

Original article

Analysis of Causes of Blindness among South Indian Population

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Abstract:

Aim: To determine the age, sex and cause specific prevalence of blindness (3/60 or less).

Materials and Methods: 97 patients with vision less than 3/60 were evaluated for the cause for low vision (blindness). Examination protocol consisted of the following: demographic details, Ocular examination using Snellen's chart, Auto refractometry, Ophthalmoscopy, Tonometry, Confrontation test.

Results: Of the 97 patients, 24.7% were bilaterally blind, 80.3% were above 40 years of age. Cataract (58.7%) was the leading cause of blindness followed by glaucoma (10.4%), congenital (10.3%), refractive errors (5.2%), corneal opacities (5.1%), retina and nerve pathologies (5.2%) and other causes (5.2%).

Conclusion: Cataract, glaucoma, refractive errors, corneal opacities and congenital causes are the most common causes of blindness in our study in chronological order.

Key words: Vision 2020, Ophthalmoscopy, Tonometry, Cataract, Glaucoma, Blindness

Introduction

Prevention of blindness must be the first goal of Ophthalmology. To tackle the problem of blindness we should know the exact incidence, prevalence, nature and etiology of blindness of population under care. The last one and half decades have witnessed the emergence of rapid assessment surveys in eye care as a cornerstone for the planning and monitoring of eye care services.^{[1], [2]}

With a massive global effort of eliminating avoidable blindness under the VISION 2020: The Right to Sight initiative, the sound epidemiological data have become more relevant, to assess the trends in prevalence of visual impairment and to assist in planning and monitoring of blindness prevention programmes worldwide. Definition of Blindness: The World Health Organization (WHO) defines blindness as "visual acuity of less than 3/60 or its equivalent".^[3] Visual field less than 10⁰,

irrespective of the level of visual acuity is also labeled as blindness (WHO1977).^[4] Categories of visual impairment^[4]: Normal vision - equal to or better than 6/18, Moderate visual impairment - worse than 6/18 but equal to or better than 6/60, Severe visual impairment - worse than 6/60 but equal to or better than 3/60, Blindness - worse than 3/60. The latest WHO figures state about 285 million people worldwide are visually impaired; 39 million are blind.^[5] While the problem is global, the magnitude of blindness is much higher in India. India alone has 15 million blind people, which comes to 40 % of the total in the world (highest in the world).^[6] This study was undertaken to assess the causes for blindness in our set up to throw light on the preventive measures that can be carried out.

Materials and methods

This is a cross-sectional study to assess age, sex and cause specific prevalence of blindness (3/60 or

less) among patients attending the Out Patient Department of a tertiary care hospital. This study was approved by Institutional Ethics committee; Informed consent was taken from the patients participating in the study. All patients with visual acuity less than 3/60 in either or both eyes were included. During the period of study from July 30, 2013 to September 28, 2013, 97 patients were assessed. Demographic data like name, age, gender, residence, education and occupation were obtained. Details of visual morbidity including duration of vision loss, onset, progression, diurnal variation, ocular involvement and associated symptoms were obtained. In addition, significant histories like diabetes, hypertension, trauma, vitamin A deficiency, smoking, alcohol intake, exposure to oculo-toxic drugs and relevant family history were gathered. Visual acuity (VA) tested with Snellen's chart. Unaided VA was recorded for all subjects. Aided VA was recorded if a subject reported the use of spectacles. VA with pinhole checked too. External ocular examination was performed by oblique illumination. Colour vision tested using Ishihara's pseudo-isochromatic chart, refractive

errors using auto refractometry, visual field by confrontation method and intra ocular pressure measured using Schiottz tonometry. Lens opacities were assessed using distant direct ophthalmoscopy and the lens was graded as Normal, Obvious lens opacity, Aphakia or Pseudophakia. If the lens could not be examined due to conditions like corneal opacities, then it was documented. In cases where fundus examination was feasible the findings were documented.

Results

From the 97 subjects examined, following results were obtained. 57 patients were visually challenged due to cataract, followed by glaucoma (10), congenital causes (10), refractive errors (5), corneal disorders (5), nerve involvement (3), retinitis pigmentosa (2), aphakia (2), trauma (1), tuberculous uveitis (1) and HIV (1). Figure 1 shows the major causes for blindness as observed in the study. On sorting, 53 were males and 44 were females. Incidence of blindness between the two genders is shown in figure 2.

