

A PROSPECTIVE STUDY ON ASSESSMENT OF VISUAL FUNCTION OF TRUCK DRIVERS TRAVELLING ON NATIONAL HIGHWAY

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ABSTRACT

BACKGROUND

Truck drivers commonly referred as truckers, provide essential services to industrialized societies and are also responsible for inspecting all their vehicles for safe operation. They are the most responsible persons for highway mishaps. While at work they are carried out by, information taken from their visual inputs about the road itself, other vehicles, pedestrians, signs, the passing scenery, etc. rest of the information, may be processing through other information sources.

The aim of the study was to examine and evaluate the visual traits of truck drivers on national highway.

MATERIALS AND METHODS

This prospective study was conducted on truck drivers passing through NH 45 near PADALAM, Chengalpattu, Tamil Nadu, India. Drivers were examined for visual acuity with Snellen's chart, colour vision with Ishihara plates, field vision by confrontation method and preliminary fundus through direct ophthalmoscope.

RESULTS

Totally 148 drivers were examined, out of which 120 (81.08%) were found to be fit for driving. 22 had refractive error (14.86%), 3 had cataract (2.02%), 1 had diabetic retinopathy (0.67%), 1 had vasculitis (0.67%), 1 had defective colour vision (0.67%).

CONCLUSION

Among the population examined, approximately 20% of them were found to have some form of defective vision. Criteria for driving safely should be revised and regularly monitored. Current Driving Licensing System followed in India and the issuance of license should include better visual assessment parameters should be given importance at issue and renewal of driving license.

KEYWORDS

Visual Parameters, Truck Drivers, Driving License, National Highways.

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BACKGROUND

Road transport is vital to India's economy. It is considered to be critical for the country's development. It caters to the needs of 1.1 billion people.¹ India as a developing nation has a huge and comprehensive network of road highways. The National Highways Authority of India is the authority responsible for the development and maintenance of national road highways. Transportation of goods in India is mainly dependent on roads. It also carries almost 90% of the country's passenger. The India's highway network density is 0.66 km per square kilo meter of land.²

Road highways safety is a major social concern and depends on the drivers of the heavy motor vehicle driving in the highways. Truck drivers are the most responsible and vulnerable for highway mishaps.³ They are responsible for their own and lives of others as well. Road highways safety is a crucial issue that needs focus in the present era of increased traffic fatalities.⁴

Among the human factors that influence safe driving,⁵ visual skills of the drivers are of the fundamental concern.⁶ According to the 2013 report of the Ministry of Road Transport and Highways, GOI, "driver fault" forms a significant share of the causes of road accidents in India and it stands at 78 per cent.

Our study was done in the eye camp conducted by National Highways Authority of India.

MATERIALS AND METHODS

The study was prospective in design and was conducted on the truck drivers passing through NH 45 at Padalam, Chengalpattu (C.G.). Inclusion criteria were the truck drivers of age group 20-60 yrs. passing through the NH 45 at

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Padalam, Chengalpattu between 9 am and 6 pm between the dates of 2/10/2017 and 6/10/2017. All the drivers were examined for visual acuity (Snellen’s charts), colour vision (Ishihara plates), visual fields (confrontation method) and fundus (direct ophthalmoscopy).

data obtained for India from a report prepared for ICO 30th World Ophthalmology Congress. The mean age of drivers was 32 years (range 18-60 years). 22 drivers had refractive errors (14.86%), nearly 3 (2.02%) drivers had cataract, 1 had diabetic retinopathy (0.67%), 1 had colour blindness (0.67%), 1 had vasculitis (0.67%).

