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ORIGINAL ARTICLE

Fitness to Drive among Commercial Intercity Drivers in Benin-City, Edo State

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ABSTRACT

Background: Unfit drivers are prone to road traffic accident, therefore their health is paramount in ensuring the safety of road users. To determine the fitness to drive among commercial intercity bus drivers in Benin City, Edo State

Material and methods: A descriptive cross-sectional study was conducted among 194 commercial intercity drivers. The respondents were selected using systematic random sampling technique. Data was collected with the aid of an interviewer-administered questionnaire. Estimation of the alcohol level, visual acuity, blood pressure and body mass index was done for respondents using an Alcomate breathalyzer, Snellen's chart, sphygmomanometer, measuring tape/weighing scale, respectively. IBM SPSS version 21 software was utilized for data analysis. Level of significance was set at $p < 0.05$.

Results: The mean age of respondents was 40.5 ± 7.3 years. Eighty-seven (44.8%) of the respondents had blood alcohol level greater than the legally acceptable limit, 12 (6.2%) were observed to be visually impaired while 4 (2.1%) were hypertensive. Based on these indices, 95 (49.0%) of the respondents were unfit to drive.

Conclusion: Almost half of the drivers were unfit to drive based on their abnormal blood alcohol level, visual acuity and high blood pressure. This emphasizes the need for proper pre-medical and periodic medical examination of drivers to ensure their fitness to drive. This will minimize the occurrence of road traffic accidents and their sequelae.

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INTRODUCTION

In Nigeria, majority of the population depend on commercial transport as their means of transportation. Therefore the health of commercial drivers is paramount in ensuring the safety of the passengers. Unfit drivers are prone to road traffic accident (RTAs) which results from vehicular and /or environmental factors as well as human factors. According to the World Health Organization in 2015, RTA was ranked the 9th leading cause of death globally.[1] It is responsible for about 1.25 million deaths annually and non-fatal injuries in 20 to 50 million people.[1] Low and middle income countries are disproportionately affected as they contribute to 90% of these fatalities.[1] RTA accounted for 5,053 deaths and 30,105 injured persons in Nigeria as at 2016 while in Edo State it accounted for 122 deaths and 820 injured persons.[2] RTA causes a huge economic burden on individuals, families and the nation as a whole. In low and middle

income countries RTA is estimated to cost the government 4-5% of the gross domestic product.[3]

Drivers require a combination of concentration, good visual and auditory function to drive.[4] Fitness to drive involves medical and non-medical evaluations of an individual's functions by a qualified medical practitioner to ensure that they can drive safely.[5] It is best determined by a driver's functional status than medical diagnosis alone.[6, 7] It is assessed using the following parameters: visual assessment, hearing assessment, neurological examinations, endocrine examinations, cardiovascular examinations, musculoskeletal examinations, alcohol and drug test, mental state and sleepiness scale in view of the medical conditions likely to influence driving. These medical conditions include blackouts, cardiovascular disease, uncontrolled diabetes, musculoskeletal conditions, neurological conditions (e.g. seizure disorders, dementia), cognitive impairment from other causes, psychiatric conditions, substance misuse or dependency, sleep disorders and vision disorders.[5-8] In Nigeria the highway code captures only prescribed alcohol level for driving and visual assessment in assessing fitness to drive.[9]

Drink driving, also referred to as drinking under the influence of alcohol alters a drivers' functional status. It is reported to be a cause of 1% of RTAs in Nigeria and as such national maximum legal blood alcohol concentration (BAC) levels have being instituted for the general population, young drivers and commercial drivers. In Nigeria, the maximum BAC level across board is ≤ 0.5 mg/l or 0.05% of blood alcohol. [5] Drink driving in addition to smoking, use of drugs, body mass indices of overweight and obesity, infrequent structured physical activity observed among most commercial drivers can predispose them to hypertension and increased risk of RTAs.[7, 11] Other stressors of the job associated with hypertension include tight schedules, long hours of driving, traffic congestion and lack of sleep.[12, 13] Sight is an important functional component in driving as 95% of the sensory requirement for driving comes from vision.[14, 15] Visual impairment distorts the drivers ability to see. Studies have shown a higher risk of involvement in RTA among drivers with visual impairment.[14, 16] Distant visual acuity of at least 20/40 (Snellen) in both eyes with or without corrective lenses, field of vision of at least 70^{o} in the horizontal meridian in each eye, and the ability to recognize the colors of traffic signals and devices showing standard red, green, and yellow are the accepted recommendations for commercial drivers to be termed fit to drive in terms of sight. [6]