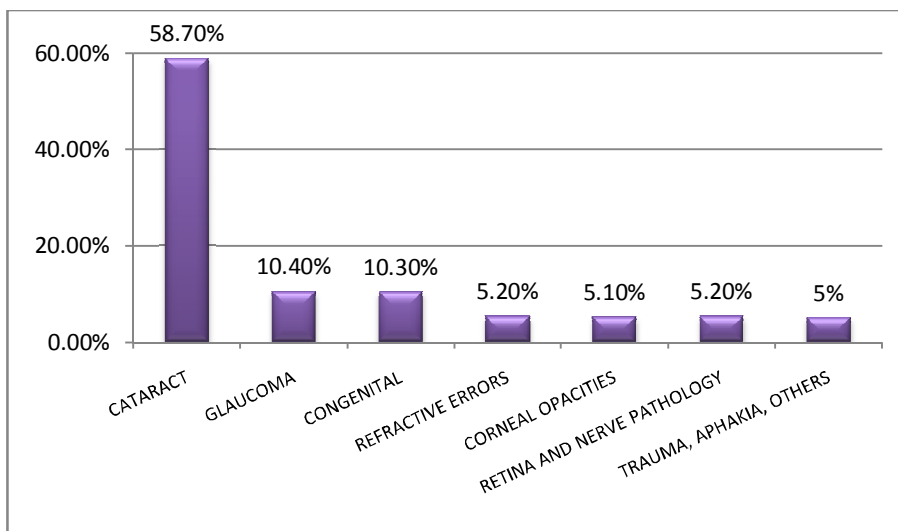


Figure 1 Incidence of blindness in study population

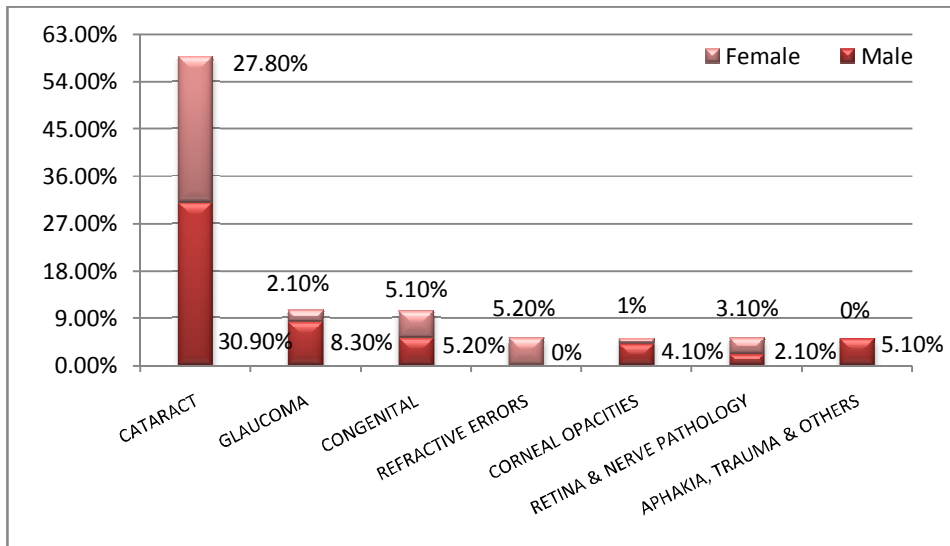


Figure 2 Distribution of blindness in both genders

Table 1 Distribution of causes of blindness in age group

	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	TOTAL
CATARACT	1	-	-	-	4	21	22	5	4	57
GLAUCOMA	-	-	-	-	2	4	3	1	-	10
CONGENITAL	2	1	-	4	3	-	-	-	-	10
REFRACTIVE ERRORS	-	-	1	1	2	1	-	-	-	5
CORNEAL OPACITIES	-	-	1	-	-	1	2	1	-	5
RETINA & NERVE PATHOLOGY	-	1	1	2	-	-	1	-	-	5
APHAKIA, TRAUMA & OTHERS	-	-	3	1	-	-	1	-	-	5

