Section: Ophthalmology

Original Research Article

PREVALENCE AND CAUSES OF NON-CATARACT VISUAL IMPAIRMENT AMONG TRIBAL POPULATION

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ABSTRACT

Background: Visual impairment is a significant public health problem in India, particularly among tribal populations with limited access to eye care services. While cataract is a major cause, data on non-cataract visual impairment in tribal areas remain limited. **Objectives:** To determine the prevalence and causes of non-cataract visual impairment and blindness among the tribal population attending to a government hospital.

Materials and Methods: This hospital-based prospective observational study was conducted at the Department of Ophthalmology, District Hospital, Paderu, Andhra Pradesh, from March to June 2024. Eighty subjects aged more than forty years with best corrected visual acuity ≤6/18 in the better eye were included. Subjects with cataract and refractive errors were excluded. Comprehensive ocular examination was performed. Visual impairment was classified according to World Health Organization criteria. Data were entered in Microsoft Excel and analysed using SPSS software. Results were expressed as frequencies and percentages.

Results: The mean age of the study population was 54.29 years, with male predominance (64%). Visual impairment was present in 66%, severe visual impairment in 26%, and blindness in 10% of subjects. Corneal opacity (30%) was the most common cause of visual impairment, followed by glaucomatous optic neuropathy (18%). Toxic optic neuropathy due to adulterated toddy palm wine consumption accounted for 55% of blindness cases.

Conclusion: Most causes of non-cataract visual impairment and blindness were avoidable or treatable. Early detection, improved awareness, and strengthened eye care services are essential to reduce preventable blindness in tribal areas.

Keywords: Visual Impairment.

INTRODUCTION

Visual impairment and blindness continue to pose significant public health challenges in developing countries, including India. Although considerable progress has been made in reducing cataract-related blindness through national eye care programmes, a substantial burden of visual impairment persists due to causes other than cataract. These causes often remain under-recognised and inadequately addressed, particularly in underserved populations.[1] Tribal communities represent one of the most marginalised sections of Indian society and face multiple barriers to accessing healthcare services, including geographical inaccessibility, poor awareness, socioeconomic constraints, and limited availability of specialised eye care facilities. Consequently, preventable and treatable eye diseases often present at advanced stages in these populations, leading to avoidable visual impairment and blindness.[2]

Existing literature on visual impairment in India has largely focused on cataract and refractive errors as major contributors. However, data on the prevalence and pattern of non-cataract causes of visual impairment among tribal populations are limited.[3] Conditions such as corneal opacity, glaucomatous optic neuropathy, retinal vascular disorders, uveitis-related complications, and optic nerve diseases contribute significantly to visual disability and may be preventable if detected and treated early.[4]

Understanding the spectrum of non-cataract causes of visual impairment is essential for planning targeted screening programmes, strengthening referral systems, and allocating resources effectively in tribal areas. Identification of avoidable causes can further support the development of community-based awareness and preventive strategies.[5]

The present study was undertaken to determine the prevalence and causes of visual impairment and blindness other than cataract among the tribal population attending a
government hospital in Andhra Pradesh, with the aim of highlighting preventable causes and guiding future public health interventions.

MATERIALS AND METHODS

Study Design and Reporting Guideline

This was a hospital-based prospective observational study conducted in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for reporting observational studies.

Study Setting

The study was carried out in the Department of Ophthalmology, District Hospital, Paderu, a government hospital catering predominantly to the tribal population of Andhra Pradesh, India.

Study Period

The study was conducted over a period of four months, from March 2024 to June 2024.

Study Population

A total of eighty subjects aged more than forty years attending the ophthalmology outpatient department were included in the study.

Selection Criteria

Inclusion Criteria

- Subjects aged more than forty years
- Best corrected visual acuity (BCVA) of ≤6/18 in the better eye
- Subjects willing to participate in the study and provide informed consent

Exclusion Criteria

- Presence of any type of cataract
- Refractive errors as the primary cause of visual impairment
- Visual acuity better than 6/18
- Subjects unwilling to participate in the study

Study Procedure

After obtaining informed consent, all subjects underwent a comprehensive ophthalmic evaluation. Visual acuity for distance was assessed using Snellen's visual acuity chart.