RESULTS

Totally 148 drivers were examined out of which 120 (81.06%) were found fit for driving, criteria adapted as per

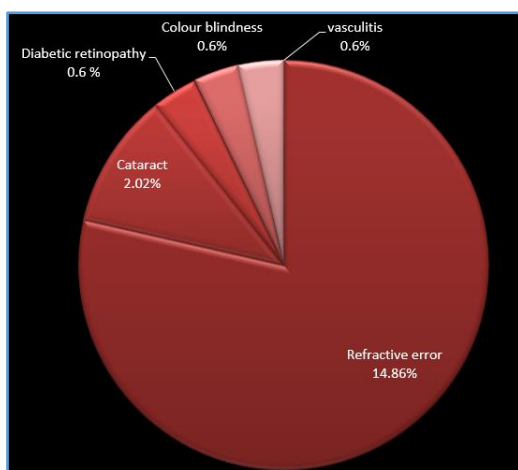
Sl. No.	Age	Visual Acuity	Colour Vision	Field Vision	Preliminary Fundus	Accident History	Remarks
1	37 Y	6/6 AND 6/6	N	N	N	NIL	N
2	32 Y	6/6 AND 6/6	N	N	N	NIL	N
3	58 Y	6/60 AND 6/60	N	N	MEDIA HAZY	NIL	CATARACT
4	37 Y	6/18 AND 6/24	N	N	N	NIL	HYPERMETROPIA
5	34 Y	6/6 AND 6/6	N	N	N	NIL	N
6	42 Y	6/6 AND 6/6	N	N	N	NIL	N
7	40 Y	6/6 AND 6/6	N	N	N	NIL	N
8	40 Y	6/6 AND 6/6	N	N	N	NIL	N
9	40 Y	6/6 AND 6/6	N	N	N	NIL	N
10	38 Y	6/6 AND 6/6	N	N	N	NIL	N
11	40 Y	6/6 AND 6/6	N	N	N	NIL	N
12	47 Y	6/18 AND 6/36	N	N	N	NIL	MYOPIA
13	39 Y	6/6 AND 6/6	N	N	N	NIL	N
14	60 Y	6/24 AND 6/18	N	N	N	NIL	MYOPIA
15	33 Y	6/6 AND 6/6	N	N	N	NIL	N
16	39 Y	6/6 AND 6/6	N	N	N	NIL	N
17	31 Y	6/6 AND 6/6	N	N	N	NIL	N
18	32 Y	6/6 AND 6/6	N	N	N	NIL	N
19	54 Y	6/6 AND 6/6	N	N	N	NIL	N
20	39 Y	6/6 AND 6/6	N	N	N	NIL	N
21	26 Y	6/6 AND 6/6	N	N	N	NIL	N
22	40 Y	6/18 AND 6/36	N	N	N	NIL	MYOPIA
23	49 Y	6/24 AND 6/12	N	N	N	NIL	MYOPIA
24	39 Y	6/6 AND 6/6	N	N	N	NIL	N
25	42 Y	6/6 AND 6/6	N	N	N	NIL	N
26	43 Y	6/6 AND 6/6	N	N	N	NIL	N
27	38 Y	6/6 AND 6/6	N	N	N	NIL	N
28	49 Y	6/24 AND 6/18	N	N	N	NIL	MYOPIA
29	52 Y	6/36 AND 6/12	N	N	N	NIL	MYOPIA
30	38 Y	6/6 AND 6/6	N	N	N	NIL	N
31	39 Y	6/6 AND 6/6	N	N	N	NIL	N
32	38 Y	6/6 AND 6/6	N	N	N	NIL	N
33	54 Y	6/24 AND 6/36	N	N	N	NIL	MYOPIA
34	31 Y	6/6 AND 6/6	N	N	N	NIL	N
35	50 Y	6/18 AND 6/24	N	N	N	NIL	MYOPIA
36	40 Y	6/6 AND 6/6	N	N	N	NIL	N
37	24 Y	6/6 AND 6/6	N	N	N	NIL	N

