



## The Prevalence of Refractive Error and Color Blindness in Truck Drivers

Authors

**Dr Anjali Slathia<sup>1</sup>, Dr Renu Hashia Dhar<sup>2</sup>, Dr Pallavi Mahajan<sup>3</sup>**

<sup>1</sup>Senior Resident, Department of Ophthalmology, ASCOMS & Hospital, Sidhra, Jammu (J&K), India

<sup>2</sup>Associate Professor, Department of Ophthalmology, ASCOMS & Hospital, Sidhra, Jammu (J&K), India

<sup>3</sup>Junior Resident, Department of Ophthalmology, ASCOMS & Hospital, Sidhra, Jammu (J&K), India

Corresponding Author

**Dr Renu Hashia Dhar**

Associate Professor, Department of Ophthalmology, ASCOMS & Hospital, Sidhra, Jammu, (J&K), India

Email: [renuhashia66@gmail.com](mailto:renuhashia66@gmail.com), Phone no-+91 9419153396

### Abstract

**Introduction:** *There has been a steep increase in Road traffic accidents in the last two decades in developing nations such as India. Driving has become a visually intensive task which requires sensory ability (mainly visual), mental ability and compensatory abilities. As per the Motor Vehicles Act, 1988, and Central Motor Vehicles Rules, 1989, a medical certificate from a registered medical practitioner is sufficient to qualify for driving license. Truck drivers are most vulnerable for highway accidents. This might be due to many reasons but impaired visual function can be one of the major causes for mishaps. In view of the importance of good vision, this study was conducted to assess the ocular status of interstate truck drivers.*

**Aim and objectives:** *Assessment of prevalence of refractive error and color blindness among the interstate truck drivers.*

**Materials and Methods:** *A study was carried out in collaboration with Indian Oil Corporation, India at Jammu in Indian Oil Depot in which 140 interstate truck drivers were included. All the respondents had their visual acuities and color vision evaluated with the aid of Snellen's and E-chart (in case of illiterates) and Ishihara pseudo-chromatic plates respectively. The subjects had their eyes examined with the help of torch and direct ophthalmoscope. Presbyopic correction was given on the spot. All those with ocular problems were referred to Dept of Ophthalmology, ASCOMS for further evaluation*

**Results:** *In all 140 drivers were examined out of which 116(82.8%) were found to have visual acuity 6/6 (normal vision) while 24(17.14%) drivers had refractive errors. Of the 24 truck drivers with refractive errors; 12 drivers were having hypermetropia, 9 drivers were having myopia and 3 drivers were found to have astigmatism. None of the drivers had color blindness. Irrespective of refractive error, 74(52.8%) drivers were found to have presbyopia.*

**Conclusion:** *Most of the truck drivers having defective vision were in the age group of 41-50 years. Hence, drivers in this age group should be screened frequently to detect visual defects and they should be encouraged to wear corrective spectacles to have normal visual acuity.*

**Key words:** *Refractive error, truck drivers, visual acuity, color blindness.*

## Introduction

There has been steep increase in Road traffic accidents in the last two decades in developing nations such as India. Road traffic accident is a major health problem worldwide. It is a leading cause of death from trauma<sup>[1]</sup>. Driving has become a visually intensive task which requires sensory ability (mainly visual), mental ability and compensatory abilities. As per the Motor Vehicles Act,1988. and Central Motor Vehicles Rules, 1989, a medical certificate from a registered medical practitioner is sufficient to qualify for driving license .It has been predicted that by 2020,road traffic injuries will rank as high as third among causes of disability-adjusted life years (DALYs) lost<sup>[2]</sup>

Studies in drivers are relatively small in scale.In European Union as well as in most other countries, there are legal standards for the visual functions of drivers. Relatively little attention is paid to the prevalence of visual problems in driving population in India. The vision requirement for driving safety in India is BCVA 6/18 binocularly data as obtained from report vision requirements for driving safety prepared for International Council Of Ophthalmology(ICO) 30<sup>th</sup> World Ophthalmology Congress, Brazil, 2006<sup>[3]</sup> In view of the importance of good vision, this study was conducted to assess the ocular status of inter state truck drivers working with Indian Oil Corporation Limited so that some recommendations can be provided for forming guidelines to the Indian Oil Corporation regarding recruitment of drivers in their office.

## Material and Methods

We carried out a study was in collaboration with Indian Oil Corporation, India at Jammu in Indian Oil Depot in which 140 inter state truck drivers were included. The study was approved by Institutional Ethical Committee of our institute and the participant's confidentiality was maintained. All the respondents were explained the examination procedure and their informed consent was taken. Each driver was asked about

any history of illness followed by their personal habits like smoking/chewing tobacco, alcohol consumption, etc. All the truck drivers had their visual acuities and color vision evaluated with the aid of Snellen's and E-chart(in case of illiterates) and Ishihara pseudochromatic plates respectively. The subjects had their eyes examined with the help of torch and direct ophthalmoscope. Presbyopic correction was given on the spot. All those with ocular problems were referred to Deptt of Ophthalmology, ASCOMS for further evaluation.

