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An Assessment of Visual Acuity of Commercial Vehicle Drivers in Makurdi, Benue State, North-Central Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author COO designed the study and wrote the protocol. Author OSA performed the statistical analysis and managed the literature searches. Authors COO and BAO managed the analysis of the study. All Authors read and approved the final manuscript.

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ABSTRACT

Aim: This study was designed to investigate the visual acuity and the relationship between visual acuity and rate of road traffic accident (RTAs) among commercial (private and government transport companies) vehicle drivers in Makurdi, North Central Nigeria.
Methods: A structured questionnaire was administered to each driver by face-to-face interview in four major motor parks in Makurdi metropolis. The documented information included driver's demographic data, duration of driving, history of previous ophthalmic examination, past ophthalmic disease and history of involvement in road traffic accident. Participants were taken through a comprehensive eye examination.
Results: One hundred and twenty-two (122) male commercial vehicle drivers were enrolled for this study with a mean age of 33.8 + 0.81 years. 98.4% (n=120) of the drivers had normal visual acuity in both eyes. Analysis showed that there was no correlation between visual acuity of the drivers and the number of road traffic accident.

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Conclusion: The prevalence of visual impairment in this study was low. The result also showed that there is no relationship between visual acuity and road traffic accident. Majority of the drivers in this study never had any eye test done before obtaining their driving license.

Keywords: RTA; visual acuity; commercial vehicle drivers; motor parks.

1. INTRODUCTION

Road traffic injuries are a major but neglected public health challenge that requires concerted efforts for effective and sustainable prevention. Road traffic injuries are among the leading causes of death and lifelong disability globally [1] .Worldwide, it was estimated that 1.35 million people are killed in road crashes each year and as many as 20 million to 50 million persons suffer non-fatal injured due to same reason [2]. Globally, road traffic injuries are reported as the leading cause of death among young people aged 15-29 years and are among the top three causes of death among young people aged 15-44 years [1]. The Institute for Health Metrics and Evaluation (IHME) estimated about 907,900,1.3 million and 1.4 million deaths from road traffic injuries in 1990,2010 and 2013 respectively [3].

In Africa, the numbers of road traffic injuries and death have been increasing over the last three decades [4]. According to the 2015 Global Status Report on road safety, the WHO Africa Region has the highest rates of fatalities from road traffic injuries worldwide at 26.7 per 100,000 population for the year 2013 [1,5]. In Africa, from all registry based study, Nigeria recorded the highest and lowest fatal crash rate at 716.57 per population and 2.9per 100,00 populations in 1990 and 2011 respectively [6,7]. In Nigeria, the overall rate of road traffic injury about 41 per 1000 population and mortality from road traffic injuries is about 1.6 per 1000 persons [8]. The road traffic injury rate is the highest in any single study in Africa. Furthermore, about ₦80billion is lost yearly on road accidents [9,10].

With the ever-increasing number of vehicles on the roads, drivers need to call up on increasing use of sensory and motor skills in order to negotiate safely through the traffic. Approximately 95%of the sensory input to the brain required for driving comes from vision [11]. Visual acuity(VA) is acuteness or clearness of vision, which is dependent on the sharpness of the retinal focus within the eye and the sensitivity of the interpretative faculty of the brain [12]. This ability is important for many activities of daily living, the most prominent of which is reading. Visual acuity is generally considered the most important modality of visual function.

Visual acuity testing is often the only testing required in this region of Nigeria for obtaining a driver's license. There is no agreed standard within or between countries, however, on the level of visual acuity required for driving. In the United Kingdom, the legal standard required for driving a private car or motorbike is to be able to read a number plate at 20.5 m. Guidelines issued by the Driver and Vehicle Licensing Authority suggest that this corresponds to between $^{6}/_{9}$ and $^{6}/_{12}$ vision on the Snellen chart and the guidelines of the Royal College of Ophthalmologists equate this to about 6/10 vision [13,14]. In Australia the visual acuity required for issue or renewal of a driver's licence is either $^{6}/_{12}$ or $^{6}/_{18}$ depending on the state of issue [15]. In the United States, visual acuity of $^{6}/_{12}$ is the most common standard but ranges up to $^{6}/_{21}$ for an unrestricted licence [16]. In Nigeria, the requirement for obtaining driver's licence for private motor drivers is visual acuity of at least $^{6}/_{12}$ in the better eye and $^{6}/_{36}$ in the poorer eye while for commercial drivers, the minimum visual acuity is $^{6}/_{9}$ in the better eye and $^{6}/_{24}$ in the poorer eye with or without glasses [17].

Studies revealed that the relationship between visual acuity and traffic accidents is rather weak. [18,17,17] also found that 8.0% of the drivers were visually impaired in one eye with cataract, the leading cause of visual impairment in the better eyes of the affected. Several private and government transport companies are springing up in the Country, but little attention is placed on the visual acuity of drivers and there is dearth of information about the relationship between road traffic accident and visual acuity. This study therefore aims to investigate the visual acuity of commercial (private and government transport companies) drivers and to investigate if there is a relationship between visual acuity and rate of road traffic accident in Makurdi Benue State, a state in North central Nigeria.

