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ORIGINAL RESEARCH

Clinicodemographic Profile of Visual Disability Among Applicants for Disability Certification in South India

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Purpose: To study the causes of visual disability and clinico-demographic factors among applicants for disability certification in a tertiary care hospital in Karnataka.

Methods: A prospective, cross-sectional study analyzing the applications of 194 people who applied for disability certificates between May 2022 and September 2023 at a tertiary care hospital in Karnataka. The causes of visual impairment/blindness, percentage of disability, and respective sociodemographic factors, such as age and sex, were analyzed. The analysis was performed following the visual impairment (VI) disability categories and percentages proposed by the Government of India.

Results: A total of 194 applications for disability certificates were analyzed, of which 60.8% (118) were males and 39.2% (76) were females. Most of the applications were from the 35–60 years age group (41.2%), followed by the 18 (26.8%), 60+ (17.5%), and 18–35 years age groups (14.4%). When the specific diagnostic causes of visual impairment and blindness were analyzed, the leading cause was retinitis pigmentosa (18.5%), followed by optic atrophy (11.8%), corneal opacities (9.79%), and pathological myopia (6.7%). Almost one-third of the cases (28.9%) were found to have been preventable causes of VI/blindness. Among these patients, most avoidable cases were under 18 years of age (40.4%). More than half of the applicants were categorized as blind (59.3%), followed by 21.1% with moderate VI, 13.4% with mild VI, and 6.2% with severe VI.

Conclusion: This study highlights various causes and associated demographic factors of visual impairment and blindness among applicants for disability certificates. Analysis of the applications for visual disability certification proves useful in obtaining data on the burden of visual impairment on the healthcare system. Although the specific findings are more local in scope, these data provide insight into changing trends in eye disease and can be used to better plan and implement local- and national-level intervention strategies.

Keywords: visual disability, visual impairment, avoidable blindness, disability certification

Introduction

The International Classification of Diseases-11 defines visual impairment as presenting the best corrected visual acuity in the better-seeing eye worse than 6/12 or 20/40. [1] Out of 253 million visually impaired people worldwide, up to 90% of this burden is seen in developing countries, such as India.[2] Of the 36 million people who are blind globally, 80% of such cases are due to avoidable causes.[2] Efforts to combat this barrier to eye health have been taking place for decades at both the global and national levels. For example, the World Health Assembly's Global Action Plan (WHA GAP) aimed to reduce the prevalence of avoidable causes of visual impairment by 25% from 2010–2019[3]. India was the first country in the world to launch a national program for the control of blindness, which has been instrumental in reducing the prevalence of blindness in the country. Encouragingly, the WHA GAP measure of a 25% reduction in prevalence has been achieved in India[4] but has not been achieved globally.[5] However, visual impairment and blindness continue to be major public health concerns in the country.[6]

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As science and technology continue to evolve and lifespans continue to be extended, there has been an identified need in healthcare to pay attention to noncommunicable diseases, such as age- and lifestyle-related diseases, with an emphasis on promotional and prevention-based approaches. This can be similarly extrapolated to eye health and visual impairment, with changing risk factors and lifestyles contributing to changing epidemiological trends.[7] For example, in Southeast Asia, there has been great success in the control of trachoma, a communicable disease.[7] On the other hand, there is an increasing prevalence of diseases such as myopia, which is thought to be linked to increased time spent in classrooms, and diabetic retinopathy, a lifestyle-related disease.[7] Notably, the prevalence of visual impairment and blindness varies across geographical regions, with different sociodemographic factors contributing to the same prevalence. Given this variation in prevalence across the country, there is a need for evidence-based local data to effectively plan, implement, monitor, and evaluate community-based interventions in a particular region.

According to guidelines by the Ministry of Social Justice and Empowerment of the Government of India, the minimum degree of disability should be 40% for an individual to be eligible for any concessions or benefits.[8] This is a completely voluntary process, and obtaining this certification allows a visually disabled person to access various social services and benefits (such as employment, education, travel concessions, and tax benefits). However, even if this certification is not obtained by the individual, analysis of the applications for visual disability certification is useful for obtaining data on the burden of visual impairment on the healthcare system and the various causes and factors associated with visual impairment and blindness in the region.[9] Hence, we aimed to analyze the causes of visual disability in applicants for disability certification and the associated demographic factors in a tertiary care hospital in Karnataka.