**Gross Examination of Eyes:** The driver to be tested was made to sit in front of the examiner. Light was thrown on the eyes by a torch and both the eyes were examined for any anomalies(such as lid deformities, papillary reflexes and orbital anomalies). Corneal opacities, depth of anterior chamber, and lens opacities were examined under a slit-lamp biomicroscope in department of Ophthalmology at ASCOMS and Hospital, Sidhra, Jammu.

**Procedure for recording Visual Acuity:** Each person was tested individually for recording their Visual Acuity. The person to be examined was made to sit at a distance of 6m(20') from Snellen's test chart. A metallic trial frame was placed in front of the eyes and the person was asked to read the test types by closing the opposite eye with an occluder. In case of illiterate person, he was asked to show the directions of E-test types. The vision was recorded as per the standard procedure:-6/60,6/36,6/24,6/18,6/12,6/9,6/6.Those who could not identify the test types were asked to count the fingers of the examiner from a distance of 5,4,3,2,1,0.5m and close to the face. The persons who might not count the fingers were asked to tell the movements of hand of the examiner placed in front of their eyes.If the person still could not tell the movements of hand then he was asked to tell the direction of falling of the light of a torch<sup>[4]</sup> The refractive errors were determined using autorefractometer.

**Recording of color vision:** The person to be tested for color vision was asked to sit in front of

the examiner<sup>[5]</sup>. He was shown the standard Ishihara’s color plates at a reading distance of about 30cm. The person was screened first for red-green color deficiency by showing the appropriate color plates, then for blue-green color deficiency by showing the related color plates. The person was enquired about night blindness as per standard protocol<sup>[6]</sup>

**Results**

140 truck drivers working with Indian Oil Corporation Limited, Jammu city, J&K, India were screened under this study, after proper informed consent. Their ages ranged between 22 and 65 years with a mean age of 48.6± 8.6 years. The respondents were all males. The majority of the respondents were married (78.7%) and 21.3% were single. Out of these, 24(17.14%) were having refractive errors [Table 1]. Number of truck drivers with visual acuity < 6/18 was 13(9.28%). The cases of color blindness and night blindness were not detected in any of the truck drivers. Out of 24 truck drivers with refractive errors, 12(50%) were having hypermetropia, 9(37.5%) were having myopia and 3(12.5%) were having astigmatism. Irrespective of type of refractive errors, 74 (52.8%) truck drivers were detected to have presbyopia (inability to see near objects) [Table-2]

**Table 1:** Prevalence of Refractive errors among Truck drivers

Duration (years)	Frequency	% age
< 5 yrs	7	5%
5-10 yrs	12	8.57%
11-15 yrs	32	22.85%
16-20 yrs	78	55.71%
> 20 yrs	11	7.85%
Total	140	100%

**Table 2:** Distribution of refractive errors

Type of refractive error	Frequency(n=24)	Percentage%
Hypermetropia	12	50%
Myopia	9	37.5%
Astigmatism	3	12.5%
Total	24	

Age group (years)	Truck drivers screened (n)	Drivers with refractive error %	Truck drivers with VA < 6/18
21-30	13	3(2.14%)	1(0.71%)
31-40	29	5(3.57%)	2(1.42%)
41-50	65	9(6.42%)	6(4.28%)
51-60	31	6(4.28%)	3(2.14%)
>60	2	1(0.71%)	1(0.71%)
TOTAL	140	24(17.14%)	13(9.28%)

**Table 3:** Duration of driving experience

**Table 4:** Visual Acuity of better and second eye

Visual acuity	Better eye		Second eye	
	frequency	% age	frequency	% age
6/5-6/18	127	90.71%	123	87.8%
6/18-6/60	13	9.28%	17	12.14%
Total	140	100%	140	100%

**Table 5 :** Ocular findings of respondents

Ocular findings	Frequency (n)	% age
Presbyopia	74	52.85%
Immature cataract	15	10.71%
Allergic conjunctivitis	6	4.28%
Others	10	7.14%
Refractive errors	24	17.14%

The duration of driving experience of the respondents revealed that majority (55.71%) had driving experience of more than 16 years, 5% drivers had driving experience of less than 5 years, 8.57% had driving experience of less than 10 years, 22.8% drivers had driving experience of less than 15 years and 7.85% drivers had driving experience of more than 20 years [Table-3]. All the respondents had a valid driver’s licence. Most respondents had visual acuity of 6/5-6/18(90.71% and 87.8%) in the better eye and second eye respectively whereas visual acuity of 6/18-6/60 was 9.28% and 12.14% in better eye and second eye respectively. [Table-4]. All the respondents had normal color vision. The ocular findings of respondents revealed that 74 drivers (52.85%) had

presbyopia, 15(10.71%) had immature cataract, 6(4.28%) had allergic conjunctivitis whereas 10(7.14%) had other forms of ocular morbidity. [Table-5]. Few respondents were already using glasses but majority did not use recommended glasses.