Sl. No.	Age	Visual Acuity	Colour Vision	Field Vision	Preliminary Fundus	Accident History	Remarks
38	28 Y	6/6 AND 6/6	N	N	N	NIL	N
39	39 Y	6/6 AND 6/6	N	N	N	NIL	N
40	29 Y	6/6 AND 6/6	N	N	N	NIL	N
41	43 Y	6/6 AND 6/6	N	N	N	NIL	N
42	28 Y	6/6 AND 6/6	N	N	N	NIL	N
43	26 Y	6/6 AND 6/6	N	N	N	NIL	N
44	38 Y	6/6 AND 6/6	N	N	N	NIL	N
45	43 Y	6/6 AND 6/6	N	N	N	NIL	N
46	41 Y	6/6 AND 6/6	N	N	N	NIL	N
47	40 Y	6/6 AND 6/6	N	N	N	NIL	N
48	51 Y	6/18 AND 6/36	N	N	N	NIL	MYOPIA
49	28 Y	6/6 AND 6/6	N	N	N	NIL	N
50	55 Y	6/36 AND 6/36	N	N	N	NIL	MYOPIA
51	40 Y	6/6 AND 6/6	N	N	N	NIL	N
52	50 Y	6/36 AND 6/18	N	N	N	NIL	MYOPIA
53	42 Y	6/6 AND 6/6	N	N	N	NIL	N
54	52 Y	6/18 AND 6/24	N	N	N	NIL	MYOPIA
55	44 Y	6/6 AND 6/6	N	N	N	NIL	N
56	24 Y	6/6 AND 6/6	N	N	N	NIL	N
57	29 Y	6/6 AND 6/6	N	N	N	NIL	N
58	54 Y	6/36 AND 6/36	N	N	N	NIL	MYOPIA
59	40 Y	6/6 AND 6/6	N	N	N	NIL	N
60	42 Y	6/6 AND 6/6	N	N	N	NIL	N
61	42 Y	6/6 AND 6/6	N	N	N	NIL	N
62	35 Y	6/6 AND 6/6	N	N	N	NIL	N
63	31 Y	6/6 AND 6/6	N	N	N	NIL	N
64	26 Y	6/6 AND 6/6	N	N	N	NIL	N
65	51 Y	6/24 AND 6/36	N	N	N	NIL	MYOPIA
66	22 Y	6/6 AND 6/6	DEFECTIVE	N	N	NIL	COLOUR BLINDNESS
67	29 Y	6/6 AND 6/6	N	N	N	NIL	N
68	32 Y	6/6 AND 6/6	N	N	N	NIL	N
69	25 Y	6/6 AND 6/6	N	N	N	NIL	N
70	37 Y	6/6 AND 6/6	N	N	N	NIL	N
71	39 Y	6/6 AND 6/6	N	N	N	NIL	N
72	26 Y	6/6 AND 6/6	N	N	N	NIL	N
73	23 Y	6/6 AND 6/6	N	N	N	NIL	N
74	32 Y	6/6 AND 6/6	N	N	N	NIL	N
75	26 Y	6/6 AND 6/6	N	N	N	NIL	N
76	26 Y	6/6 AND 6/6	N	N	N	NIL	N
77	36 Y	6/6 AND 6/6	N	N	N	NIL	N
78	32 Y	6/6 AND 6/6	N	N	N	NIL	N
79	30 Y	6/6 AND 6/6	N	N	N	NIL	N
80	22 Y	6/6 AND 6/6	N	N	N	NIL	N
81	27 Y	6/6 AND 6/6	N	N	N	NIL	N
82	25 Y	6/6 AND 6/6	N	N	N	NIL	N