Materials and Methods

A prospective, cross-sectional study was conducted by analysis of the applications of 194 people who applied for disability certificates was performed at Government Wenlock Hospital, Mangalore, Karnataka. The study was carried out in accordance with the guidelines of the Declaration of Helsinki and subsequent revisions. The authorization of the Institutional Ethics Committee of Kasturba Medical College Mangalore, India was obtained. (Name of the Ethics Committee: Kasturba Medical College, Mangalore IEC No: IEC KMC MLR 04–2022/120).

Informed consent was obtained from all the study participants. The government of India guidelines were followed for disability/blindness certification.[8] The criterion for selection was all the applicants for disability certification in the ophthalmology department during the study period. Records with less than 50% incomplete information were excluded. The sample size calculated was 288 participants, with the formula $n=z^2pq/d^2$, where z= 1.96 at 95% Cl, p=75%;[9] q=1–p=25%; and d= degree of accuracy=5%. We analyzed all applications for visual disability certification between May 2022 and September 2023 to determine the causes of visual impairment/blindness, percentage of disability, and respective sociodemographic factors, such as age and occupation, after excluding incomplete/correctable causes of VI.

The same analysis was performed following the visual impairment (VI) disability categories and percentage disability calculation per the proposed guidelines of the Government of India[9] (Table 1). The data were analyzed via IBM SPSS version 25. Continuous and categorical data are presented as the means and percentages, respectively. Comparisons of

Table 1 Visual Impairment (VI) Disability Categories as per the Proposed Guidelines of the Government of India

Better Eye Best Corrected	Worse Eye Best Corrected	Percent Impairment	Disability Category	
6/6 to 6/18	6/6 to 6/18	0%	0	No Visual impairment
	6/24 to 6/60	10%	0	Mild Visual impairment
	Less than 6/60 to 3/60	20%	I	
	Less than 3/60 o Light Perception	30%	II (One eyed person)	

(*Continued*)

Table 1 (Continued).

Better Eye Best Corrected	Worse Eye Best Corrected	Percent Impairment	Disability Category	
6/24 to 6/60Or Visual field less than 40 up to 20 degree around center of fixation or hemianopia involving macula	6/24 to 6/60	40%	III a (low vision)	Moderate visual impairment
	Less than 6/60 to 3/60	50%	III b (low vision)	
	Less than 3/60 to No Light Perception	60%	III c (low vision)	
Less than 6/60 to 3/60 Or Visual field less than 20 degree around center of fixation	Less than 6/60 to 3/60	70%	III d (low vision)	Severe visual impairment
	Less than 3/60 to No Light Perception	80%	III e (low vision)	
Less than 3/60 to 1/60 Or Visual field less than 10 degree around center of fixation	Less than 3/60 to No Light Perception	90%	IV a (Blindness)	Blindness
Only HMCF Only Light Perception No Light Perception	Only HMCF (hand movements counting fingers) Only Light Perception No Light Perception	100%	IV b (Blindness)	

continuous variables against different categorical variables were performed via ANOVA followed by Tukey's post hoc analysis. The associations between categorical variables were evaluated via chi-square analysis. A p value of ≤0.05 was considered significant for all analyses.

Results

A total of 194 applications for disability certificates were analyzed, of which 60.8% (118) were males and 39.2% (76) were females. Most of the applications were from the 35–60 years age group (41.2%), followed by the 18 (26.8%), 60+ (17.5%), and 18–35 years age groups (14.4%). A total of 28.4% of the applicants had been educated until middle school, whereas 13.4% and 11.4% obtained high school and graduate level education, respectively. A total of 23.2% of the applicants had completed only primary school, and the remaining 23.2% had no educational qualifications.

Among the 194 applicants, only 10 had a history of consanguinity in their family (5.2%). Additionally, only 14 applicants (7.2%) had a history of eye disease in their families.

We found that 8.8% of patients had a history of eye trauma, and 22.7% had a history of previous eye surgery. Additionally, only 17.5% reported a history of usage of low vision aids.

We classified the causes of VI on the basis of the site of disease as the whole globe, cornea, lens, retina, optic nerve, or cortex. The leading anatomical site was the retina (36.7%), followed by the whole globe (27.8%), optic nerve (17.5%), cornea (9.8%), lens (6.7%), and cortex (1.5%) [Figure 1].

