

## Analysis of vision screening of truck drivers in a truck parking campus located in a busy national highway

C. Xavier Jayaseelan<sup>1</sup>, Panimalar Veeramani<sup>2,\*</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Assistant Professor, Dept. of Ophthalmology, Saveetha Medical College & Hospital, Saveetha University, Chennai

**\*Corresponding Author:**

Email: drpani07@gmail.com

### Abstract

The importance of good visual acuity for safe driving cannot be over emphasized. Most of the road traffic accidents are mainly due to poor or low visual acuity, stress and psychological factors affecting the drivers. An attempt was made to ascertain the visual status of the truck drivers for visual disorders by screening them in a truck parking campus near Sriperumbudur, located in NH 45 (Chennai-Bangalore highway) frequented by National Permit carriers from all states in India, as it is a highly industrialised area with many manufacturing and assembling units, ware houses and many other electronics and mechanical industrial units located in and around this area.

**Purpose:** The purpose of this study was to determine the prevalence of visual function impairment among truck drivers frequenting the national highways. The data from this study will provide necessary information on visual functions among truck drivers, help to make appropriate policy towards driver's screening, obtaining licence and regulations and the importance of periodic vision check up.

**Materials and Methods:** A cross-sectional study was done on drivers frequenting one of the truck parking areas located in the busy NH 45 (Chennai – Bangaluru highway). Drivers were examined for visual acuity, colour vision, and fields by confrontation method. Those requiring further evaluation were examined in detail in the base hospital.

**Results:** Totally 148 drivers were examined, out of which 80(54.05%) were found fit for driving. The remaining 68(45.95%) had visual impairment of some sort. Refractive error was the most common cause of visual impairment present in 46(31.08%) drivers followed by cataract in 14(9.45%), retinopathies due to Hypertension and Diabetes was seen in 10(6.75%), Glaucoma in 7(4.7%), ARMD in 4(2.7%), peripheral corneal opacities in 6(4.05%), and Squint in 3(2.02%). Colour blindness was seen in 3(2.02%) drivers.

**Conclusion:** Prevalence of visual impairment among drivers was about 45.95% which is quite a large magnitude to be accepted. Driver fault forms a significant share of the causes of road accident in India. With driving tests in India not factoring in visual acuity, poor eyesight could be a major culprit in road accidents. In India the criteria for vision requirement for safe driving is to be revised and regular monitoring and better visual examination parameters should be given more importance for issue and renewal of driving licenses to prevent road accidents.

**Keywords:** Cataract, Refractive errors, Road safety, Vision, Visual impairment, Truck drivers

### Introduction

India has 48.65 lakhs km of road network making it the second largest in the world.<sup>(1)</sup> Transportation of goods in India is mainly dependent on roads, carrying almost 65% of its freight. As a developing nation it has a vast and exhaustive network of national highways (NH) connecting various parts of the country. Road traffic accident is a major health problem worldwide and is a leading cause of death from trauma.<sup>(2)</sup> The drivers are more vulnerable for highway mishaps. Visual disability among drivers is one of the major causes of road accidents in India. Over half of the Indian drivers responsible for road accidents have at least one vision disability, according to a study by the Indian Institute of Sciences(IISc).<sup>(3)</sup> This study mainly focuses on the visual functions of drivers as vision is the most important source of information during driving and many driving related injuries have been associated with visual problems.

### Materials and Methods

A screening camp was conducted on May 15, 2014 for truck drivers for visual disorders in a truck parking campus located in NH 45 (Chennai - Bangalore highway) frequented by National Permit carriers from all states in India, as it is a highly industrialised area with many electronics and mechanical manufacturing and assembling units, ware houses, MNC units including Hyundai Motors and its accessories like Mobis, GSH, Renault Nissan motors, BMW, Mercedes Benz, Isuzu etc. This was a cross sectional, non comparative type of study. These drivers were tested for distant vision, near vision and colour vision and visual field by confrontation method in addition to focal examination of the anterior segment with magnifying loupe by a team of ophthalmologist and supporting staff. Those suspected of having visual problems underwent detailed check up at the base hospital. Comprehensive eye examination at the base hospital included Visual Acuity using Snellen's chart, Refraction, Direct Ophthalmoscopy, Tonometry, Slit Lamp Biomicroscopy. Special tests like Gonioscopy,

Automated Humphrey Perimetry, Fundus photography and Fundus Fluorescein Angiography were performed in indicated individuals. Detailed examination was done for cataract, glaucoma, ARMD and retinopathy due to different causes. All drivers with uncorrected refractive error were given spectacles and those needing surgery were counselled for the same. Anti-glaucoma medication prescribed and advised for a regular follow up for those diagnosed with glaucoma. The results were tabulated and evaluated.

