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RESEARCH ARTICLE

Assessment of visual function of truck drivers in a national highway of central India

Rahul Verma[1], Puneet Bharadwaj[2]

[1]Associate Professor & Head, Department of Ophthalmology, [2]Associate Professor, Department of Chest & T.B., Chhattisgarh Institute of Medical sciences (C.I.M.S.), Bilaspur, Chhattisgarh, India

Correspondence to: Dr. Rahul Verma (drrahulv@yahoo.co.in)

ABSTRACT:

Purpose: To assess and analyze the visual function of drivers on national highway.

Materials & methods: The prospective study was done on drivers passing through NH 200 at Bilaspur (C.G.). Drivers were examined for Visual acuity, colour vision and fields

Results: Total 1041 drivers were examined out of which 834(80.11%) were found fit for driving. 196 had refractive error (18.82%), 11 cataract (1.05%), 3 corneal opacity & 2 squint were noted. 14 (1.34%) drivers were having defective colour vision.

Conclusion: According to the present criteria 20% drivers were unfit; in India criteria for driving safely is to be revised and regular monitoring & better visual examination parameters should be given more importance for issue and renewal of driving licenses.

Keywords: Visual, Drivers

INTRODUCTION:

India has large and diverse transport industry. It caters to the needs of 1.1 billion people. In 2007, the sector contributed about 5.5 percent to the nation's GDP, with road transportation contributing the lion's share [1]. India as a developing nation has a vast and exhaustive network of national highways connecting various parts of country. Transportation of goods is mainly dependent on roads. Roads are the dominant mode of transportation in India today. They carry almost 90 percent of the country's passenger traffic and 65 percent of its freight. The density of India's highway network -- at 0.66 km of highway per square kilometer of land – is similar to that of the United States (0.65) and much greater than China's (0.16) or Brazil's (0.20) [1].

Safety on highways depends on the drivers of the heavy motor vehicle driving to the fullest in the highways. Truck drivers are most responsible and simultaneously most vulnerable. They have their lives in their hand and lives of others as well, on the road. Our study was conducted in association with Bilaspur traffic police & Bilaspur truck owner association.

In this study we assessed the visual function of drivers on national highway 200 at Bilaspur (C.G.)

MATERIALS & METHODS:

The study was prospective in design. Study was done on all the drivers passing through NH 200 at Bilaspur (C.G.). The study was done for duration of 5 days between 2/4/10 to 6/4/10.

All the drivers were examined by an ophthalmologist for Visual acuity (landolt's C, snellens charts), Colour vision (ishihara plates) and visual fields (confrontation method). Drivers having unaided or with glass visual acuity less than 6/6 in either eye were examined by pin hole to read the Snellen's chart.

*The vision requirements 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 30th WORLD OPHTHALMOLOGY CONGRESS BRAZIL 2006 [2].

RESULTS:

Total 1041 drivers were examined out of which 834(80.11%) were found fit for driving.*

**Criteria adapted as per data obtained for India from report prepared for international council of ophthalmology 30th WORLD OPHTHALMOLOGY CONGRESS BRAZIL 2006 [2]*

Mean age of drivers was 32 years (range 18-60 years). 196 drivers had refractive errors (18.82%). Among 196 refractive errors 144 were not having any visual acuity correction while 52 were having under correction. 14 (1.05%) drivers were having cataract. 3 drivers had corneal opacity & 2 had squint. 14(1.34%) drivers were having defective colour vision.

DISCUSION:

International council of ophthalmology (ICO) recommends various visual functions to be tested.

Report prepared for the International Council of Ophthalmology at the 30th World Ophthalmology Congress Sao Paulo, Brazil, February 2006 suggested Criteria and Rules [2]. It stresses the need for binocular (both eyes open) measurements and the need for a gray zone in which decisions will be based on individual consideration, rather than on the application of strict numerical criteria. It also stresses the interaction of visual and non-visual parameters. For visual acuity the commonly used threshold of 20/40 (0.5, 6/12) is accepted. For visual fields a binocular field of at least 120° horizontal and 40° vertical is suggested. Contrast sensitivity screening is listed as desirable.

There is a relationship between age and driving safety. According to Keltner & Johnson (1987) [3] the California Department of Motor Vehicles Driver Record Study reported in the period 1972-1974 an incidence of 2 accidents /100.000 miles in 20 year old drivers. This number regressed to 1/100.000 for the age group 30-60 years and rose again after that age to reach 2/100.000 at the age of 70 years. Younger drivers take more risks especially in speeding, whereas older persons are probably more rapidly distracted or fail to appreciate a potentially dangerous situation. These are all non-visual factors. The person's physical condition, hearing and slowing of reactions with age also play a role [4].

