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OCULAR HEALTH STATUS AND VISUAL FITNESS OF COMMERCIAL DRIVERS IN ABAKALIKI METROPOLIS, NIGERIA

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ABSTRACT

Objective: **The stipulated minimum visual requirement for issuance of commercial driving license in Nigeria is based only on distance visual acuity (VA) minimum of 6/9 in the better eye and 6/12 in the poorer eye. The objective of this study was to describe the ocular health status of commercial vehicle drivers who are registered with the major motor parks in Abakaliki Metropolis and their visual fitness for commercial driving.**

Methodology: **This was a cross sectional descriptive study of the ocular health of all drivers in 4 major commercial motor parks in Abakaliki, South-eastern Nigeria; who presented for eye screening during the Federal Road Safety Corps of Nigeria - organized drivers' sensitisation on visual testing. Relevant data were collected and analysed using SPSS software package version 22 and presented in simple tables showing frequencies, percentages and proportions. Relationship between presenting visual acuity (PVA) and self-reported history of road traffic accident (RTA) was tested using the chi square Statistic. Significance was set at $p < 0.05$.**

Results: **The 103 drivers who participated in this study were all males. Their ages ranged from 24 to 75 years with a mean age of 43.2 ± 12.3 years. Nearly half of the participants (46 or 44.2%) had ocular complaints, out of which 43 (93.5%) reported difficulty with near vision (reading small prints), and 36 (78.3%) reported diminution of distant vision. Ocular examination revealed that 44 participants (42.7%) had no eye disorder, while 59 (57.3%) had various ocular disorders including glaucoma 25 (42.4%), refractive errors 11 (18.6%); cataract 11 (18.6%); pterygium 5 (8.5%); hypertensive retinopathy 4 (6.8%), age-related macular degeneration 2 (3.4%); and optic atrophy 1 (1.7%). Visual acuity testing revealed that only 86 (83.5%) of the drivers met the federal road safety commission's guideline for visual acuity level for commercial vehicle drivers of ≥ 6/12 in the poorer eye.**

Conclusion: **A significant number (17 or 16.5%) of commercial drivers in Abakaliki metropolis were unfit for commercial driving by the federal road**

safety commission's guideline. The most common ocular disorders were glaucoma, cataract and uncorrected refractive errors.

INTRODUCTION

Commercial drivers of motorised vehicles such as motor cars, buses, vans, motorized two-wheeled and three-wheeled vehicles, play a very important role in mass transportation; especially in low and medium income countries where most families do not own a car.[1, 2] Enforcement of safety regulations for commercial transportation is therefore, a very important need for communities. Globally, road crash injury is a leading cause of death for young drivers and riders aged 15-29 years.[1-3] An estimated 1.25 million lives are lost from road traffic accidents every year, Current trends show that by 2030, road traffic injuries (RTA) will become the seventh leading cause of death globally.[4.]

Vision is the most important source of information during driving and many driving -related injuries have been associated with visual problems.[6, 7] Visual functions predict driving performance / driving safety globally and is therefore part of the criteria required for obtaining drivers license. Although visual functions, such as visual acuity, visual field, contrast sensitivity, color vision, night vision, etc. can be measured as part of an eye examination, the routine functional vision estimate of driving safety is often limited to visual acuity and sometimes visual field; contrast sensitivity is rarely required. The International council of Ophthalmology (ICO) recommended the following minimum visual function criteria for drivers licensing: a minimum threshold of 20/40 (0.5, 6/12) for visual acuity; and a binocular field of at least 120° horizontal and 40° vertical for visual fields. It listed contrast sensitivity screening as desirable but not a compulsory requirement.[6]

In Nigeria, the Federal Road Safety Commission (FRSC), which was established in 1988 (by Decree 45 of 1988), regulates driving licensing and other issues related with driving safety.[5,8,9] The stipulated minimum visual requirement for issuance of driving license is based only on distance visual acuity (VA) and requires a minimum VA of 6/9 in the better eye and 6/12 in the poorer eye of commercial motor vehicle drivers and VA of at least 6/12 in the better eye and 6/36 in the poorer eye for drivers of private vehicles . [5, 8, 9] This is very much in keeping with the recommendations of the International Council of Ophthalmology (ICO). [6]