Sl. No.	Age	Visual Acuity	Colour Vision	Field Vision	Preliminary Fundus	Accident History	Remarks
83	29 Y	6/6 AND 6/6	N	N	N	NIL	N
84	30 Y	6/6 AND 6/6	N	N	N	NIL	N
85	23 Y	6/6 AND 6/6	N	N	N	NIL	N
86	40 Y	6/6 AND 6/6	N	N	N	NIL	N
87	40 Y	6/6 AND 6/6	N	N	N	NIL	N
88	24 Y	6/6 AND 6/6	N	N	N	NIL	N
89	36 Y	6/6 AND 6/6	N	N	N	NIL	N
90	40 Y	6/6 AND 6/6	N	N	N	NIL	N
91	30 Y	6/6 AND 6/6	N	N	N	NIL	N
92	24 Y	6/6 AND 6/6	N	N	N	NIL	N
93	31 Y	6/6 AND 6/6	N	N	N	NIL	N
94	22 Y	6/6 AND 6/6	N	N	N	NIL	N
95	28 Y	6/6 AND 6/6	N	N	N	NIL	N
96	25 Y	6/6 AND 6/6	N	N	N	NIL	N
97	27 Y	6/6 AND 6/6	N	N	N	NIL	N
98	35 Y	6/6 AND 6/6	N	N	N	NIL	N
99	37 Y	6/6 AND 6/6	N	N	N	NIL	N
100	47 Y	6/6 AND 6/6	N	N	N	NIL	N
101	39 Y	6/6 AND 6/6	N	N	N	NIL	N
102	33 Y	6/6 AND 6/6	N	N	N	NIL	N
103	34 Y	6/6 AND 6/6	N	N	N	NIL	N
104	56 Y	6/18 AND 6/24	N	N	N	NIL	MYOPIA
105	43 Y	6/6 AND 6/6	N	N	N	NIL	N
106	22 Y	6/6 AND 6/6	N	N	N	NIL	N
107	42 Y	6/6 AND 6/6	N	N	N	NIL	N
108	30 Y	6/6 AND 6/6	N	N	N	NIL	N
109	21 Y	6/6 AND 6/6	N	N	N	NIL	N
110	44 Y	6/6 AND 6/6	N	N	N	NIL	N
111	52 Y	6/36 AND 6/18	N	N	N	NIL	MYOPIA
112	40 Y	6/6 AND 6/6	N	N	N	NIL	N
113	32 Y	6/6 AND 6/6	N	N	N	NIL	N
114	32 Y	6/6 AND 6/6	N	N	N	NIL	N
115	38 Y	6/6 AND 6/6	N	N	N	NIL	N
116	36 Y	6/6 AND 6/6	N	N	N	NIL	N
117	37 Y	6/6 AND 6/6	N	N	N	NIL	N
118	26 Y	6/6 AND 6/6	N	N	N	NIL	N
119	57 Y	6/24 AND 6/36	N	N	N	NIL	MYOPIA
120	27 Y	6/6 AND 6/6	N	N	N	NIL	N
121	46 Y	6/18 AND 6/24	N	N	N	NIL	HYPERMETROPIA
122	54 Y	6/36 AND 6/60	N	N	N	NIL	MYOPIA
123	49 Y	6/36 AND 6/36	N	N	N	NIL	MYOPIA
124	29 Y	6/6 AND 6/6	N	N	N	NIL	N
125	48 Y	6/6 AND 6/6	N	N	N	NIL	N
126	44 Y	6/6 AND 6/6	N	N	N	NIL	N
127	31 Y	6/6 AND 6/6	N	N	N	NIL	N

Sl. No.	Age	Visual Acuity	Colour Vision	Field Vision	Preliminary Fundus	Accident History	Remarks
128	32 Y	6/6 AND 6/6	N	N	N	NIL	N
129	25 Y	6/6 AND 6/6	N	N	N	NIL	N
130	26 Y	6/6 AND 6/6	N	N	N	NIL	N
131	36 Y	6/6 AND 6/6	N	N	N	NIL	N
132	19 Y	6/6 AND 6/6	N	N	N	NIL	N
133	23 Y	6/6 AND 6/6	N	N	N	NIL	N
134	28 Y	6/6 AND 6/6	N	N	N	NIL	N
135	41 Y	6/6 AND 6/6	N	N	N	NIL	N
136	34 Y	6/6 AND 6/6	N	N	N	NIL	N
137	46 Y	6/6 AND 6/6	N	N	N	NIL	N
138	37 Y	6/6 AND 6/6	N	N	N	NIL	N
139	54 Y	6/60 AND 4/60	N	N	MEDIA CLEAR FEW DOT AND BLOT HAEMMORHAGES WITH HARD EXUDATES FR DULL	NIL	DIABETIC RETINOPATHY
140	56 Y	6/36 AND 6/60	N	N	MEDIA HAZY	NIL	CATARACT
141	51 Y	6/18 AND 6/24	N	N	N	NIL	HYPERMETROPIA
142	35 Y	6/6 AND 6/6	N	N	N	NIL	N
143	29 Y	6/36 AND 6/36	N	N	MEDIA CLEAR SHEATHING OF VESSELS COTTON WOOL SPOTS IN ST QUADRANT FR DULL	NIL	VASCULITIS
144	37 Y	6/6 AND 6/6	N	N	N	NIL	N
145	34 Y	6/6 AND 6/6	N	N	N	NIL	N
146	24 Y	6/6 AND 6/6	N	N	N	NIL	N
147	59 Y	6/60 AND 5/60	N	N	MEDIA HAZY	NIL	CATARACT
148	40 Y	6/6 AND 6/6	N	N	N	NIL	N