Visual acuity is the visual parameter that is most easily and therefore most widely measured. It is often considered for a general measure of vision, although it only tests the central macular area. For optical problems (defocus, opacities) this is adequate. For retinal problems (also prevalent in an older population) visual acuity is only a partial measure, since foveal function does not predict perifoveal function. The 20/40 (0.5, 6/12) standard is the criterion most widely used. We believe this to be reasonable, not because one becomes an unsafe driver at 20/50 (0.4, 6/15) but because it includes a safety margin for adverse conditions.

Szlyk et al (1993) [5] compared the driving performances of 20 patients with juvenile macular dystrophy (Stargardt disease or cone-rod dystrophy) and visual acuity between 20/40 and 20/70 with 29 control subjects with normal vision. The proportion of individuals involved in accidents in the central vision loss group was comparable to that of the control group.

Contrast sensitivity may be reduced due to optical factors, as in cataract patients. Contrast problems may also result from retinal problems (AMD, glaucoma, etc.) that are also common among the elderly. If contrast sensitivity loss is caused by optical problems (defocus, scatter), both visual acuity and contrast sensitivity will be affected. Brabyn et al. (2001) [6] showed that some people in an elderly population may have 20/20 (1.0, 6/6) acuity on a high contrast chart in good illumination, but may easily drop to 20/200 (0.1, 6/60) or below with low light, low contrast and glare.

Mäntyjärvi & Tuppurainen (1999) [7] strongly suggest to include simple tests for contrast sensitivity and glare sensitivity in the requirements for a driving license in older drivers. In patients with lens opacities, the problems are not only the reduction of central vision and the visual field restrictions. Poor contrast sensitivity and glare also play an important role. Owsley et al. (2001) [8] studied the impact of cataract on driving in an older population (274 with cataract and 103 cataract free drivers). Drivers with a history of crash involvement were 8 times more likely to have a serious contrast sensitivity deficit in the worse eye (defined as a PelliRobson score of 1.25 or less) than those who were crash free. They concluded that severe contrast sensitivity impairment played a major role in car accidents even when it was present in only one eye.

Wood et al (1993) [9] simulated three conditions of visual impairment in 14 young, visually normal, individuals: monocular vision, cataract and peripheral field restriction. Using modified swimming goggles the extent of visual fields and low contrast visual acuity were significantly decreased. In this study simulated cataract caused the greatest detriment to driving performance followed by binocular visual field restriction even though the drivers still satisfied the visual requirements for driving licensure. On the other hand monocular vision did not significantly affect the driving performance.

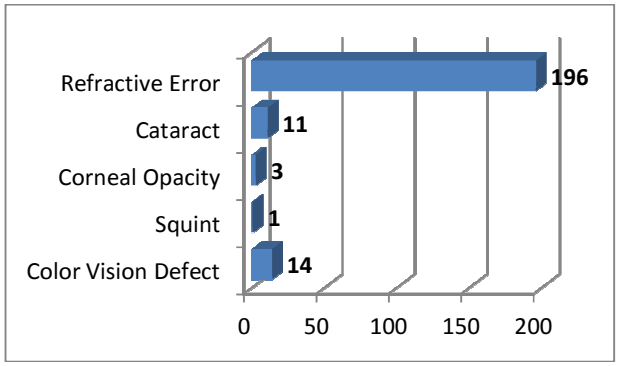
Glare sensitivity may similarly result from optical problems, such as cataract, or from retinal problems. In the first case straylight and disability glare are important; in the latter case, glare recovery time is also important. A recent European study [10] validated the use of a new straylight meter in an international population study.

The Guidelines of the European Commission [11] have dropped color vision requirements. They are still in use in some states in the USA, in Bulgaria, Columbia and provinces in Canada. Studies by Verriest et al (1980) [12] have shown that abnormal color vision is not incompatible with safe driving. The problem of recognizing traffic lights is overcome by the standardized position of the different lights, appropriately chosen colors and in some countries by the differences in their sizes.

Our study has several limitations. In our study snellens acuity chart was used due to non availability of log MAR chart. Contrast sensitivity (Pelli robson chart, MARS hand held chart), Glare sensitivity, diplopia, night vision tests can also be included. Contrast sensitivity testing was not done which is the limitation of our study.

CONCLUSION:

- According to the present criterion ≈ 20% drivers were unfit; in India criteria for driving safely is to be revised and modified including other criteria (visual field, contrast sensitivity) which most of the western countries have.
- Abnormal color vision is incompatible with driving safely but problem can be overcome by standardized position of traffic lights.
- Regular monitoring & better visual examination parameters should be given more importance for issue and renewal of driving licenses.
- Frequent ocular examinations are recommended for older drivers.
- Ocular examination for drivers should be more frequent in various parts of different high ways in country to increase the safety margin of our national highways.



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