The leading etiological cause of VI/blindness was dystrophy (25.8%) (N=50), followed by congenital diseases (19.1%) (N=37) and degenerative conditions (12.4%) (N=24). Other major causes were refractive error/amblyopia (8.2%) (N=16), trauma (8.2%) (N=16), hereditary diseases (7.2%) (N=14), vascular conditions (5.7%) (N=11), inflammatory conditions (5.7%) (N=11), and glaucoma (5.7%) (N=11). Other causes were strabismus/amblyopia (1.5%) (N=3) and neoplasia (0.5%) (N=1) [Table 2].

Almost one-third of the cases (28.9%) were found to have been preventable causes of VI/blindness [Table 3]. Among these, the maximum number of avoidable cases was observed in the under 18 age group (40.4%), followed by the 60+, 35–60-, and 18–35-year-old age groups (in descending order) [Figure 2]. However, there was no statistically significant correlation between age and whether the cause of VI was preventable (p=0.071).

We found no association between age and the anatomical site of disease (p= 0.167); however, there was a significant association between age and the etiology of disease (p=0.001). A greater proportion of those under 18 years of age were

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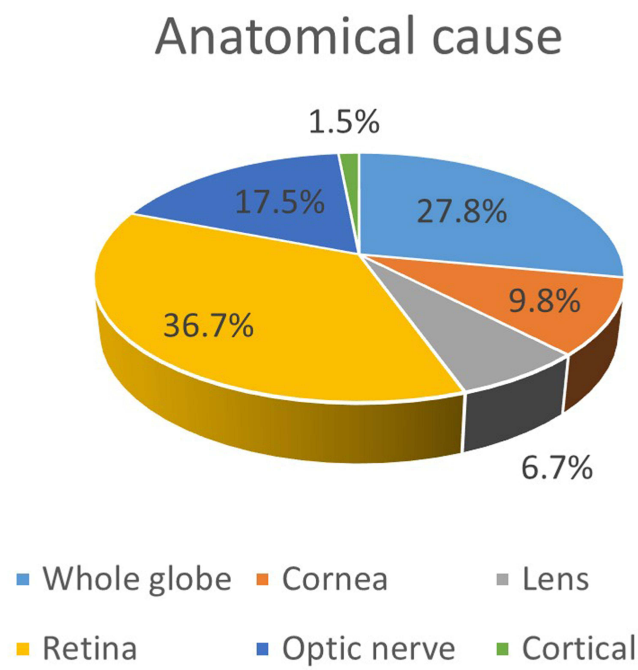

Figure 1 Distribution of patients according to anatomic cause.

found to have congenital diseases, whereas in elderly individuals (60+), the predominant causes of VI/blindness were dystrophy or degenerative diseases [Figures 3 and 4].

More than half of the applicants were categorized as blind (59.3%), followed by 21.1% with moderate VI, 13.4% with mild VI, and 6.2% with severe VI [Table 4].

Table 2 Distribution of Patients by Etiological Cause

Etiological Cause	N(Number of Applicants)	%(Percentage of Applicants)
Dystrophy	50	25.8
Degenerative	24	12.4
Vascular	11	5.7
Hereditary	14	7.2
Refractive error/amblyopia	16	8.2
Congenital	37	19.1
Traumatic	16	8.2
Glaucoma	11	5.7
Strabismus/amblyopia	3	1.5
Inflammatory	11	5.7
Neoplasia	1	0.5

Table 3 Distribution of Patients Based on the Presence of a Preventable/Avoidable Cause

Preventable/Avoidable Cause of Blindness	N(Number of Applicants)	%(Percentage of Applicants)
Yes	56	28.9
No	138	71.1

Age was correlated with the severity of visual impairment (p=0.022), with most older patients rather than younger patients falling under the blindness category [Table 5]. Similarly, age was also significantly related to the percentage of patients with disability (p<0.001).

There was no association between the anatomical site of disease and the severity of visual impairment (p= 0.089). Furthermore, no correlation was found between the etiology of disease and the severity of visual impairment (p=0.075) [Table 6 and 7]. However, the percentage disability of patients was greater for retinal diseases than for whole-globe diseases (p=0.021). Similarly, etiologic cause was also associated with the percentage of disability (p<0.001), the p value being significant, as only one patient with neoplasia had 100% disability [Table 7].

In terms of the relationship between the prevention of VI and disease severity, blindness was observed in a significantly lower proportion of patients with an avoidable cause [Table 8].

