions (29.2%) were the most common cause followed by complicated Aphakia and Pseudophakia [15]. However in a study in a blind school of Allahabad, complicated Pseudophakia was found to be the cause of blindness in 6.6 % of the children [1].

In 16-30 years of age group, microphthalmos (20%) was the commonest cause of VI followed by coloboma and hereditary retinal conditions (19%). In contrast, Ambastha A et al, reported macular scar (19%) as the most common cause of VI [15]. Similarly, in our study in the age group 31 to 45 years, phthisis bulbi (14.7 %) was the most common cause of blindness/visual handicap but Ambastha A et al, again showed macular

scar (22%) as the most common cause in this age group in their series from Bihar [15]. In addition to regional differences in the prevalence of ophthalmic diseases within the same country, the proportions of etiologies are also influenced by other factors such as social awareness within the community, support for the blind to travel to tertiary center for certificate applications, and taboo associated with blindness that can prohibit patients to not approach health authorities.

In our cohort of 46 to 60 years patients, the most common cause of VI was again phthisis bulbi (21.7 %) followed by optic atrophy (19.5 %), retinitis pigmentosa (17.3 %) and leucomatous corneal opacities (13.0%). In contrast, Ambastha A et al reported glaucoma (30 %) to be the most common cause of VI between 46-65 years of age [15].

Another study by Bunce C et al. noted that the most common recorded cause of certifications in the older age group for both blindness and partial sight in United Kingdom(UK) was degeneration of macula and posterior pole that was largely comprised of patients with age-related macular degeneration [6]. It is possible that differing definitions for blindness between countries leads to differences in reported etiologies of blindness amongst applicants of blindness certificates. Additionally, the overall life expectancy being lower, the incidence of macular degeneration may be lower in India as compared to United Kingdom. Lastly, patients with visual impairment may not approach higher centers in India for blindness certification due to poverty and psychosocial issues.

Out of 310 applicants in our study, 189(61%) were males and 121(39%) were females, depicting gender inequalities. Men seeking more certificates than females in this cohort may be because of their traditional role as bread earners and more mobility in our society and hence, more need for employment and other benefits and not necessarily due to lower incidence of blindness in women.

One of the merits of our study is apart from giving data regarding handicap and blindness as in blindness disability certificates, applications for the same also inform about different causes of VI. This study also provides information regarding age wise distribution of causes of VI. Some limitations were encountered during the study; it was dependent on the quality of information recorded on applicant's forms that could not be verified and the definition of disability used in the study was based on medical model, and hence could not be compared with other studies that used different definitions of disability. In addition, the younger age group was adversely impacted due to poor history by the parents/guardians regarding the precise period of onset, cause, and process of blindness; this made correlation of findings and determining the exact diagnosis difficult. Further the evaluation was hampered by the unavailability of electrophysiological devices and a portable ultrasound device.

Conclusion:

Data from applications of blindness disability certificates provide important information regarding the different causes of VI and blindness. To reduce the burden of blindness, patients with lower categories of VI (category I and II) who are eligible for blindness certificate should approach government institutions. To increase awareness amongst the patients with lower categories of VI, we advise various approaches like displaying posters regarding blindness/VI and low vision aids at public places, along with print media, broadcast media and social media publicity. We should also strengthen and enhance the implementation of existing national policies, plans and programs for eye health and prevention of blindness and VI. We must also increase and expand research capabilities under blindness prevention and control programs to study various causes of blindness and design preventive measures to avoid blindness. Additionally, we suggest one such study should be undertaken at the end of each decade to see changing trends in the pattern of VI and blindness within the geographic area where the study was conducted.

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