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Research article

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Assessment of Visual Acuity, Color Vision, Dry Eye and Field of Vision among Drivers Working in a Teaching Hospital

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ABSTRACT

Purpose:

This study aimed to evaluate ocular healthcare seeking behaviour and vision screening outcomes of drivers working at a teaching hospital.

Settings and Design:

It was a hospital-based cross-sectional study conducted in the Outpatient Department of Ophthalmology between November 2021 to January 2022 among 50 drivers employed at Saveetha Medical College and Hospital, India. Drivers were examined for Visual acuity, Color vision, Dry eye using Schirmer's strip, and field of vision using the confrontation method

Methods and Material:

This study was done on 50 subjects, age group between 20 - 60 Years, and it is approved by the Institutional Ethics committee of Saveetha College of Allied Health Sciences. Drivers working in a teaching hospital were included. Participants were subjected to a comprehensive Ophthalmic examination, Visual acuity measured using Snellen's chart, Color vision using Ishihara's chart and Dry eye evaluated with Schirmer's strip using Whatman's filter paper and field of vision measured by Confrontation method for 50 subjects.

Results:

From this study, we found that Dry eye was the most common ocular morbidity among 44% of drivers followed by Refractive errors in 38%, Color vision in 18% and the field of vision is normal among the drivers.

Conclusion:

The frequencies of unsafe driving habits and performance increase with visual impairment. Driver fault forms a significant share of the causes of road accidents in India. Therefore, regular monitoring and better visual examination parameters should be given more importance for issues and the renewal of driving licenses to prevent road accidents. Regular eye examinations are recommended for drivers.

Keywords: Visual Acuity, Color Blindness, Vehicle Drivers, Dry eye.

INTRODUCTION

Vision is the most important source of information during driving and many driving-related injuries have been associated with visual problems⁽¹⁾. Visual acuity alone is not an appropriate method for assessing full visual function, which also includes other vision components such as visual field, color vision, and contrast sensitivity among others. Visual disability among drivers is one of the major causes of road accidents in India. Good visual acuity in addition to good stereopsis normal color vision, satisfactory eye coordination, and the ability to various levels of illumination is essential to a driver to avoid road traffic accidents. ⁽²⁾. Color vision plays a very important role in recognizing traffic signals, vehicle lamps, and signboards. Any significant loss of visual function such as visual acuity or visual field will diminish a person's ability to operate a vehicle. If the distance vision is poor, the driver may not see the hazards until it is too late to react safely ⁽³⁾. Therefore, ascertaining good vision for drivers could help in ensuring the safety of drivers and passengers as well as other road users thereby preventing road traffic accidents⁽⁴⁾.

SUBJECTS AND METHODS

It was a hospital-based cross-sectional study, conducted in the outpatient department of ophthalmology. The procedures involved in this study

are visual acuity, color vision, Schirmer's test, and confrontation measured in both eyes. Visual acuity measured using Snellen's chart, Color vision using Ishihara's chart and Dry eye evaluated with Schirmer's strip using Whatman's filter paper and field of vision measured by Confrontation method for 50 subjects. This cross sectional study sample consisted of 50 drivers with 20-60 years of age (n=50) where 35 were in the age group of 20-40 years and 15 were in the age group of 41-60 years and all the respondents were male drivers working in a teaching hospital.

RESULTS

This cross-sectional study sample consisted of 50 male drivers. The results were shown in table III and represented graphically in Figure III. From this study, we found that Dry eye was the most common ocular morbidity among 44% of drivers followed by Refractive errors in 38%, Color vision in 18% and the field of vision is normal among the drivers. Normal vision was defined as a visual acuity $\geq 6/9$ in the better-seeing eye. Visual impairment was defined as a visual acuity $<6/18$ in the better-seeing eye. The visual field was assessed based on the results of the confrontation visual field. The data was coded and data analysis was done using the statistical package for social sciences (SPSS) version 16.0. Appropriate descriptive statistical analysis was used to present the results

Table 1: Age Wise Distribution of Drivers

AGE	Total number of Drivers(n=50)
20-40	35(70%)
41-60	15(15%)

From table 1, It is observed that among 50 drivers, 35 of them are in the age group of 20-40 years i.e, 70% and 15 were in the age group of 41-60 years i.e, 30%. The above data is graphically represented in Fig 1.