Anterior segment examination was performed using a slit-lamp biomicroscope. Intraocular pressure was measured using Goldmann applanation tonometry, followed by gonioscopy wherever indicated.

Posterior segment evaluation was carried out using 78 dioptre lens and indirect ophthalmoscopy after pupillary dilatation. Fundus photographs were obtained using a fundus camera when required for documentation. Each subject was categorised based on the World Health Organization [6] classification of visual impairment into visual impairment, severe visual impairment, or blindness. Causes of visual impairment were further classified as avoidable or unavoidable and according to the primary ocular tissue involved.

Statistical Analysis

Data was entered into Microsoft Excel to create the database. Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) software. Results were expressed as frequencies, percentages, tables, and graphs. Descriptive statistics were used for analysis. Wherever applicable, results were presented with appropriate indicators of measurement. A P value of <0.05 was considered statistically significant.

Ethical Considerations

The study was conducted in accordance with the ethical standards of the responsible institutional ethics committee and in compliance with the Declaration of Helsinki (1975), as
revised in 2000. Ethical committee approval was obtained prior to the commencement of the study. Written informed consent was obtained from all participants. Confidentiality of patient information was strictly maintained, and no identifying information was included in the manuscript.

RESULTS

Table 1: Demographic profile of study population

Total subjects	80
Males	51 (64%)
Females	28 (36%)
Mean age (years)	54.29

Table 2: Distribution of severity of visual impairment

Category	Percentage
Visual impairment	66%
Severe visual impairment	26%
Blindness	10%

Table 3: Causes of Visual Impairment, Severe Visual Impairment, and Blindness

Causes	VI (%)	SVI (%)	Blindness (%)
Corneal opacity	30	15	–
Glaucomatous optic neuropathy	18	24	–
Anterior uveitis complications	12	–	–
Hypertensive retinopathy and vascular occlusion	12	–	–
High-risk proliferative diabetic retinopathy	9	15	18
Optic atrophy (post-inflammatory)	8	15	–
Age-related macular degeneration	6	24	–
Phacolytic glaucoma sequelae	–	–	18
Endophthalmitis	–	–	9
Toxic optic neuropathy(toddy palm wine)	–	–	55

