

Prevalence of Ocular Manifestations and Visual Impairment among Pre-employment Screening Candidates at a Tertiary Care Hospital, Tamil Nadu, India

AJAY VENKAT ANANTHAN¹, P DINESH², ASHWINI SONKAMBLE³, K MEENA DEVI⁴

ABSTRACT

Introduction: The importance of pre-employment check-ups cannot be understated. Every year visual impairment causes an enormous loss of productivity running in billions worldwide. One of the major reasons for this is lack of comprehensive data on national and international levels about the prevalence of visual impairment in the working sector.

Aim: To assess the prevalence of ocular manifestations and visual impairment among the pre-employment screening candidates at a tertiary care hospital, Tamil Nadu, India.

Materials and Methods: This cross-sectional prospective study was conducted, from March 2022 to July 2022, at Trichy SRM Medical College Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India. All the pre-employment candidates who attended the Ophthalmology Outpatient Department were

included in the study. A comprehensive ophthalmic evaluation was done to all the pre-employment candidates. The Statistical Package for Social Sciences (SPSS) version 2.0 was used for the data analysis.

Results: A total of 530 candidates were screened during this period, which included 325 (61.3%) males and 205 (38.6%) females. The mean age was 33.75±11.52 years. The most common ocular manifestation was refractive errors in 52 (9.81%), senile cataract in 43 (8.11%), presbyopia in 32 (5.66%) and amblyopia in 20 (3.77%) patients.

Conclusion: The overall prevalence of ocular manifestations and visual impairment among visual impairment was 43.39%. This helps in early detection of ocular morbidities among pre-employment candidates and appropriate and timely intervention will improve the productivity of the candidate.

Keywords: Amblyopia, Ocular morbidities, Presbyopia, Refractive errors, Senile cataract

INTRODUCTION

The most important and complex sense is vision. World Health Organisation (WHO) estimates about 1.04 billion people worldwide who needs correction and 49% of them have either no or inadequate correction [1-3]. India is one of the largest economies in the world; India aspires to be a \$5 trillion economy. About 68 million employees are currently registered in India; with many millions more unofficial workers, but there is productivity loss in employment, these include absenteeism and reduction in workforce participation. One of the major reasons for loss of productivity is related to health problems, Eye and vision disorders are the second most prevalent health problem. Suffering from visual impairment is likely to impede the productivity [4]. WHO in 2009 estimated that annually \$269 billion of productivity is lost worldwide due to uncorrected vision. Productivity losses due to the same reason are more in Asia (159 billion \$), in America (57 billion \$), Europe (50 billion \$) and in India alone it is about (37 billion \$) as per WHO 2009 Statistics [5]. Poor eye health imposes a recurring cost to the Indian economy equivalent to 0.6% of Gross Domestic Product (GDP) (INR 1.2 trillion) resulting in a substantial constraint on the country's growth aspirations [4]. Avoidable blindness reduces the probability of working by 30%, and those who remain in employment are 20% less productive. Also, caregivers spend 5-10% of their time taking care of those with blindness and the worst forms of visual impairment [4].

The aim of the study was to assess the prevalence of ocular manifestations and visual impairment among pre-employment screening candidates at a tertiary care hospital, Tamil Nadu, India.

MATERIALS AND METHODS

This cross-sectional prospective research was conducted in the Department of Ophthalmology at Trichy SRM Medical College

Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India, from March 2022 to July 2022. The Institutional Ethical Committee approval was obtained (Ref No:211/TSRMMCH&RC/ME-1/2022-IEC No:060). Pre-employment screening check-up included a comprehensive ocular examination conducted in the Department of Ophthalmology; the Department of Medicine conducted the physical examination and laboratory investigations. The pre-employment candidates included labours, clerks, computer operators, and drivers in the tyre industries. The sample size was calculated using WHO sample size calculator with 95% confidence interval and 10% level of significance.

Inclusion criteria: All candidates aged 18-59 years appearing for pre-employment screening were included in the study.

Exclusion criteria: Those not willing for ocular examination/those who have not given the consent to participate in study and patients attending Ophthalmology Department for eye check-up other than pre-employment screening were excluded from the study.

Candidates were apprised of the nature of the examination and its intended purpose, after obtaining their consent, the candidates demographic details (name, age, sex, address and occupation) were noted.