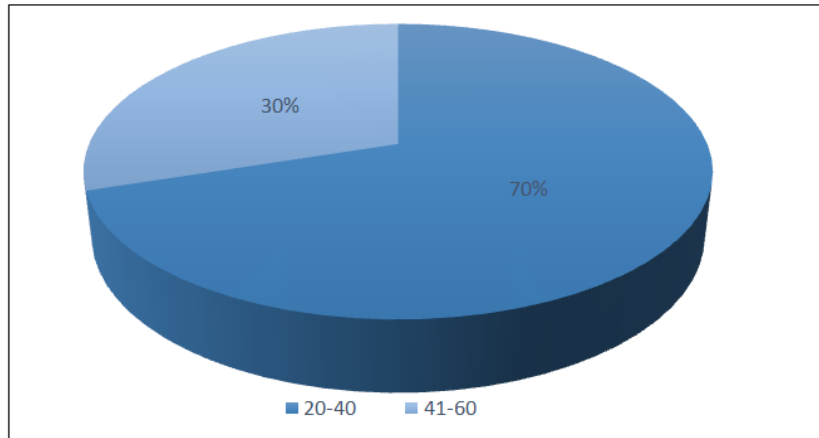


Fig 1: Age Wise Distribution of Drivers

Table 2: Age Wise Distribution of Visual Acuity (Binocularly)

Vision	20-40 years(n=35)	41-60 years(n=15)	n=50
6/6	26(74%)	5(33.3%)	31(62%)
6/9-6/18	7(20%)	8(53.3%)	15(30%)
6/24-6/60	2(5.71%)	2(13.3%)	4(8%)

From table 2, we observe that About 31(62%) drivers were emmetropic i.e, with 6/6 vision and remaining 19(38%) drivers had visual acuity less than 6/6. 4 drivers, i.e, nearly 8% had visual acuity less than 6/18 making them unfit for driving. 62% of drivers were fit for driving, Visual impairment was found in 38%. The above data is graphically shown in Fig 2.

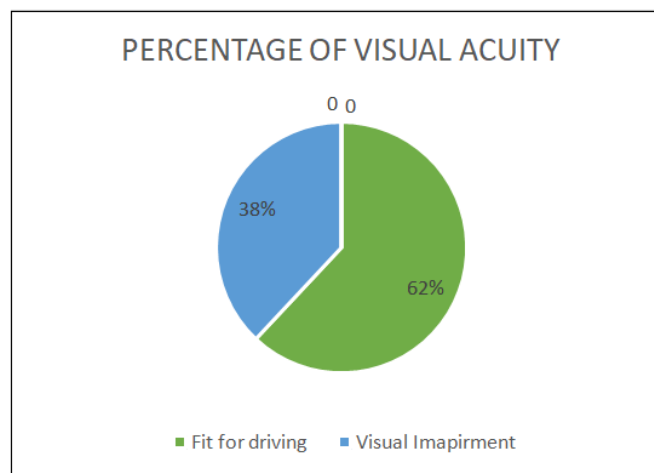


Fig2: Percentage of Visual Acuity

Table 3: Age Wise Distribution of Ocular Diseases Among Drivers

OCULAR DISEASES	20-40 years(n=35)	41-60 years(n=15)	n=50
Dry Eye	13(37.1%)	9(60%)	22(44%)
Refractive errors	9(25.7%)	10(66.6%)	19(38%)
Colour Blindness	5(14.2%)	4(26.6%)	9(18%)
Field of Vision	0(0%)	0(0%)	0(0%)

From table-3, Dry eye was found to be the most common visual impairment found in 44% of the drivers, followed by refractive errors in 38% of drivers, Colour Blindness in 18% and Field of Vision is normal among drivers. The above data is represented graphically in Fig 3.