Beside visual function, other factors that can affect driving performance include training, experience and familiarity with the driving environment. Age of the driver and non-visual medical conditions are also important.[6, 7, 10, 11] There is evidence that the combination of several minor limitations may be more important than any one limitation by itself[6, 10, 11]. The international council of ophthalmology advocates periodic evaluation before renewal of driving license, especially for older subjects.[6]

This study is aimed at assessing the ocular health status of commercial drivers in Abakaliki with a view to determining their visual fitness for commercial driving based on guidelines of the Federal Road Safety commission (FRSC) of Nigeria, for commercial vehicle drivers. The findings of this study will be useful evidence for the purpose of relevant education of the drivers and also policy makers.

METHODOLOGY

Background of study area: Ebonyi state is one of the South-Eastern states of Nigeria. It has a population of approximately 2 .9

million people and is made up of 13 local government areas within three senatorial zones. It has a total land area of 5,530km^2 and is located on coordinates 6^{0}15'N 8^{0}05'E[12]. Abakaliki is the capital city of Ebonyi state and the centre of most economic activities in the state. As a result, commercial vehicle drivers operating to and from Abakaliki play a very important role in the economic life of the people.

Study Design: This was a cross sectional, descriptive study

Sample Size: All consenting commercial drivers in 4 major commercial motor parks in Abakaliki, South eastern Nigeria, who presented themselves for the screening exercise, were recruited into the study.

Ethical Clearance: Ethical clearance for this study was obtained from the research ethics committee of the National Obstetric Fistula centre, Abakaliki. Permission was obtained from the Drivers' Union. The eye screening was done in collaboration with the Federal Road Safety Commission (FRSC), Abakaliki, as part of promotion of vision screening for commercial drivers. Ahead of the screening, the Road traffic Workers union was notified of this exercise by the Road Safety commission and drivers duly prepared to participate actively.

Informed Consent: Written informed consent was obtained from participants and refusal of participation was respected.

Procedure: A proforma/questionnaire was developed for data collection. Ten (10) research assistants comprising of 4 Ophthalmologists-in training (resident doctors) 2 nurses and 4 medical students were recruited and trained for the study. A temporary eye examination booth was created in each of the parks where the subjects were examined.

Eye examination was as follows:

- Presenting visual acuity (PVA) was assessed for each subject with the aid of the Snellen's chart placed 6m from the respondent in broad day light
- Those with visual acuity of 6/9 or less were presented with a pinhole and the test repeated.
- Improvement of visual acuity with pinhole was considered as a refractive error.
- Anterior segment examination was with the aid of pen torch and magnifying head loupe
- Posterior segment examination was with the direct ophthalmoscope.
- All respondents who had ocular problems were referred to the eye clinic at Federal Teaching Hospital, Abakaliki for further evaluation and management.

Data analysis: Data was entered into a personal computer, cleaned and analyzed using the Statistical Package for Social Sciences (SPSS), version 22 (SPSS Inc, Chicago, Illinois, USA). Descriptive statistics were reported and presented on frequency tables as proportions, percentages and means ± standard deviation. Inferential statistics were presented on contingency tables and relationships between the outcome variable and categorical variables were tested using the Chi Squared Statistic. Significance was set at $P < 0.05$

Definitions

- Presenting visual acuity (PVA) is the distance visual acuity (VA) measured unaided, if the subject does not normally wear spectacles or measured with spectacles on, if normally worn.
- Visual acuity (VA) fitness for commercial vehicle drivers is VA ≥ 6/9 in the better eye and ≥ 6/12 in worse eye.[5, 8, 9]

RESULTS

Socio-demographic characteristics of the drivers: The number of drivers interviewed was 103 and all of them were males. The minimum age was 24 years and the oldest driver was aged 75 years. The mean age was 43.2 ± 12.3 SD. The most common age group

was 40-49 years (33%) followed by the 30-39 years age group (30.1%). See Table 1.