Study Procedure

Ophthalmic examination included measurement of visual acuity with Snellen distance visual acuity chart and Roman near vision chart and best corrected visual acuity. The pseudoisochromatic Ishihara colour plates were used to screen for colour blindness. Any candidates who had visual field defect on confrontation were subjected to visual field examination using perimetry machine. Detailed anterior segment examination was performed under

slit lamp. Posterior segment examination was done using 90D lens and indirect ophthalmoscope. Anterior segment and fundus photography was taken in case of any ocular pathology. Intraocular Pressure (IOP) was screened using non contact tonometer, those who had IOP >21 mmHg was confirmed using Goldman applanation tonometer. In any glaucoma suspects further evaluation was done with pachymetry for central corneal thickness, perimetry to rule out visual field defects. B-scan ultrasonography was done to rule out posterior segment pathology in those whose fundus could not be visualised due to ocular media opacity.

STATISTICAL ANALYSIS

Statistical Package for Social Sciences (SPSS) version 2.0 was used to enter and analyse the data. The mean and standard deviation of a person's age were calculated using descriptive statistics. For the ocular findings, a percentage was derived.

RESULTS

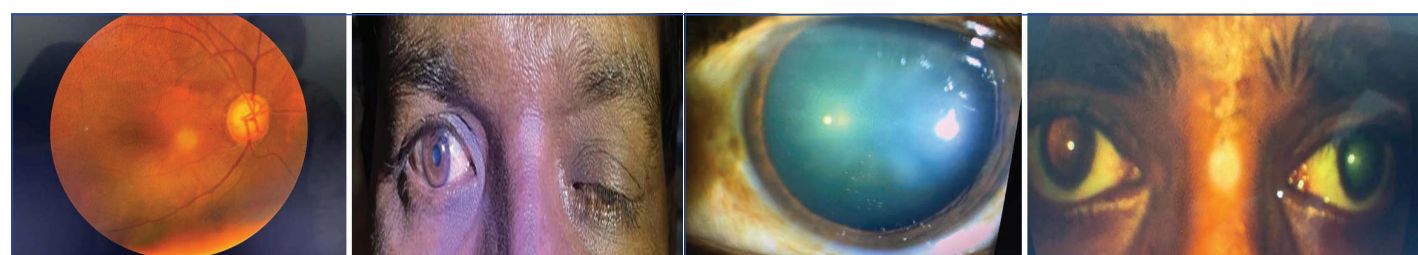
During the study period, 530 candidates were screened. Out of the 530 candidates, 325 (61.3 %) were male and 205 (38.6%) were females [Table/Fig-1]. The mean age was 33.75±11.52 years. The top two common ocular findings were refractive error 52 (9.81%) and senile cataract 43 (8.1%) [Table/Fig-2]. Overall, 50 (9.43%) patients were symptomatic and 180 (33.96%) were asymptomatic.

Age (years)	Males	Females
18-28	115	72
29-38	88	79
39-48	74	29
49-58	48	25
Mean±SD	81.25±24.29	51.25±24.41

[Table/Fig-1]: Age and gender distribution.

Ocular morbidity/diagnosis	n (%)
Emmetropia /No ocular morbidity	300 (57%)
Refractive error	52 (9.81%)
Amblyopia	20 (3.77%)
Cataract	43 (8.11%)
Glaucoma	4 (0.75%)
Ptosis	2 (0.38%)
Allergic conjunctivitis	10 (1.89%)
Colour blindness	5 (0.94%)
Corneal opacity	2 (0.38%)
Diabetic retinopathy	12 (2.26%)
Hypertensive retinopathy	15 (2.83%)
Strabismus	5 (0.94%)
Presbyopia	32 (5.66%)
Age related macular degeneration	5 (0.94%)
Pterygium	13 (2.45%)
Corneal degeneration	10 (1.89%)
Total	530 (100%)

[Table/Fig-2]: Prevalence of ocular manifestations.