Incidence of blindness due to different causes in different age groups is as shown in table 1. On categorizing the duration of blindness, 90 suffered from chronic vision loss and 7 suffered from acute vision loss. On analyzing the onset and progression of acquired vision loss, 79 had slow progression and 8 had rapid progression. Diurnal variation was found in 43 patients. Major presenting complaints included watering, followed by pain, diplopia,

irritation, photophobia, coloured halos, head ache and redness. 37 subjects had no other symptoms other than diminished or loss of vision. Significant past, personal and family histories revealed that, 1 history of albinism, 10 had the history of trauma, 16 had history of diabetes, 9 had history of hypertension, 9 had history of both diabetes and hypertension, 8 had history of smoking, 6 had history of both smoking and alcoholism, 1 had

history of vitamin deficiency, 1 had history of maternal drug intake and 10 had significant family histories. Recordings of VA in each eye showed that 10 eyes had NO PL, 36 had > PL but < HM vision, 15 had > HM but < CFCF vision, 5 had > CFCF but < 1/60 vision, 21 had > 1/60 but < 2/60

vision, 32 had > 2/60 but < 3/60 vision, 6 had > 3/60 but < 4/60 vision, 3 had > 4/60 but < 5/60 vision, 10 had > 5/60 but < 6/60 vision and finally 56 eyes had > 6/60 vision. 1 patient with visual field <5⁰ was considered blind.

Table 2 Distribution of causes of blindness in eye

BLINDNESS CAUSES	TOTAL		LEGAL		SOCIAL		ECONOMICAL	
	1 EYE	2 EYES	1 EYE	2 EYES	1 EYE	2 EYES	1 EYE	2 EYES
CATARACT	2	-	26	3	26	2	13	-
GLAUCOMA	1	-	7	-	2	1	1	-
CONGENITAL	-	1	5	2	5	1	2	-
REFRACTIVE ERRORS	-	-	-	-	4	1	2	-
CORNEAL OPACITIES	3	-	3	-	-	-	1	-
NERVE PATHOLOGIES	-	1	1	-	-	1	-	-
RETINITIS PIGMENTOSA	-	-	-	-	-	1	-	-
OTHERS	-	-	4	-	2	-	-	-
GRAND TOTAL (NO. OF PATIENTS)	7(7.2%)		43(44.7%)		46(47.9%)		-	

Based upon the visual acuity in both the eyes, the patients were classified as follows: Totally blind – 7, legally blind – 43 and socially blind – 46 patients. It is defined thus. Total blindness: No light perception (PL –ve). Legal blindness: Vision in

better eye <1/60 to PL. Social blindness: Vision in better eye <3/60 to 1/60. Economic blindness: Vision in better eye <6/60 to 3/60. Classification of patients based on visual acuity has been shown in Table 2.

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Table 3 Ocular involvement in various etiologies

CAUSES	UNILATERALLY BLIND	BILATERALLY BLIND
CATARACT	50	7
GLAUCOMA	8	2
CONGENITAL	2	8
REFRACTIVE ERRORS	4	1
CORNEAL OPACITIES	4	1
RETINITIS PIGMENTOSA	-	2
NERVE PATHOLOGIES	1	2
APHAKIA, TRAUMA & OTHERS	4	1
TOTAL	73(75.2%)	24(24.7%)

Based on visual acuity in either eye, the number of subjects visually challenged in one or both eyes were sorted, of which 73 suffered from unilateral vision loss and 24 suffered from bilateral vision loss Table 3. Assessment of visual acuity with pinhole showed that, 23 patients had improved vision with pinhole. The Corneal pathologies observed included: Age related changes in 35 patients, Opacities in 9 patients, Microcornea in 2 patients and endothelial loss in 1 patient. Of these, vision was affected in 5 individuals. The examination of the anterior chamber showed that it was shallow in 2 glaucomatous patients and revealed fibrous exudates in 1 patient with mature cataract. Pupillary light reflex was absent in 26 patients. 8 had pinpoint pupil, 1 had posterior synechiae and 1 had relative afferent pupillary defect. Examination of Lens revealed the following findings: Right eye – 43 immature cataract, 14 mature cataract, 12 pseudophakia, 2 aphakia. Left eye – 37 immature cataracts, 15 mature cataract, 16

pseudophakia, 2 aphakia. Bilaterally – 27 immature cataracts, 3 mature cataract, 4 pseudophakia, 2 aphakia. Among the 24 pseudophakic, 3 had developed posterior capsular opacification. Based on the assessment of refractive errors by auto refractometry, only 2 had improvement with glasses. Auto refractometry revealed pathologic myopia (>5dioptries) in 5 patients. Fundus examination in possible cases revealed 3 degenerative myopia, 4 glaucomatous changes and Stargardt’s disease in 1 patient (retinitis pigmentosa variant). Intra-ocular pressure measurement revealed bilateral increase of IOP in 1 patient and unilateral raise of IOP in 9 patients. Among the patients in whom Visual field was assessed, 35 had reduced field of vision. 9 had bilaterally reduced field of vision. Causes for bilateral reduced field of vision include: retinitis pigmentosa (2) with tubular vision, glaucoma (2), cataract(1), refractive error(1) and congenital cause(1).