Table 1

Socio-demographic characteristics of drivers in Abakaliki

Variable	Frequency (n = 103)	Percentage
Age: Mean age = 43 ± 12.2		
Age group:		
20-29	9	8.7
30-39	31	30.0
40-49	34	33.0
50-59	16	15.5
≥ 60	13	12.8
Educational Status		
≤ Primary education	53	51.4
Secondary education	41	39.8
Tertiary education	9	8.8
State of origin:		
Ebonyi	71	68.9
Enugu	13	12.6
Anambra	7	6.8
Abia	7	6.8
Imo	3	2.9
Cross River	1	1.0
LGA of drivers from Ebonyi State (n = 71):		
Izzi		
Ohaukwu	12	16.9
Onicha	12	16.9
Ezza North	10	14.1
Ezza South	9	12.7
Abakaliki	8	11.3
Ikwo	8	11.3
Afikpo south	4	5.6
Ishielu	3	4.2
Ebonyi	2	2.8
Ivo	2	2.8
	1	1.4

Majority of the drivers (71 or 68.9%) were indigenes of Ebonyi state while the rest came from the surrounding states of Enugu (12.1%), Anambra (6.8%), Abia (6.8%), and Cross River states (1.0%). The majority of those from Ebonyi State hail from Ohaukwu and Izzi LGAs which accounted for 11.7% of the drivers each; followed by Onicha, Ezza North and Ezza South with 9.7%, 8.7% and 7.8% respectively. Their educational status reveals that over half of the participants (51.4%) had ≤ primary education (See table 1).

Ocular symptoms/complaints: The drivers were asked if they had any ocular symptoms and if yes, the type of symptoms they had. At the time of the study, 46 of the drivers (44.7%) reported ocular symptoms. Of this number, 43 (93.5%) reported difficulty with reading/ near work, 36 (78.3 %) reported diminution of distant vision, 29 (63.0%) reported tearing, 28 (60.9%) reported

redness of the eyes, 26 (25.2%) reported itching and 25 (54.3%) reported foreign body sensation. Other symptoms include Glare (47.8%), Pain (30.4%), Trauma (28.3%), swelling of the eye (4.3%) and protrusion of the eye (4.3%). See table 2.

Table 2

Ocular symptoms of drivers

Ocular symptoms	Frequency	Percentage
Have Ocular symptoms	**46**	**44.7**
Which Ocular symptoms (n = 46)*:		
Difficulty with reading	43	93.5
Diminution of vision	36	78.3
Tearing	29	63.0
Redness of the eyes	28	60.9
Itching of the eyes	26	56.5
Foreign body sensation	25	54.3
Glare	22	47.8
Pain	14	30.4
Trauma	13	28.3
Swelling	2	4.3
Protrusion of the eye	2	4.3

**Some respondents had more than one ocular symptom*

Provisional ocular diagnosis: Ocular examination of the the 103 drivers revealed that 44 (42.7%) had normal eyes, while 59 (57.3%) had ocular disorders. Of these 59 participants with ocular disorders, glaucoma accounts for 25 (42.4%), refractive error 11 (18.6%); cataract 10 (16.9%); Pterygium 5 (8.5%); age-related macular degeneration 2 (3.4%); Optic atrophy 1 (1.7%); and hypertensive retinopathy 1 (1.7%). See Table 3.