When the specific diagnostic causes of visual impairment and blindness were analyzed, the leading cause was retinitis pigmentosa (18.56%), followed by optic atrophy (11.86%), corneal opacities (9.79%), and pathological myopia (6.7%) [Table 9]. Other significant conditions included glaucoma, macular dystrophy, and diabetic retinopathy [Table 9].

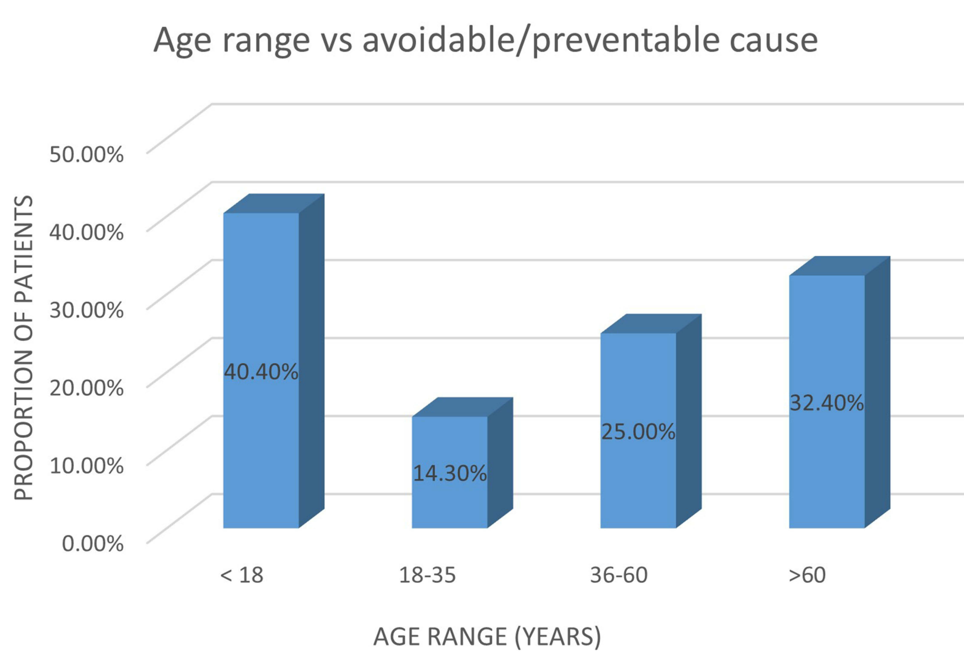

Figure 2 Distribution of patients based on the presence of a preventable/avoidable cause.