Discussion

Consistent with other studies^[7], cataract was found to be the leading cause of blindness in our setup, accounting for 58.7% as shown in Figure 1. In India cataract (62.6%), refractive errors (19.7%), glaucoma (5.8%), corneal blindness (0.9%), posterior segment disorders (4.7%), others (6.3%).^[8] Thus cataract remains a major public health problem in India with regional variations

similar to other developing countries in Asia^{[7] [9] [10] [11] [12]}. The major causes of blindness globally^{[13] [14]} are cataract (39%), uncorrected refractive errors (18%), glaucoma (10%), age-related macular degeneration (7%), corneal opacity (4%), diabetic retinopathy (4%), trachoma (3%), eye conditions in children (3%), and onchocerciasis (0.7%). A comparison of prevalence of blindness has been shown in Figure 3.

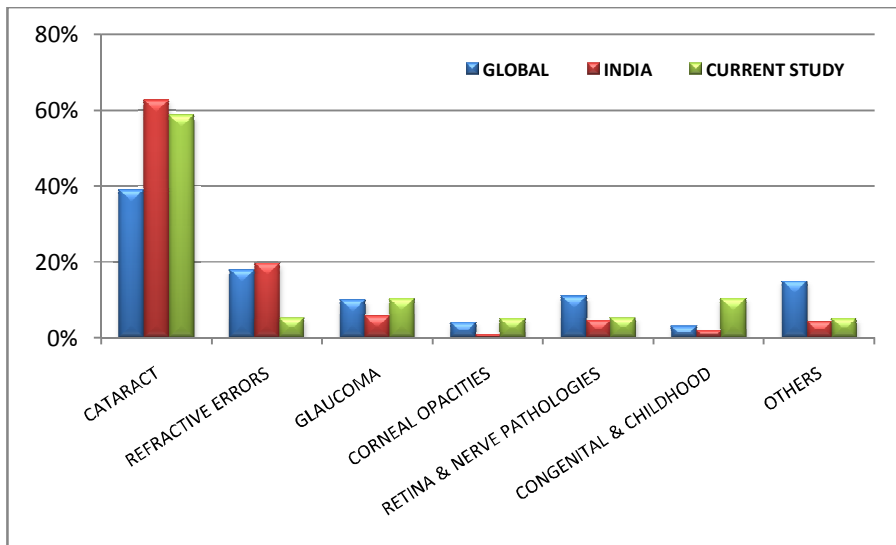


Figure 3 Comparison of Prevalence of Blindness (Global^{7,9,10,11,12}, India^{13,14})

Blindness was more prevalent among males (54.6%) than females (45.4%), occurring in a ratio of 1.2 : 1. While the study from Gujarat in India^[15], China^[16] and Latin America^[17] found no association, other studies from India found a significant association between gender and blindness^{[7] [18]}. An increase among men was noted but it was not statistically significant. It is possible that some unknown socio-demographic factor is influencing this trend. A comparison of incidence of blindness in both the genders has been shown in Figure 2. While blindness due to congenital causes was equal in both genders, a slight male preponderance was found in incidence of cataract

and retina and optic nerve pathologies. This was not statistically significant. But incidence of glaucoma and corneal disorders between males and females were in the ratio 4:1, which is significant. While all cases of blindness due to uncorrected refractive errors occurred in females, blindness due to trauma and other causes occurred only in males. The age specific blindness prevalence was found to be greater with increased age. Nearly 80.3% of blindness was noted over 40 years of age, consistent with other studies in India and the rest of the world^{[7] [9] [10] [12]}. Greater incidence was noted in 51 – 70 age group (57.7%) and cataract was the main reason behind, accounting for 76.7% of all