Table 3

Distribution of Provisional diagnosis among participants (N=59)

Diagnosis	Frequency	%
Glaucoma/Glaucoma suspect	25	42.4
Refractive error	11	18.6
Cataract	10	16.9
Pterygium	5	8.5
Hypertensive Retinopathy	4	6.8
Age related Maculopathy	2	3.4
Optic atrophy	1	1.7
Other	1	1.7
Total	59	100.0

Visual acuity Fitness for driving: The visual acuity assessment of the participants, using PVA revealed that 86 (83.5%) of the drivers met the road safety commission guideline for visual acuity level for commercial vehicle drivers while 17 drivers (16.5%) were unfit for commercial driving, mostly due to monocular visual impairment. Thus, 11(64.7%) of the 17 visually unfit drivers, though they had visual acuity of ≥ 6/12 in their better eye had < 6/36 in the poorer eye (monocular visual impairment). See Table 4. The relationship between Visual acuity fitness for driving and self-reported history of road traffic accident (RTA) was not statistically significant (**X^2 = 0.05; P=0.82**).

Table 4

Relationship between Visual Acuity Fitness for drivers Licence and self-reported history of Road Traffic Accident (RTA)

Visual Acuity fitness for driving	**Frequency**	**Percent**	
Fit for driving commercial vehicles i.e. no driving restrictions (≥ 6/9 in better eye and ≥ 6/12 in poorer eye)	86	83.5	
Visually unfit for driving (< 6/12 in the poorer eye)	17	16.5	
	Have you had road traffic accident (RTA) before?		**Total**
Visual acuity fitness for driver's License	Yes	No	
Fit for commercial driving (≥ 6/9 in the better eye and ≥ 6/12 in worse eye)	40	46	86
Others (Unfit for commercial driving)	8	9	17
TOTAL	**48**	**55**	**103**

X^2 = 0.05; P=0.82

Relationship between Monocular visual impairment and monocular blindness with RTA: There were 9 participants with monocular visual impairment, of which 7 were blind in one eye (monocular blindness), using WHO definition of best corrected VA < 3/60. There was no statistically significant relationship between monocular visual impairment or monocular blindness with self-reported history of RTA: X^2 =0.045; P=0.85 (for monocular visual impairment) and X^2 = 0.358; P=0.549 (for monocular blindness).

Table 5

Relationship between Monocular visual impairment and self-reported history of Road Traffic Accident (RTA)

	have you had road trafic accident (RTA) before?		
	Yes	**No**	**Total**
Monocular impairment	4	5	9
Others	44	50	94
Total	48	55	103

X^2 = 0.045; P=0.85

DISCUSSION

The participants in this study were all males. This finding compares with other studies done in Nigeria and India and suggests that commercial driving is still exclusively a job for males in developing countries [4,5,7,8].

The educational status of the participants in this study revealed that over half of the participants (51.4%) had less than primary school education. This trend suggests that commercial driving may not be a choice vocation for the elites in this part of Nigeria. Despite the need for basic education for driving, there was no statistically significant relationship between educational level and road traffic accident in this study.

Majority of the participants (66.1%) were aged 30-49 years, with a mean age of 43 years. This age group represents the active work force in the country. The mean age recorded in this study compares with other reports on commercial drivers.[5,7,8] but differs from a report from a study amongst university drivers where an older mean age of 50.1 years was reported.[13] That probably reflects the irregular employment pattern of

university workforce. Fresh employment will attract younger workforce.

The age of driving is important as it has been observed that while younger drivers are said to have more car crashes due to inexperience or risky behaviors, older drivers may have the problem of inattention and slower visual processing.[13,14] Furthermore reduced sensory cognitive function and vision – threatening ocular conditions are more common in persons aged 50 years and above. [5,9,10]

Some other important visual parameters that decline with age include accommodation and adaptation, which although not usually listed as part of visual function tests for driving license; may affect visual performance in older age.[10] Adaptation is required to perceive objects when levels of illumination are changing, as might occur during night-time driving or in parking garages. Older adults require more time than young adults to adjust to abrupt changes in light or darkness and therefore often report difficulties dealing with the sudden onset of bright lights, such as the headlights of an oncoming car. Glare may also play a role in visual difficulties in older age; especially at night [10,11] Glare was one of the notable ocular symptoms among the participants who had symptoms (47.8%). Glare is more common among people who have cataract; mostly age-related cataract.