There is paucity of data addressing fitness to drive among commercial intercity drivers in our environment. This study assessed the fitness to drive among commercial intercity bus drivers using three parameters: blood alcohol estimation, visual acuity and blood pressure readings. Findings from the study will generate evidence-based findings for policy formulation geared towards making the road safer.

METHODOLOGY

One hundred and ninety-four commercial intercity bus drivers in Benin City, Edo State were interviewed in a descriptive cross sectional study conducted between November 2014 and October 2015. There are 88 registered commercial parks in Benin City with 1022 registered bus drivers. Of these commercial parks only 17 are involved in intercity transportation. The study population included all intercity bus drivers in full time employment with registered transport companies in Benin City who have been in employment for more than 6 months. Sample size was calculated using the Cochrane

formula[17] for single proportion using a prevalence of 11.5%, which was the proportion of commercial drivers with visual impairment in a study conducted in Ilorin.[18] The final sample size was adjusted for 10% non-response using the appropriate formula to give a sample size of 172. However, 194 respondents participated in the study.

Respondents were selected using a systematic random sampling technique from 17 commercial transport parks involved in intercity transportation. A sampling interval was calculated using the formula: total number of commercial drivers in Benin City divided by calculated minimum sample size. Thereafter a sampling frame was drawn using the nominal row of all drivers involved in intercity transportation as presented by the management in each park. The first unit driver was selected using a simple random sampling (balloting) using the calculated sampling interval every nth driver was then selected to partake in the study.

Ethical clearance to conduct the study was obtained from the University of Benin Teaching Hospital Ethics and Research Committee. Permission was obtained from the management of the companies and verbal informed consent obtained from study participants. Data was collected by the use of an interviewers administered questionnaire consisting of the following sections: socio-demographic characteristics of respondents, diagnosed and perceived health problems of respondents, fitness to drive assessment and body mass index estimation. Blood alcohol estimation was done with the Alcomate® Core Breathalyzer. It accurately measures blood alcohol content from an analysis of the subject's lung air. The Alcomate® Core measures blood alcohol levels up to 0.40% in 0.01% intervals. The Core breathalyzer provides 10% accuracy at 0.10% blood alcohol concentration. [19] Alcohol breath test < 0.5mg/dl (or 0.05% of blood alcohol) was taken as within limit (normal level), while ≥ 0.5mg/dl (or 0.05% of blood alcohol) was regarded as over the limit (abnormal levels). [9]

Visual acuity was done in an open field during the day, using the Snellen's chart (or illiterate E chart) placed at 6 meters from the respondents. More than two errors in reading the letters of any line are regarded as a failure to read that line. Each eye was tested separately with or without corrective lenses. Visual acuity of 6/6 - 6/18 was considered to be normal, while the other readings were considered as abnormal i.e. (< 6/18 - 6/60 - visual impairment, < 6/60 - 3/60 - severe visual impairment while visual acuity less than 3/60 - blindness).[20] Blood pressure was measured using manual mercury sphygmomanometer blood pressure monitor placed on the arm of the participant. The participant was seated quietly for at least 5 minutes in a chair with their backs supported and their arms bared and supported at heart level. The cuff was inflated until the radial pulse was obliterated, then the area over the brachial artery was auscultated while the cuff was slowly deflated. The first Korotkoff sound signals the systolic blood pressure. The diastolic blood pressure was the point where these sounds disappear. Two or more readings separated by 30 minutes were averaged where the first two readings differed by more than 5 mm Hg, additional readings were obtained and averaged. Blood pressure was graded using the WHO-ISH classification of hypertension.[21] Blood pressure readings ≤ 140/ 90 mmHg were regarded as normal while readings of > 140/ 90mmHg were regarded as abnormal.[21]