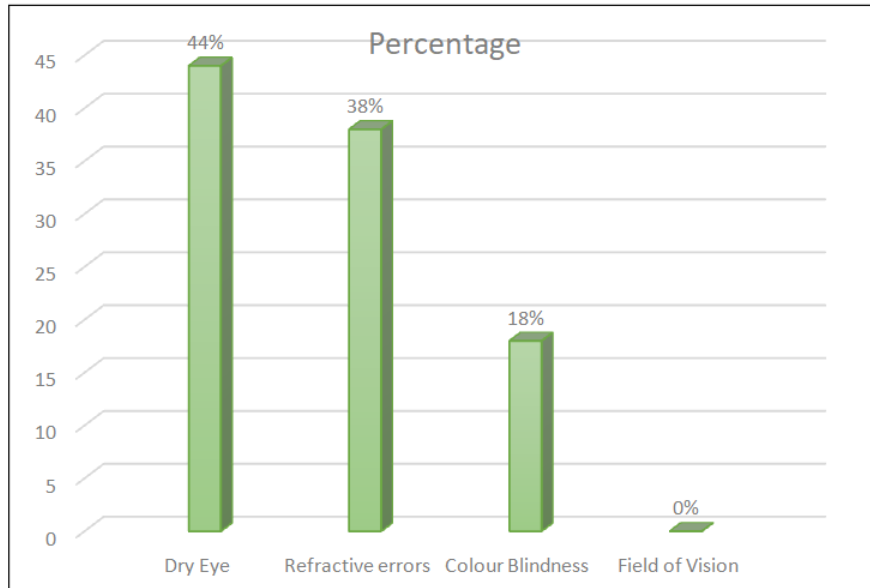


Fig 3: Age Wise Distribution of Ocular Diseases Among Drivers

DISCUSSION

Vision is the most important source of information during driving and many driving-related injuries have been associated with visual problems. It's a fundamental component of safe driving and it is the most important sensory factor in driving accounting for about 95% of all sensory requirements. Vision plays a very important role not only to concentrate on the road ahead and also in the various other reflexes needed to control the vehicles in different situations depending mainly on a normal visual acuity for the safety of the passengers.

Driving is a visually intensive task that requires a set of abilities which include sensory ability, mental ability, motor ability, and compensatory abilities. One needs to get different kinds of vision to be able to drive safely. Good visual acuity in addition to good stereopsis normal color vision, satisfactory eye coordination, and the ability to various levels of illumination is essential to a driver to avoid road traffic accidents.

Visual assessment can be done using a Snellen chart and an illiterate E chart. The visual acuity test includes monocular and binocular testing. Vision functions are among the prominent physical functions that assist a driver in perceiving traffic situations.

In this study, which was conducted among drivers between 20-60 years, we found that 62% of drivers were emmetropic and were fit for driving. The remaining 38% of driving had visual impairment of some sort or the

other. Dry eye was the most common ocular morbidity in our study followed by refractive errors. Overall 44% had dry eyes and 8% of drivers had visual acuity <6/18 making them unfit for driving. Colour Blindness was seen in 18% of the drivers. Surprisingly all were unaware of such defects existing in them and had never faced any problem due to that. The field of vision among drivers is quite normal.

A similar study conducted by Dr. Verma R et al showed a prevalence of refractive error to be 18.82%. Another study conducted by Dr. Vikas Mahatme et al in the year 2014 in Nagpur had similar results as this study with 33% refractive error.

According to a study conducted by Jayaseelan X.C and Veeramani P et al., on analysis of vision screening of truck drivers in a truck parking campus located in a busy national highway, 54.05% of drivers were fit for driving and 45.94% had visual impairment which is a quite large magnitude to be accepted.

Ovenseri-Ogomo G, Adofo M, et al., has undergone study on the relationship between poor vision and occurrence of road traffic accidents and the barriers to uptake refractive error services among drivers and to study the barriers to the use of eye care services and spectacle correction and explore the relationship between visual function and occurrence of RTA's. Over 12% of the commercial drivers do not have the minimum visual acuity required for driving while 6.8% had visual impairment (VA < 6/18 in the better eye).

They concluded that there was no association between the occurrence of RTA's and visual impairment, visual field, and color vision defect.

CONCLUSION

This study found that the prevalence of visual impairment among drivers is very high and poses a serious health and social issues. There was under-

utilization of eye care services among the studied population. Several barriers were also reported. We recommended ocular examination by an ophthalmologist should be introduced as a compulsory test process for using and renewing a driver's license. This could ascertain the minimum visual requirement for driving and will help to reduce the incidence of road traffic accidents.

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