[Table/Fig-3]: Right eye -Glaucomatous optic disc. [Table/Fig-4]: Left eye -Ptosis. [Table/Fig-5]: Rosette cataract. [Table/Fig-6]: Left eye: Cataract and exotropia (Images from left to right)

Refractive error without amblyopia was present in 52 candidates, out of which 27 were using spectacles and the rest of the 23 were unaware of their refractive condition. Two patients used contact lenses for their refractive error, both were high myopic, and one had Contact Lens Induced Acute Red Eye (CLARE). Glaucoma was found in four, out of which two were females and had chronic angle closure glaucoma; and two males were incidentally diagnosed with primary open angle glaucoma, one had a significant visual loss of <3/60 with the following fundus findings of glaucomatous disc [Table/Fig-3]. Age-related macular degeneration was found in five, the age range was 50 years and above, and three of them had grade IV nasal pterygium. One patient had total leucomatous corneal opacity. Two patients had ptosis; one had complete [Table/Fig-4] and one with partial ptosis.

Fifteen patients had grade two hypertensive retinopathy changes and 12 had mild non proliferative diabetic retinopathy changes. Of all the patients with cataract, two of them had a significant history; one with trauma history [Table/Fig-5] and other with history of electric shock which had caused cataract [Table/Fig-6]. The overall prevalence of ocular manifestations and visual impairment among visual impairment was 43.39%.

DISCUSSION

Refractive error was the major cause of visual impairment in this study with a prevalence rate of 9.81%, which was significantly lower compared to other studies; the other studies had a prevalence rate for refractive error ranging from 19.5-36.93% [Table/Fig-7]. One of the probable reasons could be the plenitude availability of eye services in and around Trichy. These services could have been accessed by the other employees (with refractive errors) missed out in the present study.

In the present study, the prevalence rate for cataract was 8.11% similar to others except the one by Desai R et al., (1%) [6-11]. In the current study, the youngest candidate presenting with cataract was 21 years (that occurred as a result of electric burn), other studies have also noted cataract in young individuals probably due to occupational hazards and occupational exposure to toxic chemicals, Ultraviolet (UV) radiation, which has cataractogenic effect [7-10]. In the current study, prevalence rate of presbyopia was 5.66%; a similar prevalence rate for presbyopia was seen in the studies by Ezisi CN et al., [7] and Oveneri-Ogbomo G et al., [8] but the study by Janarthan SD et al., [9] had a higher prevalence rate (53%). There is also a significant higher prevalence rate of pterygium in the other studies [7,8,10]; this may be due to the geographic location and interindustry differences.

This study was conducted in Trichy which is the major energy engineering manufacture hub of Tamil Nadu [12], and all these jobs are visually demanding. Even though studies have shown a significant population of workers suffering from visual impairment, only a few industries in this region sent their workers for pre-employment screening. These visually impaired workers need to be treated and managed to prevent the workers from injuring themselves and their fellow workers and to prevent productivity loss. Thus, these findings rationalise for the pre-employment ocular screening.

Authors name	Number of employees screened	Occupation of the population	Mean age (years)	Refractive error	Cataract	Presbyopia	Pterygium
Present study	530	Tyre Industry	33.75±11.52	50 (9.81%)	43 (8.11%)	32 (5.66%)	2.5%
Ezisi CN et al., [7]	384	Stone Industry	32±11.8	75 (19.5%)	25 (6.5%)	18 (4.7%)	37.9%
Ovenseri-Ogbomo G et al., [8]	406	Mining Industry	41.1	79 (19.5%)	26 (6.5%)	31 (4.7%)	25.8%
Janarthanan SD et al., [9]	111	Small Scale Industry	39.7±8.9	36.93% (whole number not provided by the authors)	6.3%	53%	-
Desai R et al., [10]	284	Metal Tube Industry	20-40	57 (20.4%)	3 (1.05%)	-	19.8%
Khan S et al., [11]	1500	Not Specified	23.14±5.66	50 (3.3%)	110 (7.3%)	42 (2.8%)	50 (3.3%)

[Table/Fig-7]: Comparison of ocular manifestations with other studies [7-11].

Limitation(s)

The sample size was relatively small and the screening candidates mostly comprised of workers from tyre industry; it does not cover all the sub-strata of workers to get the overall estimate. Follow-up could not be carried out to know the impact on productivity after treating the cause of the visual impairment.

CONCLUSION(S)

This study concluded that the prevalence of visual impairment and other ocular manifestations are high among workers. The prevalence of associated ocular manifestations varies according to the occupation and geographic location. The study has emphasised the need for comprehensive study at a regional and national level about pre-employment ocular check-ups and the full economic impact of vision problem needs among workers that go far beyond direct health costs.