The weight of drivers was measured in Kilogram (kg) using the electronic weighing scale with capacity of 150kg with divisions of 100g. The scale was placed on an even floor with driver standing in the centre, hands by

the sides, without shoes and with light clothing. The scale was calibrated to zero reading before each weighing session by the researcher and assistants. A standard and known weight of 5kg was used to standardize the weighing scale. Height was measured in meters (m) using an inelastic measuring tape graduated on a vertical wall. The respondents were required to stand barefooted with feet together, as tall and straight as possible against the vertical rod with the head in Frankfort horizontal plane position. An improvised headpiece was lowered to rest firmly on the head, with sufficient pressure to compress the hair and the subject was instructed to take a deep breath. Readings were taken with the respondent looking ahead. Body mass index (BMI) was calculated for each subject as weight in kilograms/height^2 in meters squared. BMI was classified using the WHO BMI classification given as: < 18.5 – Underweight; 18.5-24.9 - Healthy/Normal weight; 25 – 29.9 - Pre-obese (Overweight); 30 – 34.9 - Obesity Class I; 35 - 39.9 - Obesity Class II; > 40 - Obesity Class III.[22, 23.]

Respondents were classified as fit and unfit to drive based on the following parameters: blood alcohol estimation, visual acuity test, blood pressure readings and BMI. Respondents with normal values for the three parameters were categorized as fit to drive while those with abnormal values for either one or more of the parameters respondents were categorized as unfit to drive.[5] Data was entered into a spread sheet and analyzed using the SPSS version 21 software. Results were presented using frequency tables. Univariate and bivariate analysis were done. Level of significance was set at $p < 0.05$.

RESULTS

A total of 194 respondents participated in the study. Eighty-nine (45.9%) of the respondents were within the age group 31-40 years followed by 66 (34.0%) who were within the age group 41-50 years. One hundred and seventy-three (89.2%) had a secondary level of education. Ninety seven (39.7%) of the respondents had worked for less than 10 years. (Table 1) Thirty-five (12.4%) and 30 (15.5%) of the respondents had been diagnosed with hypertension and myocardial infarction, respectively. One hundred and twenty (61.9%) of the respondents complained of back pain, 102 (52.6%) stated that they had malaria in the preceding six months, 98 (50.5%) stated that they had headache, 95 (49.0%) had fever from other causes, 90 (46.4%) fatigue, 85 (43.8%) mentioned cough, 72 (37.1%) mentioned cold and catarrh. (Table 2)

Table 1: Socio-demographic characteristics of respondents

Characteristics	Frequency (n = 194)	Percent
Age (Years)		
21-30	21	10.8
31-40	89	45.9
41-50	66	34.0
51-60	18	9.3
Mean age ± SD (years)	40.5 ± 7.3	
Level of education		
Primary	13	6.7
Secondary	173	89.2
Tertiary	8	4.1
Work experience (Years)		
≤ 10	97	50.0
11-20	77	39.7
≥ 21	20	10.3
Mean duration of work experience ± SD (years)	12.5 ± 3.5	
Driving duration per day (hours)		
4-6	89	45.9
7-9	87	44.8
10 and above	18	9.3
Mean duration of driving ± SD (hours)	7.5 ± 1.5	

Table 2: Respondents morbidity pattern (Diagnosed and reported health problems)

Morbidity pattern	Frequency (n = 194)	Percent
Diagnosed health problems*		
Hypertension	35	18.0
Myocardial infarction	30	15.5
Visual impairment	15	7.7
Diabetes mellitus	10	5.1
Insomnia	5	2.6
Reported health problems*		
Back Pain	120	61.9
Malaria	102	52.6
Headache	98	50.5
Fever (other than malaria)	95	49.0
Fatigue	90	46.4
Cough	85	43.8
Cold and catarrh	72	37.1
Neck pain	45	23.2
Vision problems	25	12.9
Hemorrhoids	12	6.2