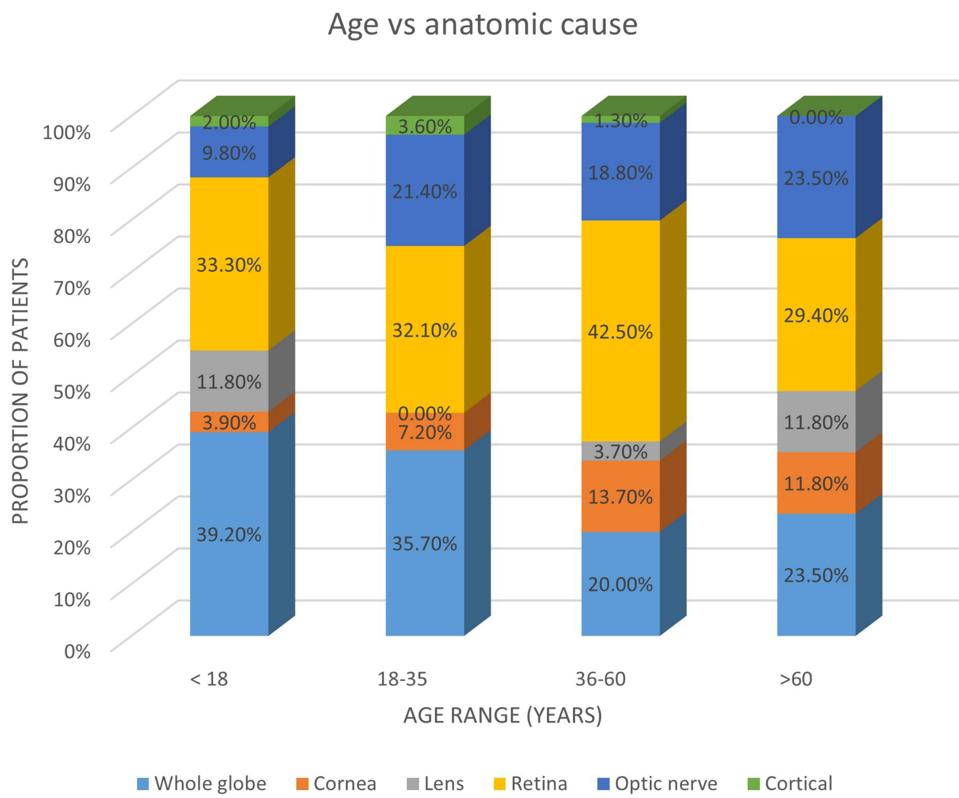

Figure 3 Association between age and anatomic cause.

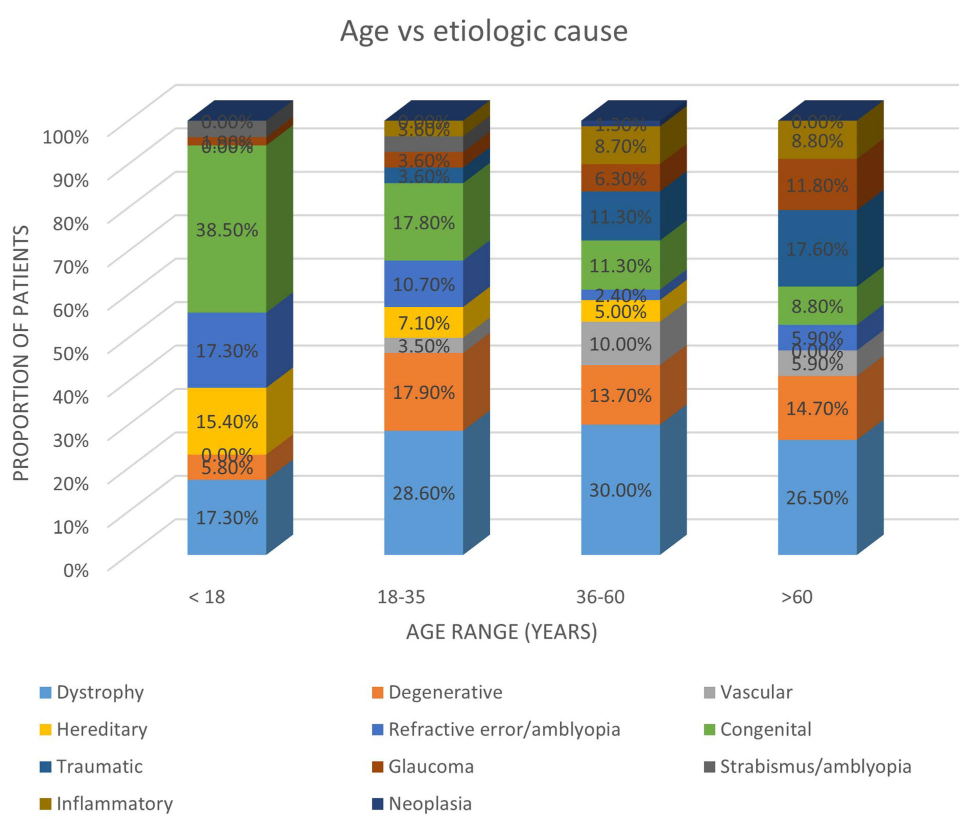

Figure 4 Association between age and etiological cause.

Table 4 Distribution of Patient-Based Categories of Visual Impairment

Low Vision	N(Number of Applicants)	%(Percentage of Applicants)
Mild VI	26	13.4
Moderate VI	41	21.1
Severe VI	12	6.2
Blindness	115	59.3

Table 5 Association Between Age and Low Vision According to Chi-Square Analysis. Age Was Significantly Linked to the Severity of Low Vision, With Most Older Patients Showing Blindness Than Younger Patients

Age (in years)	N(Number of Applicants)	Visual Impairment				P value
	%(Percentage of Applicants)	Mild	Moderate	Severe	Blindness	
< 18	N	9	18	2	23	0.022
	%	17.3%	34.6%	3.8%	44.2%	
18–35	N	7	4	2	15	
	%	25.0%	14.3%	7.1%	53.6%	
35–60	N	7	16	7	50	
	%	8.8%	20.0%	8.8%	62.5%	
≥60	N	3	3	1	27	
	%	8.8%	8.8%	2.9%	79.4%	