**Results**

Criteria for visual standard is in accordance to International Council of Ophthalmology (ICO) 30th World Ophthalmology Congress, Brazil, 2006.<sup>(4)</sup> Totally 148 drivers were examined. The mean age of drivers was 32 years (range 21- 60 years). 81 were in the age group Of 20-40yrs and 67 in the age group of 41-60yrs Table 1 shows the number of drivers in age wise distribution.

**Table 1: Age wise distribution of drivers**

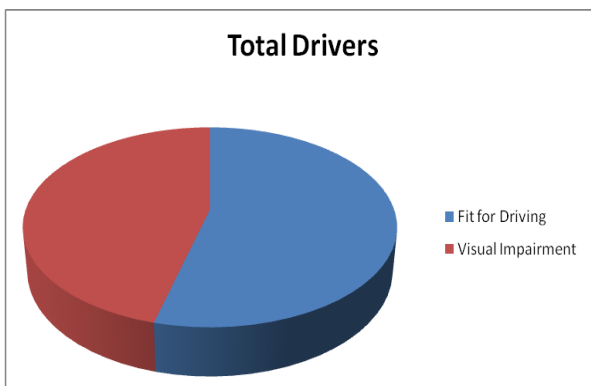
Age	Total number of Drivers (n =148)
20-40yrs	81
41-60yrs	67

Table 2 shows the visual acuity among the drivers.

**Table 2: Age wise distribution of visual acuity (binocularly)**

Vision	20-40 yrs (n = 81)	41-60 yrs (n = 67)	n = 148
6/6	53(65.43%)	27(40.3%)	80(54.05%)
6/9-6/18	12(14.81%)	19(28.35%)	31(20.94%)
6/24-6/60	16(19.75%)	21(31.34%)	37(25%)

About 80(54.05%) drivers were emmetropic and the remaining 68(45.98%) drivers had visual acuity less than 6/6. 37 drivers, that is nearly 25% had visual acuity less than 6/18 making them unfit for driving.



**Fig. 1: Percentage of Visual impairment among Drivers**

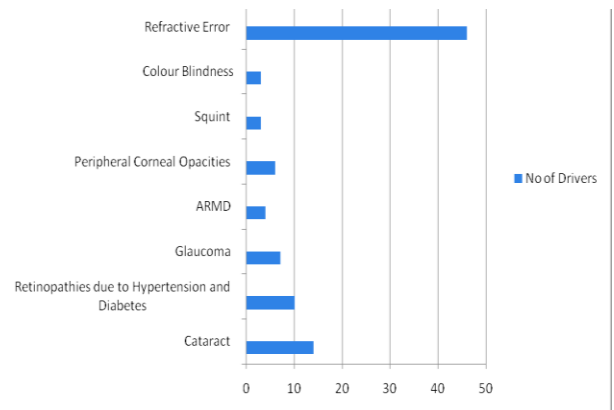
54.05% of drivers were fit for driving, visual impairment was found in 45.98% of the drivers.

Table 3 shows the different types of ocular diseases found among the drivers.

**Table 3: Age wise distribution of ocular diseases among drivers**

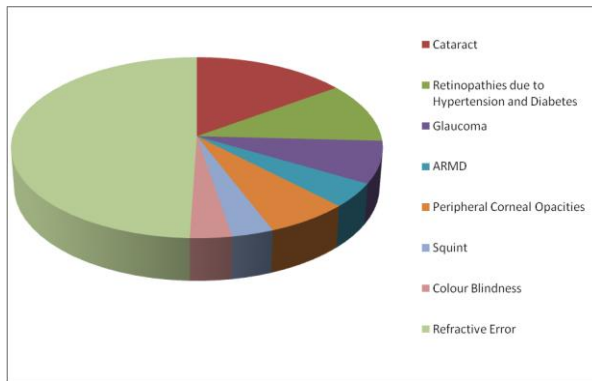
Ocular diseases	20-40 yrs n = 81	41-60 yrs n = 67	n = 148
Refractive errors	28(34.56%)	18(26.86%)	46(31.08%)
Chalazion	02(2.47%)	03(4.77%)	05(3.4%)
Chronic dacryocystitis	01(1.23%)	01(1.49%)	02(1.3%)
Peripheral corneal opacities	02(2.47%)	04(5.97%)	06(4.05%)
Cataract	01(1.23%)	13(19.40%)	14(9.45%)
Glaucoma	01(1.23%)	06(8.95%)	07(4.7%)
Retinopathies	02(2.47%)	8(11.94%)	10(6.75%)
Age related macular degeneration	0	04(5.97%)	04(2.7%)
Squint	02(2.47%)	01(1.49%)	03(2.02%)
Colour blindness	03(37.03%)	-	03(2.02%)

Refractive error was the most common visual impairment found in 33.78%, Retinopathies in 12.83%, cataract in 10.13%, glaucoma in 4.7%, peripheral corneal opacities in 4.05% and colour blindness was present in 2.02 % of the drivers.