Table 1



Graph 1. Visual Defects in Truck Drivers

DISCUSSION

International Congress of Ophthalmology recommends various visual functions to be tested.⁷ 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. It also stresses the interaction of visual and non-visual parameters

Vision Requirements of Driving Safety

The vision requirements for driving safety is BCVA 6/12 binocularly, data as obtained from report for driving safety prepared for International Council of Ophthalmology (ICO) 30th World Ophthalmology Congress. AS PER ICO, in India, visual acuity of 6/18 binocularly is good enough to obtain driving license.

There is a relationship between age and driving safety according to Keltner and Jhonson.⁸ The Department of Motor Vehicles Driver Record Study at California reported during the period of 1972-1974, an incidence of two accidents per 100.000 miles in 20-year old drivers. 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.⁹ Driver fatigue was recently judged to be the number-one problem in commercial transportation.

This tabulation is based on data provided by members of the International Council, as indicated.

Country	Visual Acuity, both eyes	Monocular vision	Visual fields	Color vision	Restr. License possible
Algeria (Hartani)	0.8	1.0 (+ 2 rear mirrors)			
Australia (F. Martin)	6/12	6/12	120° hor. by confrontation	No	Yes
Bulgaria (Markov)	0.6			Yes	
Belgium (Off. journal)	0.5	0.6	120° no diplopia	No	Yes
Canada ^(13,14) (Casson et al, 2000, D.P. Anderson 2005)	20/50 (Quebec 20/50)		120° (Quebec 100° hor; >30° each side)	Some yes Some no	Yes
Colombia (Rodriguez)	20/40		120°	Yes	
Denmark (Norregaard)	0.5	0.6	Nl. for hand movements		
European Union (e.g. Belgium)	0.5	0.6	120° no diplopia	No	Yes
France (J.P. Adenis)	0.5	0.6	120° no diplopia	No	
Gambia (H. Faal)	6/9		No		
Germany (Steuhl, M. Korth)	0.5 0.2	0.6	Yes		Yes
Hungary (Harvani)	0.8; 0.25 1.3	1.0	Defect of less than 30°		Yes
India (Rao, Vasavada)	6/18				
Israel (J. Pe'er)	6/12		Yes		

Recommendations of ICO

Issuance of driving license should include more criteria. There is a definite need to make the driving license requirements more uniform. The visual and driving performance of older drivers should be assessed regularly along with testing of glare and contrast sensitivity.²

For an unrestricted (non-commercial) license we recommend that, with both eyes open, the applicant should have a visual acuity of 20/40 (0.5, 6/12) or better and an uninterrupted visual field of 120° or better in the horizontal meridian.¹⁰ There is a need for restricted licenses. The purpose of allowing restricted licenses is to improve the safety margin (inherent in the standard requirements) through avoidance of hazardous conditions, especially for those who have prior driving experience and a good driving record.

CONCLUSION

To conclude, our study matches the present criterion that approximately 20% drivers were unfit to drive. Refractive errors were corrected with best glasses. Cataract, diabetic retinopathy and vasculitis patients were referred to the government eye hospital for further evaluation and management. Colour blindness is not incompatible with driving safely, but the problem can be overcome by the standardized position of traffic lights.

Better visual examination parameters should be included for issuance and renewal of driving license. Regular ocular examination for drivers should be performed in order to increase the safety margin of our national highways.

Along with visual factors, non-visual factors like the person's physical condition, hearing, age, rest hours and driving duration do also play a definite role.

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