Table 6 Association Between Anatomic Cause and Percentage Disability According to ANOVA

Anatomic Cause	N(Number of Applicants)	Mean (Percentage Disability)	Standard Deviation	P value
Whole globe	54	68.15	28.752	0.020
Cornea	19	81.58	26.721	
Lens	13	67.31	21.853	
Retina	70	82.86	23.415	
Optic nerve	34	81.47	24.757	
Cortical	3	73.33	28.868	

Table 7 Etiologic Cause Vs Percentage Disability According to ANOVA

Etiologic Cause	N(Number of Applicants)	Mean Percentage Disability	Standard Deviation	P value
Dystrophy	50	86.00	21.759	0.001
Degenerative	24	78.75	22.710	
Vascular	11	80.91	24.271	
Hereditary	14	72.14	26.941	
Refractive error/amblyopia	16	56.88	25.224	

(*Continued*)

Table 7 (Continued).

Etiologic Cause	N(Number of Applicants)	Mean Percentage Disability	Standard Deviation	P value
Congenital	37	75.54	26.920	
Traumatic	16	61.88	32.704	
Glaucoma	11	85.45	19.679	
Strabismus/amblyopia	3	46.67	15.275	
Inflammatory	11	90.00	20.494	
Neoplasia	1	100.00		

Table 8 Presence of Avoidable Causes Vs Visual Impairment via Chi-Square Analysis

Avoidable Cause	N(Number of Applicants)	Visual Impairment				P value
	%(Percentage of Applicants)	Mild	Moderate	Severe	Blindness	
Yes	N	9	23	4	20	0.001
	%	16.1%	41.1%	7.1%	35.7%	
No	N	17	18	8	95	
	%	12.3%	13.0%	5.8%	68.8%	

Table 9 Distribution of Specific Diagnoses in the Study Population

Cause	N(Number of Eyes)	%(Percentage of Eyes)
Retinitis pigmentosa	72	18.56
Optic atrophy	46	11.86
Corneal opacity	38	9.79
Pathological myopia	26	6.7
Glaucoma	22	5.67
Macular dystrophy	18	4.64
PDR	17	4.38
Amblyopia	16	4.12
Phthisis bulbi	12	3.09
Microphthalmos	12	3.09
Others	109	28.14

Discussion

As argued by Wong et al, there are significant economic and social consequences for visual impairment, which cost approximately 0.5–0.7% of our nation's yearly GDP.[10] Visual disability certification is an attempt to bridge this socioeconomic gap by identifying those in need of visual rehabilitation measures, with the added benefit of providing

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valuable data. This can be used to monitor changing trends in eye disease and aid in the crafting of regional and national health care policies.

A majority of the applicants in our study were males, and a similar trend was observed in similar studies conducted in other regions of Karnataka, such as Hassan[11] and Bangalore.[12] The same trend is observed in other states.[9],[13–15] However, compared with national[4] and global[2] surveys, visual impairment is more common in females, which leads us to conclude that there is an underrepresentation of females in applications for disability certificates. This could be due to a greater proportion of male applicants for job-related benefits or due to a lack of accessibility/knowledge for female applicants.

Approximately fifty-five percent of the applicants were from the working population (18–60 years), mirroring the trends reported in similar studies.[11],[12],[14] Notably, as shown by Bunce et al, this may not be representative of the entire region, as there is a tendency for eligible patients to be unregistered, and this tends to increase with age.[16] Furthermore, other studies have noted that the primary motives for seeking visual disability certification are financial and transport reasons, which are required more by working-age groups, leading to their overrepresentation.[17]

A total of 23.3% of the applicants did not have any educational qualifications. This is an important sociodemographic factor to consider, as it has been noted that the odds of blindness increase with illiteracy.[4] Several measures aimed at preventing eye disease, such as screening camps and awareness programs conducted at schools, fail to reach this segment of our population. On the other hand, the lack of schools for the blind in rural areas might have led to a greater proportion of applicants with blindness having no educational qualifications.