causes of blindness in this age group. 98.2% of cataract occurred over 40 years of age, this is statistically significant. This is consistent with other studies.^{[13] [14] [15]} Table 1 shows the causes of blindness in different age groups. An aging population can offset the efforts of prevention of blindness programmes unless appropriate measures are taken to account for the increasing demand for services.^[19] 92.8% suffered from chronic vision loss while 7.2% had acute loss of vision mainly due to neural pathologies, corneal ulcers and trauma. Of the acquired causes of blindness, 90.8% had slow progression while remaining 9.2% had rapid progression, in a ratio of 9.8:1. Of those who had diurnal variation (44.3%), 41 had cataract (95.3%). This is statistically significant. This shows that diagnosis of cataract can be arrived directly based upon the history of diurnal variation. Similarly, of those who had watering (27.8%) and diplopia (18.5%), 22 and 16 patients i.e 81.4% and 88.8% had cataract respectively. 38.1% had no symptoms except diminished vision. Among those who were diabetic (26.8%), 21 patients developed cataract (80.7%). This result was found to be in concordance with other studies.^{[14] [15] [19]} This observation was statistically significant with p - value = 0.006. Among those who were hypertensive (18.6%), 4 patients developed glaucoma (22.2%). This observation was not statistically significant. Among those who smoke (14.4%), 9 patients developed cataract (62.5%). This is significant. Among those patients who had family history of blindness (10.3%), 4 were congenitally blind (38.5%). This observation was statistically significant with p - value = 0.007. This could have been prevented by antenatal checkups and amniocentesis to detect chromosomal anomalies. 24.7% suffered from bilateral vision loss and 75.3% had unilateral vision loss. As shown in Table 3 the major causes for bilateral loss of

vision were congenital (33.3%) causes and cataract (29.1%). 69.8% of the males who are blind are between 51 – 80 years and 75% of the females who are blind are from 41 – 70 years.

23.7% showed improved vision with pinhole. They are likely to have better prognosis following correction. Among the corneal pathologies, opacities (9.3%), microcornea (2.1%) and endothelial loss (1%) were found to be significant. 5.1% of blindness was due to corneal involvement. This is comparable to our Indian studies.^[8] Lens examination revealed that 27.3% of the lens were normal, 56.2% revealed opacities, 14.4% were pseudophakic and 2.1% were aphakic. Bilaterally 30.1% showed opacities, 4.1% were pseudophakic and 2.1% were aphakic. This obviously revealed that lens pathology (cataract) was the important cause of blindness. This was in concordance with other studies.^{[7] [9] [10] [11] [12]} Among 24 pseudophakics, 12.5% developed posterior capsular opacification (PCO). This revealed that 1 in 8 developed PCO. Among those who were assessed for refractive status (20%), only 2.1% showed improvement with glasses (10%). Of the 10 glaucoma cases, 8 showed increased intra ocular pressure (80%), which is statistically significant. This shows that monitoring of IOP regularly can help in the early diagnosis of glaucoma. Visual field assessment revealed reduced field of vision in 36.1%. The main causes for reduced field of vision were retinitis pigmentosa (22.2%) (tubular vision) and glaucoma (22.4%). Of the 10 glaucoma cases, 4 had both increased IOP and reduced visual field (40%). 2 cases revealed all the three changes namely, raised IOP, reduced visual field and optic nerve head changes (20%). No subject was found to be blind due to diabetic retinopathy, similar to that found by Dandona et al.^[18] So was the case in age related macular degeneration, trachoma and onchocerciasis. It is possible that some unknown

socio-demographic factor is influencing this trend. As the Figure 3 clearly shows, the prevalence of blindness due to cataract is on peak in India as well as in the current study. This is principally oriented towards the currently inadequate cataract surgical coverage here, when compared to the world. Prevalence of glaucoma as stated in the study is nearly equivalent to the global statistics. A slight decrease found in Indian statistics may probably be due to lack of awareness about the disease in our country. Blindness due to uncorrected refractive errors are nearly equal in global and national levels, but the study reveals lower prevalence of this cause. This may probably be due to earlier correction of refractive errors before they progress to poor vision. Prevalence of corneal opacities leading to blindness as stated in the study is nearly equivalent to the global statistics, while the Indian statistics shows reduced prevalence. Blindness due to retinal and nerve pathologies was lower in our setup when compared to the world. So is the

prevalence of blindness due to other etiologies. This is attributed to reduced incidence of diseases causing blindness in our country. The study shows an increase in the occurrence of blindness due to congenital causes, probably due to increased visits of such patients to hospitals to receive concessional certificates.

Conclusion

Blindness is more common over 40 years of age. Cataract is the leading cause of blindness. Diabetics are more prone to get cataract. Positive family history increases the incidence of congenital blindness. Cataract and congenital causes are the main reasons for bilateral blindness. Uncorrected refractive errors are more common among females. Vision loss usually has a slow progression. All causes of blindness observed in the study could have been either prevented by early detection (congenital causes, glaucoma), or treated and cured by appropriate interventions (cataract, uncorrected refractive errors, corneal blindness).

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