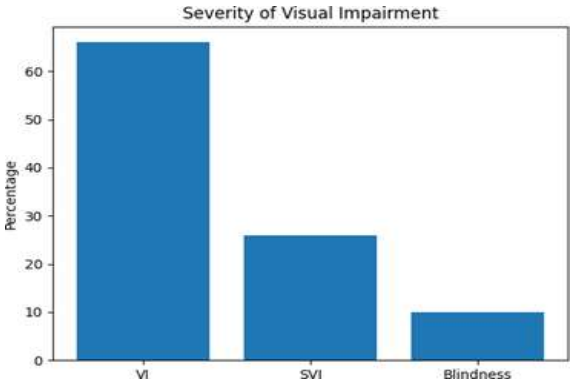


Figure 1: Bar graph showing distribution of severity of visual impairment

1) Causes of Early/Moderate Visual Impairment

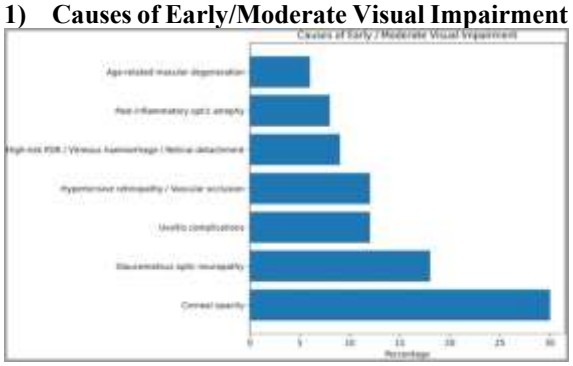


Figure 2: Bar graph showing causes of early/moderate visual impairment

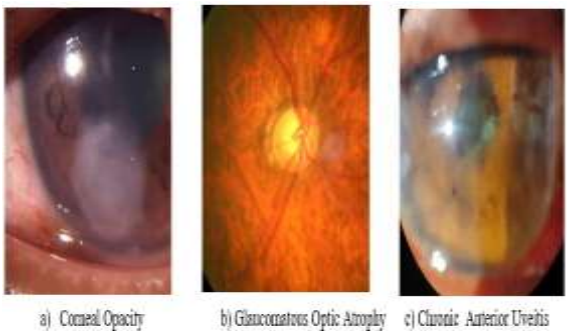


Figure 3: Images showing causes of early/moderate visual impairment

2. Causes of Severe Visual Impairment

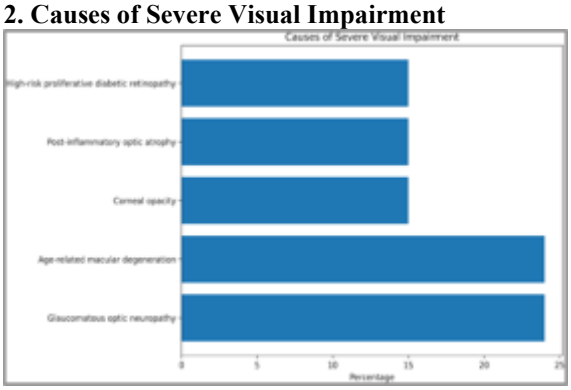


Figure 4: Bar graph showing percentage of causes of severe visual impairment

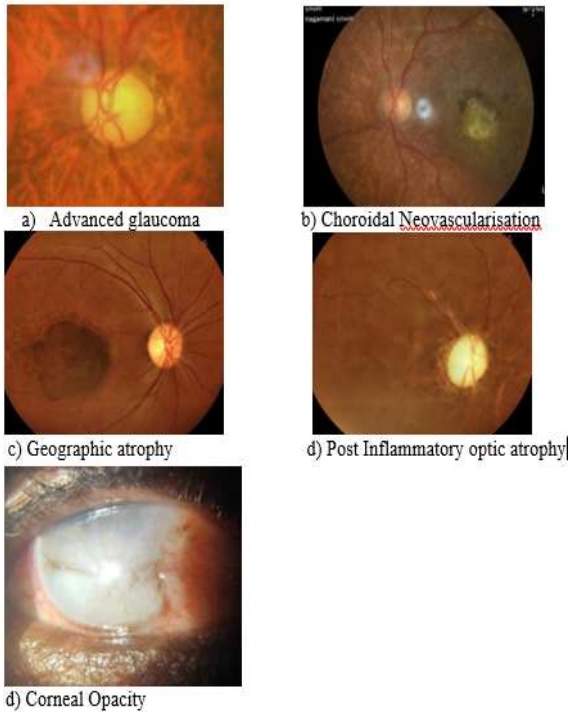


Figure 5: Images showing causes of severe visual impairment

3. Causes of blindness

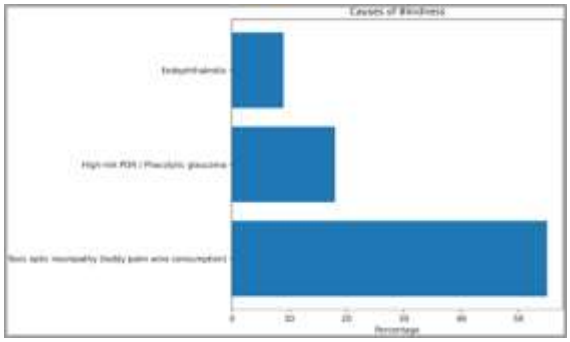


Figure 6: Causes of blindness



Figure 7: Images showing cause of blindness

DISCUSSION

The present study demonstrates a substantial burden of non-cataract visual impairment and blindness among the tribal populationattending a government hospital in Andhra Pradesh.