2. MATERIALS AND METHODS

Four major motor parks Makurdi, Benue State were included in the study; these were Benue Links Nigeria Limited, Ihotu Transport Company, Pleasure travels and Flight. Approval for the protocol for this study was obtained from the

ethic and research committee of the Benue State University. Official letters were written to the Managers of each of these four transport companies. After approval was received from the Managers to go ahead with the research, the drivers were educated on the purpose and importance of the study by the consultant ophthalmologist, thereafter verbal consent was sought from consecutive drivers who agreed to participate in the interview and subsequently presented for ocular examination.

One hundred and twenty-four commercial drivers in these four major motor parks were enrolled for this study. However, 122 consecutive drivers who consented were interviewed and had their eyes examined. All these drivers travel regularly within the local government area and to other States of the country during the day in vehicles with current valid certificate of roadworthiness.

A structured questionnaire was administered by an ophthalmologist to each driver by face-to-face interview. The documented information included driver's demographic data, duration of driving, history of previous ophthalmic examination, past ophthalmic diseases and history of involvement in road traffic accident.

Visual acuity test was done on all the respondents by an ophthalmologist and three ophthalmologists-in-training who were trained to assist. Visual acuity test was done in the open field during the day, using the Snellen's chart placed at 6 meters from the respondents. Each eye was tested separately unaided and with pinhole in cases where visual acuity was less than 6/6. Visual acuity of 6/6 - 6/12 was considered to be normal, < 6/12 - 6/60 was classified as visual impairment and < 6/60 - 3/60 was classified as severe visual impairment while visual acuity less than 3/60 was classified as blindness [18,19,20].

Data were analyzed using SPSS software for Windows, Version 21. Frequencies and percentages were obtained. The level of significance was $p < 0.05$.

3. RESULTS

A total of 122 male drivers participated in this study. Their ages ranged between 18 years and 56 years. The mean age was 33.8 ±0.81years. Agegroup25–29 represented the highest percentage of the drivers (31.1% [n=38]), followed by age groups 30–34 and 35-39 which constituted16.4% (n=20) each respectively. Only 8.2% (n= 10) drivers were 50 years and above as shown in Table 1.

Table 1. Demographic characteristics

Variable	Frequency	Percentage
Age group		
< 20	4	3.28
20 – 29	48	39.34
30 – 39	40	32.79
40 – 49	20	16.39
50 – 59	10	8.20
Educational level		
None	0	0
Primary	26	21.3
Secondary	86	70.5
Tertiary	10	8.2
Type of Vehicle driven Bus	96	78.7
Trucks	6	4.9
More than 1 type	20	16.4

All respondents had formal education. Result showed that 21.3% (n=26) had primary school education. 70.5% (n=86) had secondary school education, while 8.2% (n=10) had attained tertiary institution level of education. Majority (78.7% [n=96]) reported that they drove bus, 4.9% (n= 6) drove trucks, while 16.4% (n=20) drove more than one type of vehicle.

Fig. 1 showed that 55.7% (n=68) of the drivers have never had eye examination before, while 44.3% (n=54) had had eye examination. None of the drivers use glasses.

Analysis showed that 80.3% (n=98) reported that they have never had eye problem before, while 19.7% (n=24) reported that they have had eye problems before. Among the 24 respondents that have had eye problem, 41.7% (n=10) reported to have had conjunctivitis, 16.7% (n=4) had difficulty in reading small letters, 16.7% (n=4) reported that they do not see well at night as shown in Table 2.

Result showed that 44.3% (n=54) of drivers had had road traffic accident within the past 10years, while 55.7% (n=68) have never had road traffic accident within the past ten years. Among the 54 drivers who had had accident 42 (33.4%) had accidents once, 6 drivers had accident twice (4.9%) and 2 had accident 5 times (1.6%) as shown in Table 3.

Table 4 showed that 98.4% (n=120) of the drivers had normal visual acuity in both eyes,