Older drivers may also have reduced contrast sensitivity especially in low light levels, leading to difficulties in distinguishing targets against their background, such as problems distinguishing cars or pedestrians against background scenery, especially at night or during storms. Contrast sensitivity is not routinely tested in most countries as part of required visual function test for driving license.[6]

Accommodation, which recedes with age (presbyopia), is important for reading the signs on the dash-board or viewing objects in the mirror[10,11]. In this study 43 participants (93.5%) of the participants with ocular symptoms complained of difficulty with reading. Luckily presbyopic corrections as well as refractive errors are easily corrected with spectacles. Spectacle correction of visual acuity to achieve 'best corrected visual acuity' is globally acceptable for driving; thus, visual function tests for driving license affords potential drivers an opportunity to obtain spectacle correction for uncorrected refractive errors.

In this study 86 (83.5%) of the drivers met the road safety guideline for visual acuity level for commercial vehicle drivers while 17 drivers (16.5%) were unfit for commercial driving, mostly due to monocular visual impairment. Thus, although 11(64.7%) of the 17 unfit drivers had visual acuity of ≥ 6/12 in their better eye, they had < 6/12 in their poorer eye. This finding is unlike most other Nigerian studies [8,13,14,15] that reported visual impairment based on WHO definition (best corrected VA of less than 6/18). Using that definition Oladehinde et al[14] reported visual impairment in the better eye in 3.3% of drivers, Adekoya et.al [15] reported 2.8% while Abraham et al.[8] reported 1.7%. An Indian study reported visual impairment in the better eye of 8.7%.[7] All these other studies would have reported much higher prevalence of poor driving vision, if they had reckoned that driving requires much clearer vision than most other visual tasks. None of the participants in this study had a presenting VA of less than 6/18 in the better eye and therefore would have all been erroneously declared to have good vision for driving by WHO definition of visual impairment. Using the Road safety commission guideline ensures a higher benchmark for visual screening for commercial drivers as the VA in the poorer eye is also considered.

Vision-threatening ocular pathologies found among the participants in this study include cataracts, glaucoma, refractive

errors, optic atrophy, and hypertensive retinopathy. Glaucoma was the most common ocular pathology among the participants with ocular disorders (42.4%). This calls for a review of visual function test requirements for driving, considering that visual field testing is not a routine requirement in Nigeria. Constriction of visual field occurs in patients with glaucoma as well some other pathology such as retinitis pigmentosa, stroke and even ptosis.[10,11] Assessment of visual field is therefore, very important to detect those who may have significantly constricted visual field, despite a good central visual acuity. [10, 11] In Nigeria, as in many other countries, the stipulated minimum visual requirement for driving license is only based on distance visual acuity (VA). The visual field recommendation by The International Council of Ophthalmology (ICO) remains relevant.

Contrary to expectation, the relationship between history of road traffic accidents among the participants and visual acuity was not statistically significant, even for those with monocular blindness. This is a common observation in many other studies. [7, 8, 12-16] Perhaps visual field defects may have more negative impact on driving safety than visual acuity. In their study, Abraham and co-workers noted that although there was no significant association between road traffic accidents and visual acuity, visual field defect were significantly related to RTA[8]. However, the study by by Pepple and Adio[16] found no significant association between both visual acuity or visual field defects and RTA. It has been suggested that beside visual function, other factors including human, vehicular, and traffic environmental factors also play significant roles in causing road traffic accidents. [7,8,16]

CONCLUSION

A significant number (17 or 16.5%) of commercial drivers in Abakaliki metropolis were unfit for commercial driving, based on the Federal Road Safety Commission guideline. The most common ocular disorders were glaucoma, cataract and refractive errors.

Monocular blindness was mostly caused by glaucoma, cataract and optic atrophy. Surprisingly the relationship between visual acuity and Road Traffic Accident was not statistically significant (P=0.82) even for monocular blindness (P=0.549). The burden of glaucoma among the drivers is a wakeup call for the importance of visual field assessment in the visual function test requirement for driving license.

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