REFERENCES

- [1] Resnikoff S, Pascolini D, Mariotti S, Pokharel G. Global magnitude of visual impairment caused by uncorrected refractive errors in 2004. *Bull World Health Organ.* 2008; 86(1):63-70.
- [2] Smith T, Frick K, Holden B, Fricke T, Naisoo K. Potential lost productivity from the global burden of uncorrected refractive error. *Bull World Health Organ.* 2009;87(6):431-37.
- [3] Holden BA, Fricke TR, Ho SM, Wong R, Schlenker G, Cronjé S, et al. Global vision impairment due to presbyopia. *Arch Ophthalmol.* 2008;126(12):1731-39.
- [4] Wong B, Singh K, Khanna RK, Ravilla T, Shalinder S, Sil A, et al. The economic and social costs of visual impairment and blindness in India. *Indian J Ophthalmol.* 2022;70(10):3470-75. Doi: 10.4103/ijo.IJO_502_22. PMID: 36190029.
- [5] Weighted distribution of \$Bn 269 total productivity loss (WHO report – 2009) according to level of impairment and GDP per head in each country. URL: <https://www.visioninstitute.org/research/the-social-and-economic-impact-of-poor-vision> (accessed date: 15/10/2022).
- [6] Ahmed M, Shefali MK, Husain I, Khondaker M, Alauddin M, Hossain MA, et al. Vision impairment and productivity among female garment workers in bangladesh. A cohort study. *Asia-Pacific Journal of Ophthalmology.* 2022. Available from: <https://doi.org/10.1097/apo.0000000000000485>.
- [7] Ezisi CN, Eze BI, Okoye O, Aghaji A, Uche NJ, Ogbonnya C, et al. The clinical burden and spectrum of ophthalmic disorders in stone industry employees from Nigeria. *Open Journal of Ophthalmology.* 2018;8(4):191-06. Available from: <https://doi.org/10.4236/ojoph.2018.84023>.
- [8] Ovenseri-Ogbomo G, Ocansey S, Abu E, Kyei S, Boadi-Kusi S. Oculo-Visual findings among industrial mine workers at Goldfields Ghana Limited, Tarkwa. *Ophthalmol Eye Dis.* 2012;4:35-42. Doi: 10.4137/OED.
- [9] Janarthanan SD, Vasanth J, Reddy A, Chaudhry M. Visual profile of the small scale industry workers at the Ambattur Industrial Estate, Chennai. *J Clin Exp Ophthalmol.* 2017;8(2):646. Doi: 10.4172/2155-9570.1000646.
- [10] Desai R, Desai S, Desai N, Kumar K. Visual status of industrial workers. *Indian J Ophthalmol.* 1990;38(2):64-65.
- [11] Khan S, Rafique A, Zafar O. Frequency of incidental ocular findings during preemployment screening at a tertiary care eye hospital. *Pak J Med Sci.* 2021;37(3):746-50. Doi: <https://doi.org/10.12669/pjms.37.3.3177>.
- [12] District industrial profile Trichy 2019-20. www.domsme.gov.in/www.msmedichennai.gov.in.

PARTICULARS OF CONTRIBUTORS:

1. Postgraduate Student, Department of Ophthalmology, Trichy SRM Medical College Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India.
2. Associate Professor, Department of Ophthalmology, Trichy SRM Medical College Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India.
3. Assistant Professor, Department of Ophthalmology, Trichy SRM Medical College Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India.
4. Assistant Professor, Department of Ophthalmology, Trichy SRM Medical College Hospital and Research Centre, Tiruchirappalli, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. K Meena Devi,
Assistant Professor, Department of Ophthalmology, Trichy SRM Medical College Hospital and Research Centre, Trichy-Chennai Highway, Irungalur Village, Tiruchirappalli-621105, Tamil Nadu, India.
E-mail: drpdinesh@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jul 27, 2022
- Manual Googling: Oct 18, 2022
- iThenticate Software: Oct 26, 2022 (8%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jul 23, 2022**

Date of Peer Review: **Aug 18, 2022**

Date of Acceptance: **Oct 27, 2022**

Date of Publishing: **Dec 01, 2022**