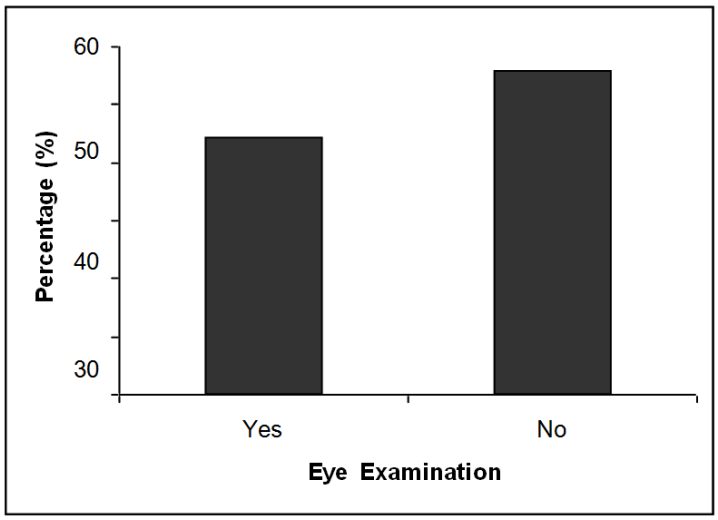

Fig. 1. Percentage of drivers who had previous eye examination/those who had not

while 1.6% (n=2) had visual impairment in both eyes. None of the drivers had severe visual impairment or blindness in the better eye. The two drivers with impaired visual acuity have never had road traffic accident.

Table 2. Previous eye problems of drivers (Ocular history of respondents)

Type	No	Percentage
Itching	2	8.3
Growth	2	8.3
Conjunctivitis	10	41.7
Difficulty in reading small letters	4	16.7
Can not see well at night	4	16.7
Long-sightedness	2	8.3
Total	24	100

Table 3. Frequency of accident among drivers

Variables	Frequency	Percentage
Involvement in road traffic crash in the past 10 years(N=122)		
Yes	54	44.3
No	68	55.7
Number of road traffic crash		
None	68	55.7
Once	42	34.43
Twice	6	4.92
Thrice	4	3.28
Five times	2	1.64
Total	122	100

Table 4. Visual acuity of drivers

Visual acuity	Frequency	Percentage
VAR		
or = 6/12	120	98.4
>6/12	2	1.2
VAL		
< or = 6/12	120	98.4
>6/12	2	1.2

Analysis showed that there was no correlation between visual acuity of driver and the number of road traffic accident as shown on Table 5.

Table 5. Correlation between Visual acuity of Commercial drivers and Road traffic Accident

	Had accident	VAR	VAL
Had accident	1	0.111	0.111

N= 122, VAR = visual acuity of right eye, VAL = visual acuity of left eye

4. DISCUSSION

The results of this study confirm that commercial driving is dominated by males in North central Nigeria, as is the case in the entire country [21]. This may be due to the fact driving is perceived to be a risky venture, which males are better placed to endure than females [22]. The dominance of an active workforce with a mean age of 33.8 $\pm$ 0.81 years is also a reflection of the demanding nature of commercial driving in Nigeria, requiring a strong and energetic to this occupation.

All the respondents had formal education with majority 70.5% having secondary school education, 21.3% had primary school education,

while 8.2% had attained tertiary institution level of education. This was in contrast to an earlier study carried out in another North central town of Ilorin where as much as 17.1% had no formal education [23]. This finding could be due to the fact that the motor parks are all in central Makurdi metropolis with many secondary and tertiary institutions.

This study provides valuable information on the ocular health of commercial drivers in Makurdi metropolis of North central Nigeria. 55.7% of the respondents have never had their eyes examination before, while 44.3% had had their eyes examined. This is clear indication that many drivers with poor visual function may be certified as fit for driving even when they **are** deficient. This finding was similar to a study done in Ilorin, North central Nigeria by [23]. This poses a very big risk to road traffic crashes. 80.3% of the respondents reported that they have never had eye problems before, while 19.7% reported that they have had eye problems before. Conjunctivitis (41.7%) is reported to be the most common previous ocular condition experienced by the respondents followed by difficulty in reading small letters (16.7%) and not seeing well at night (16.7%).

The prevalence of visual impairment in this study is 1.6%. This value is low compared with value reported in commercial drivers in Ife Central LGA (3.3%) [24,25] and Ilorin (11.5%) [26], which are all locations in other regions of Nigeria.

The result of this study also showed that there is no relationship between visual acuity and road traffic accident. This is in line with report of [26], but in contrast to the report of [24,25].

The significant association between visual impairment and RTA found in this study is similar to the results of other studies [27,28]. VA is the only visual parameter currently measured by FRSC [29], but it was noticed that the VA was not checked in most cases before drivers were issued their driver's licenses. Majority (83.6%) of the drivers in this study never had any eye test done before obtaining their driver's licenses. This implied that some individuals that would have been barred from driving based on visual impairment easily obtained driver's licenses, with a negative consequence on road safety.

5. CONCLUSION AND RECOMMENDA-TIONS

The prevalence of visual impairment in this study was low. The result also showed that there is poor relationship between visual acuity and road traffic accident. Majority of the drivers in this study had never had any eye test done before obtaining their driving licence. Mandatory ocular examination should be part of the requirements for the issuing and renewal of drivers' licence. Commercial vehicle drivers should be enlightened on the need of undergoing routine eye check annually to ensure that their visual status is still within the normal visual acuity for safe driving.

DISCLAIMER

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Approval for the protocol for this study was obtained from the ethic and research committee of the Benue State University.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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