More than one-third of the applicants had retinal problems, followed by diseases worldwide. An increased prevalence of retinal diseases has also been observed in Bangalore,[9] which is in the same state as Karnataka, and also in Central India.[13] Khan et al in northern Maharashtra[14] and Ghosh et al in West Bengal[15] also reported a high proportion of global issues among visually impaired people. Our study also revealed that the leading cause of visual impairment is retinitis pigmentosa, closely mimicking the trend in Bangalore. A study in Central India noted an increase in the prevalence of retinitis pigmentosa in their region[13.] Other retinal diseases include macular and cone dystrophies, diabetic retinopathies, and Stargardt's disease. This is especially significant given that our study revealed that there is greater severity/ percentage of disability in retinal diseases. This contrasts with global estimates of cataracts and uncorrected refractive error as leading causes of visual impairment.

In addition to dystrophies (25.8%), congenital eye diseases are the largest contributors to impaired vision. The leading etiological cause in the under 18 age group is congenital disease, whereas the >60 years population primarily has dystrophic or degenerative diseases. This indicates a need for a long-term approach via genetic counseling and education. Awareness regarding the dangers of consanguineous marriages must be stressed. This is because the predominant pattern of retinitis pigmentosa in India is autosomal recessive, of which 92% is the result of a consanguineous marriage.[18] This would also contribute to a reduction in the incidence and severity of complications seen in retinitis pigmentosa, such as glaucoma and complicated cataracts.[19] Other diseases observed in our region, such as oculocutaneous albinism, congenital cataracts, and retinal/macular dystrophies, can also be the result of consanguinity. Additionally, access to affordable genetic screening is still a significant barrier, thus necessitating a grassroots preventive approach.

A nationwide survey of blindness in the 50+ age group revealed an estimated decrease of 25% in the number of individuals with impaired vision in India,[4] with a cataract-centric approach used thus far.[20] It is the need of the hour to consider a larger investment in preventive approaches rather than just treatment-based approaches. Our study revealed that only 28.9% of those with impaired vision had a background of avoidable causes, with a maximum in the under 18 age group. Notably, the severity of the disease is lower for avoidable diseases. Among the avoidable causes, disability due to refractive errors, congenital cataracts, and amblyopia could be reduced by increasing screening in schools and via health camps. An increase in the stringency of workplace regulations and better awareness of workplace injuries and their prevention are also necessary to address the burden of phthisis bulbi.[14,15] Unlike other avoidable conditions, the prevalence of diabetic retinopathy has increased globally in the last two decades.[5] This is especially concerning, as the burden of diabetes mellitus is expected to increase over time, especially in Asia, to as high as 600 million by the year 2040.[21] Interventions for increasing the severity of diabetic retinopathy require increases in both skill and resources;

therefore, the best approach is prevention via knowledge, screening, and adequate pharmacological and lifestyle measures.

We must consider not only the prevalence but also the degree of disability experienced. Approximately fifty-nine percent of the applicants were not just visually impaired but were certified as blind. There is a positive association between increasing severity of disease and age, similar to the findings of the West Bengal study (with a correlation coefficient of 0.12).[15] With increased life expectancy and as the population ages, this will become even more relevant. It must be ensured that access to visual health services is offered to all age groups, with measures considering those in rural areas and without access to transport.

Conclusion

We may not be able to extrapolate the results of this study to the national level because of the smaller sample size and underregistration by the people for various reasons. However, this study provides evidence-based local data for effectively planning, implementing, monitoring, and evaluating community-based interventions in Karnataka. The utilization of data from regional surveys along with national surveys is needed to effectively plan for the future of our citizens' health, but bias due to underregistration in some age groups must be considered.

Data Sharing Statement

Data are available from Mendonca, T. (2024, July 18). CLINICO-DEMOGRAPHIC PROFILE OF VISUAL DISABILITY IN A TERTIARY CARE CENTRE IN SOUTH INDIA. https://doi.org/10.17605/OSF. IO/TPCF4.

Ethical Committee Clearance

Institutional ethical committee clearance for the study was obtained. Name of the Institute: Kasturba Medical College, Mangalore IEC No: IEC KMC MLR 04-2022/120.

Consent to Participate/Consent for Publication

(According to ICMJE Recommendations for protection of research participants): Obtained from participants.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Mendonca, T. (2024, July 18). CLINICO-DEMOGRAPHIC PROFILE OF VISUAL DISABILITY IN A TERTIARY CARE CENTRE IN SOUTH INDIA. https://doi.org/10.17605/OSF. IO/TPCF4.

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Disclosure

The authors report no conflicts of interest in this work.

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