**Fig. 2: Bar graph representing visual impairment among drivers**

X-axis – Number of Drivers; Y-axis- Causes for visual impairment



**Fig. 3: Pie chart representing various visual impairment among the drivers**

#### Pattern of various causes for visual defects

Table 4 shows the number of drivers who had eye check up before obtaining the licence.

**Table 4: Driver who had eye check up done before obtaining licence**

	20-40 yrs (n = 81)	41-69 yrs (n = 67)	(n=148)
Eye check up done	8(9.88%)	5(7.46%)	13(8.78%)
Eye check up not done	73(90.12%)	62(92.53%)	135(91.22%)

Only 8.78% had eye check up before obtaining licence; the remaining 91.22% didn't have an eye check up before obtaining licence.

#### Discussion

Vision is the most important source of information during driving and driving related injuries have been associated with visual problems. Therefore, visual assessment of drivers is a major health issue.<sup>(5)</sup>

In a recent study done at Guwahati, India (Chauhan S).<sup>(6)</sup> an attempt was made to identify the shortcomings in physical attributes of the drivers that may pose road safety hazards such as visual acuity, peripheral vision, depth perception, glare recovery, colour vision, contrast sensitivity, phoria, etc. Based on the analysis of data collected, the following important findings were reported by them: 3% of the drivers failed in the phoria test, 7% of the drivers failed in the glare recovery test, 5% of the drivers were found to have problem of tunnel vision while driving, 15% of the drivers were found to have unacceptable acuity vision in one of the eyes and 4% in both the eyes, 5% of the drivers had problem with night vision (vision in the presence of headlight), Performance of 5% of the drivers was found "unacceptable" in colour vision test.

In our study we found that 80(54.05%) drivers were emmetropic and were fit for driving. The remaining 68(45.94%) had visual impairment of some sort or the other. This is quite a large magnitude to be accepted. Refractive error was the most common ocular

morbidity in our study. Overall 31.08% drivers had refractive error and 25% drivers had visual acuity < 6/18 making them unfit for driving. A similar study conducted by Verma R et al<sup>(7)</sup> showed the prevalence of refractive error to be 18.82%. Another study conducted by Dr. Vikas Mahatme et al<sup>(8)</sup> in Nagpur had similar result as ours with 33% refractive error. Commercial vehicle drivers in the Central Region of Ghana had 20.4% refractive error.<sup>(9)</sup> 38 drivers were not wearing correcting glasses and 8 were wearing under corrected glasses. Refraction was done and all were prescribed correcting glasses.

Immature cataract was the second leading cause of ocular morbidity in this study and this is expected as cataract is the commonest cause of visual impairment and blindness worldwide.<sup>(10)</sup> 9.05% drivers had cataract out of which 13 were in the age group of 41-60 yrs. Cataract reduces visual acuity, contrast sensitivity and also causes an increase in disability glare<sup>(11,12)</sup> and self-reported difficulties with the tasks of daily driving.<sup>(13)</sup> Removal of cataract is associated with a marked improvement in both health related quality of life and driving performance.<sup>(14,15)</sup>

Retinopathies due to diabetes and hypertension (6.75%) followed next in the list causing visual impairment among drivers. Glaucoma was prevalent in 4.7% of drivers and ARMD in 2.7%. Cataracts, diabetic retinopathy, glaucoma, and macular degeneration may weaken colour perception, contrast sensitivity, depth perception, glare recovery, or peripheral vision components. Ultimately, these vision impairments elevate the risks of traffic collisions and violations.<sup>(16)</sup>

Colour blindness was seen in 2.02% of the drivers. Surprisingly all were unaware of such defect existing in them and had never faced any problem due to that. A direct link between increased risk of road traffic accident and colour vision defect has not been established.<sup>(17)</sup> In some circumstances it may impact performance of interpreting traffic control devices and other colour coded signals if other cues (luminance, position, pattern) are not sufficiently informative.<sup>(18)</sup>

Most disturbing and shocking finding of the study is that all drivers had a valid driving licence but nearly 91.22% of drivers never had an eye check up before obtaining the licence or during their renewal. This highlights the lack of concern and insensitivity of drivers towards visual health and at the same time points out the fault in our licensing system. Driver education is not mandatory and physical fitness of candidates with respect to visual abilities is not evaluated before issuing driver licence. Only the manoeuvring abilities of drivers are considered sufficient for getting the licence. These defects should be rectified for safety on roads. Driving is a privilege and not a right and that the primary responsibility of those who assess potential drivers is to the public not to the applicant.<sup>(19)</sup>