While national programmes have significantly reduced cataract-related blindness, non-cataract causes continue to contribute considerably to visual morbidity, particularly in underserved tribal communities.[1,7] This highlights an important epidemiological transition and underscores the need to expand blindness control strategies beyond cataract alone.

A major finding of this study is the predominance of avoidable and treatable causes of visual impairment. Corneal opacity emerged as the leading cause of early and moderate visual impairment. This finding is consistent with studies from tribal and rural regions of India, where corneal diseases related to trauma, infection, and delayed treatment remain highly prevalent.[2-4,8] Limited access to primary eye care services, poor awareness, and delayed presentation contribute significantly to the persistence of corneal blindness in these populations. These observations reinforce the need for strengthening primary eye care, promoting early treatment of corneal infections, and improving referral mechanisms.

Glaucomatous optic neuropathy was identified as a major contributor to both visual impairment and severe visual impairment. This is in agreement with previous studies that have highlighted glaucoma as a leading cause of irreversible blindness due to its asymptomatic progression and lack of routine screening.[9-11] The high burden of glaucoma-related visual loss observed in this study underscores the importance of incorporating glaucoma screening into community outreach programs and improving access to diagnostic facilities in tribal areas.

An important and distinctive observation in this study is that toxic optic neuropathy due to consumption of adulterated toddy palm wine was the leading cause of blindness. Although toxic optic neuropathy has been reported in association with methanol poisoning and adulterated alcohol consumption, its prominence in a tribal hospital-based population is noteworthy.[12-14] This finding highlights the influence of socio-cultural practices on ocular morbidity and emphasises the need for targeted public health interventions, including community awareness programs and regulation of locally brewed alcoholic beverages.

Retinal disorders, including high-risk proliferative diabetic retinopathy and hypertensive retinopathy with vascular occlusions, also contributed significantly to severe visual impairment and blindness. Similar trends have been reported in studies from rural India and neighbouring regions, where patients often present at advanced stages due to lack of awareness and inadequate screening for systemic diseases.[1,15,16] These findings suggest an emerging burden of non-communicable diseases within tribal populations and highlight the importance of integrating ophthalmic services with general healthcare and non-communicable disease screening programs.

Overall, the findings of this study indicate that a large proportion of visual impairment in this population is preventable. Strengthening primary eye care services, improving community awareness, and implementing targeted screening and early intervention strategies are essential to reduce avoidable blindness in tribal regions.

However, certain limitations must be considered. The hospital-based design of the study may introduce selection bias and limit the generalisability of the findings to the wider tribal population. Additionally, the relatively small sample size restricts the ability to draw broader population-level conclusions. Future large-scale, population-based studies are warranted to better estimate the true burden and pattern of non-cataract visual impairment in tribal communities.

CONCLUSION

This study highlights a significant burden of non-cataract visual impairment and blindness among the tribal population, with a large proportion attributable to preventable or treatable causes. Corneal opacity and glaucomatous optic neuropathy emerged as leading contributors to visual impairment, while toxic optic neuropathy due to consumption of adulterated toddy palm wine was identified as a major and unique cause of blindness in this population.

These findings underscore critical gaps in early detection, awareness, and access to eye care services in tribal regions. The predominance of avoidable causes indicates that timely intervention through strengthened primary eye care, community-based screening programs, and health education can substantially reduce visual disability.

Importantly, the identification of toxic optic neuropathy as a leading cause of blindness highlights the need for targeted public health measures, including regulation of locally consumed substances and community awareness regarding their harmful effects.

A multi-sectoral approach integrating ophthalmic services with general healthcare and public health initiatives is essential to address both medical and socio-environmental determinants of visual impairment. Future population-based studies with larger sample sizes are warranted to validate these findings and guide policy-level interventions aimed at achieving sustainable reduction in preventable blindness in underserved tribal communities.

Limitations

This study is limited by its hospital-based design, which may introduce selection bias and limit generalisability to the broader tribal population. The relatively small sample size and short study duration further restrict wider applicability. In addition, the cross-sectional design prevents assessment of causal relationships. Lack of detailed evaluation of risk factors and limited availability of advanced diagnostic tools may have led to underestimation of certain conditions.

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