### Discussion

All the respondents were males and this finding is expected in view of the fact that the commercial driving is an exclusive preserve of males in India. There is a relationship between age and driving safety according to Keltner and Jhonson<sup>[7]</sup> Younger drivers are prone for speeding, whereas older persons are probably more easily distracted or fail to appreciate and respond to a potentially dangerous situation. These factors are all non-visual. The person's physical condition hearing and slowing of reactions with age play a definite role.<sup>[8]</sup> Visual acuity is the visual parameter that is most easily and, therefore, most widely measured. It is often considered for a gross measure of vision. Its limitation is that it only tests the central macular area. For optical problems like defocusing or opacities, it is adequate. So far, very few studies have been conducted in India to evaluate visual skills of truck drivers which is an important aspect of their profession.

The percentage of truck drivers with refractive errors as obtained from our study was 17.14%. On contrary to this, percentage of truck drivers with refractive errors from similar studies carried out by Rajendra PJ et al<sup>[9]</sup> was 28.57%, 18.1% in Nigeria<sup>[10]</sup> and 19.3%<sup>[11]</sup>. Another study by Bekibele et al<sup>[12]</sup> and Erdogan H et al<sup>[13]</sup> has shown 16.7% and 21.5% drivers having refractive errors. The commonest visual problem in drivers in our study was presbyopia(52.85%). Similar results were shown in a study in Nigeria<sup>[11]</sup> in which presbyopia was detected in 50.8% whereas 97.7% drivers were shown to have presbyopia by Bekibele et al<sup>[12]</sup>. Moreover, less than satisfactory presenting(functional) binocular visual acuity (<6/18) was found in 13(9.28%) of the drivers in our study. The commonest refractive error in our

study was hypermetropia present in 12 drivers (50%) followed by myopia in 9 drivers (37.5%) and then astigmatism in 3 drivers(12.5%). Bouerne et al<sup>[14]</sup> have reported prevalence of myopia and hypermetropia in Bangladesh to be 26.3% and 15.8% respectively. At the same study, prevalence of astigmatism was detected as 32.4% which is quite different in our study. Our study has several limitations as we did not check contrast sensitivity, glare sensitivity and night vision tests.

### Conclusion

In this study, we have tried to address the importance of visual acuity in driving. The magnitude of refractive errors in truck drivers in India is quite high. Hence, there is need for stringent medical check-ups to detect visual abnormalities in Indian truck drivers. We also observed that wearing spectacles was a taboo among some truck drivers. After getting examined in our study, many drivers felt the need of correcting their refractive errors by wearing proper spectacles as refractive errors can impair the traffic security. Moreover, the truck drivers should be scheduled to have regular eye examinations to detect further impairment in visual acuity.

### Acknowledgments

The authors would like to thank the Truck drivers of Indian Oil Corporation depot in Jammu for extending their support for the study.

### References

1. Ekere AU, Yellowe BF et al. Surgical mortality in emergency room. *Int. Orthop.* 2004;28:187-190.
2. Krug EG, Sharma GK et al. The global burden of injuries. *Am. J. Public Health* 2000;90:523-526.
3. Available from <http://www.icoph.org/dynamic/attachments/resources/visionfordriving.pdf>

4. Ronald B Rabbets, Bennett and Rabbett's Clinical visual optics, 4th edition. china: Butterworth Heinemann Elsevier Publishers; 2007. p28-32
5. Filosa S, Calabro V, Lania G et al. G6PD haplotypes spanning Xq28 from F8C to red/green color vision. *Genomics* 1993;17:6-14
6. Levin LA, Nilsson SF et al. *Adler's Physiology of the eye*. 11th edition. china: Elsevier Saunders Publishers; 2011. p.648-54
7. Keltner JL, Johnson CA. Vision function, driving safety and the elderly. *Ophthalmol* 1987;94:1180-8.
8. Owsley C, McGwin G. Vision impairment and driving. (Review, 189 ref) *Surv Ophthalmol* 1999;43:535-50
9. Rajendra PJ, Murali KB et al. Refractive errors and color blindness among truck drivers: A pilot study. *J Dr NTR Univ. Health Sci* 2013;2:89-91
10. Onabolu OO, Otulana TO et al. Assessing the visual status of truck drivers in a developing country. *Trop Doct* 2008;38:54-5
11. Bekibele CO, Ajay R, Asuzu MC. Eye health of professional drivers of a Nigerian University. *Niger Postgrad Med. J* 2009;16:256-9
12. Bekibele CO, Fawole OI et al. Prevalence of refractive error and attitude to spectacle use among drivers of public institutions in Ibadan, Nigeria. *Ann. Afr. Med.* 2007 Mar;6(1):26-30
13. Erdogan H, Ozdemir L et al. Prevalence of refractive errors and color blindness in heavy vehicle drivers. *Int. J. Ophthalmol* 2011;4:319-22
14. Bourne RR, Dineen BP et al. Prevalence of refractive error in Bangladeshi adults: results of the National Blindness and Low Vision Survey of Bangladesh. *Ophthalmology*. 2004;111(6):1150-1160.