## Conclusion

Vision is the most important source of information during driving and many driving related injuries have been associated with visual problems. Prevalence of visual impairment among drivers is very high and pose a serious health issue. As majority of the drivers did not have ocular examination at the time they were issued driving licence, ocular examination by an Ophthalmologist should be introduced as part of the compulsory test process for issuing and renewing drivers license. This could ascertain minimum visual requirement for driving and will help to reduce the incidence of road traffic accidents.

## References

1. "An overview: Road Network of India". Ministry of Road Transport, Government of India.2010.
2. Omolase CO, Afolabi OT, Omolase BO, Ihemedu CO (2012) Ocular Status of Commercial Drivers in a Nigerian Community. *J Community Med Health Educ* 2:138. doi:10.4172/2161-0711.1000138.
3. Verma, Ashish and Chakrabarty, Neelima and Velmurugan S and Bhat, Prithvi B and Kumar, Dinesh HD and Nishanthi, B (2016) *Assessment of driver vision functions in relation to their crash involvement in India*. In: CURRENT SCIENCE, 110 (6). pp. 1063-1072.
4. Available from: <http://www.icoph.org/dynamic/attachments/resources/visionfordriving.pdf>.
5. Bener A., Ahmad M.D., El-Tawil M.S. Visual impairment and motor vehicle accidents. *Mid East J Emerg Med*. 2004;4:1–9.
6. Chauhan, S., Influencing traffic problem parameters through improved driver education and licensing, B Tech Thesis, IIT, Guwahati, 2009.
7. Assessment of Visual Function of Truck Drivers Travelling on National Highway of Central India: A Prospective Study Rahul Verma<sup>1</sup>, Puneet Bharadwaj, *International Journal of Scientific Study* | July 2015 | Vol 3 | Issue 4.
8. Dr. Vikas Mahatme et al *JMSCR* Volume 2 Issue 12 December 2014.
9. Boadi-Kusi SB, Kyei S, Asare FA, Owusu-Ansah A, Awuah A, Darko-Takyi C. Visual function among commercial vehicle drivers in the central region of Ghana. *Journal of Optometry*. 2016;9(1):54-63. doi:10.1016/j.optom.2015.06.004.
10. Visual functions of commercial drivers in relation to road accidents in Nigeria M. K. Oladehinde, A. O. Adeoye, B. O. Adegbehingbe, A. O. Onakoya *Indian J Occup Environ Med*. 2007 May-Aug; 11(2): 71–75. doi: 10.4103/0019-5278.34532).
11. Adamsons I, Rubin GS, Vitale S, Taylor HR, Stark WJ (1992) The effect of early cataracts on glare and contrast sensitivity. A pilot study. *Arch Ophthalmol* 110:1081-1086.
12. Rubin GS, Adamsons IA, Stark WJ (1993) Comparison of acuity, contrast sensitivity and disability glare before and after cataract surgery. *Arch Ophthalmol* 111:56-61.
13. Mangione CM, Phillips RS, Lawrence MG, Seddon JM, Orav EJ, et al. (1994) Improved visual function and attenuation of declines in health-related quality of life after cataract extraction. *Arch Ophthalmol* 112:1419-1425.
14. Owsley C, McGwin G Jr, Sloane M, Wells J, Stalvey BT et al. (2002) Impact of cataract surgery on motor vehicle crash involvement by older adults. *JAMA* 288:841-849.
15. Wood JM, Carberry TP (2006) Bilateral cataract surgery and driving performance. *Br J Ophthalmol* 90:1277-1280.
16. *International Journal of Innovative Research in Science, Engineering and Technology* Vol. 2, Issue 7, July 2013. Copyright to IJIRSET [www.ijirset.com](http://www.ijirset.com) 3074 Visual Challenges among Drivers: A Case Study in Delhi, India Dr. Neelima Chakrabarty, Arun Lakshman, Kamini Gupta, Ankit Bhatnagar.
17. Omolase CO, Afolabi OT, Omolase BO, Ihemedu CO (2012) Ocular Status of Commercial Drivers in a Nigerian Community. *J Community Med Health Educ* 2:138. doi: 10.4172/jcmhe.1000138.
18. Owsley C, McGwin G. Vision and Driving. *Vision research*. 2010;50(23):2348-2361. doi:10.1016/j.visres.2010.05.021.
19. Available from: <http://www.icoph.org/downloads/visionfordriving.pdf>.