Multiple response*

Eighty-eight (45.4%) were overweight, 85 (43.8%) had normal BMI while 21 (10.8%) were obese. Eighty-seven (44.8%) of the respondents had abnormal alcohol levels, while 107 (55.2%) had normal alcohol levels. Twelve (6.2%) of the respondents had abnormal visual acuity while 182 (93.8%) had normal visual acuity. One hundred and ninety (97.9%) had normal blood pressure levels while 4 (97.9%) had abnormal blood pressure levels. (Table 3) Ninety-nine (51.0%) of the respondents were categorized as fit to drive while 95 (49.0%) were unfit to drive. Fitness to drive was observed to increase with increasing age. Twelve (57.1%) of the respondents aged 21 – 30 years were fit to drive compared with 8 (44.4%) of the respondents aged ≥ 51 years were fit to drive ($p = 0.532$). Five (62.5%) of the respondents with tertiary level of education were fit to drive compared with 5 (38.5%) of the respondents with primary level of education were fit to drive ($p = 0.526$). Fifty (51.5%) of the respondents with ≤ 10 years' work experience were fit to drive compared with 9 (45.0%) of the respondents with ≥ 21 years were fit to drive ($p = 0.849$). Fitness to drive was observed to decrease with increasing driving duration ($p = 0.550$). (Table 4)

Table 3: Parameters in determining fitness to drive among respondents

Parameters	Frequency (%) (n = 194)	Normal levels n (%)	Abnormal levels n (%)
Alcohol level		107 (55.2)	87 (44.8)
Alcohol absent	31 (16.0)		
Within legal limit	76 (39.2)		
Above legal limit	87 (44.8)		
Visual Acuity		182 (93.8)	12 (6.2)
Normal (6/6-6/18)	182 (93.8)		
Visual impairment (<6/18-6/60)	10 (5.2)		
Severe Visual Impairment (<6/60-3/60)	2 (1.0)		
Blood pressure		190 (97.9)	4 (2.1)
Normal	188 (96.9)		
Pre-hypertension	2 (1.0)		
Class 1 Hypertension	4 (2.1)		

Table 4. Socio-demographic characteristics of respondents and fitness to drive

Characteristics	Fitness to drive Frequency (%)	
	Fit to drive	Unfit to drive
Age (years)		
21 – 30	12 (57.1)	9 (42.9)
31 – 40	39 (50.0)	39 (50.0)
41 – 50	40 (52.6)	37 (47.4)
≥ 51	8 (44.4)	10 (55.6)
	χ^2 = 0.532 p = 0.912	
Level of education		
Primary	5 (38.5)	8 (61.5)
Secondary	89 (51.4)	84 (48.6)
Tertiary	5 (62.5)	3 (37.5)
	Fishers exact = 0.526	
Work experience (years)		
≤ 10	50 (51.5)	47 (48.5)
11- 20	40 (51.9)	37 (48.1)
≥ 21	9 (45.0)	11 (55.0)
	χ^2 = 0.327 p = 0.849	
Driving duration (Hours)		
4 – 6	46 (51.7)	43(48.3)
7 – 9	40 (51.9)	41 (47.1)
10 and above	9 (45.0)	11 (55.0)
	χ^2 = 1.195 p = 0.550	
Total	**99 (51.0)**	**95 (49.0)**

DISCUSSION

Fitness to drive among respondents in this study was based on alcohol level, visual acuity with or without corrective lens and blood pressure readings. Using these indicators, almost half of the respondents were observed to be unfit to drive. This infers that these drivers constitute a danger to themselves, their passengers and other road users as they are more prone to road crashes. Almost half of the respondents had blood alcohol levels exceeding the legal allowable limit in Nigeria. This was in contrast to findings in a study conducted in Ile-Ife, Osun State, Nigeria which reported an alcohol use prevalence among commercial drivers of 67.2%.[24] A similar study in Enugu State, Nigeria revealed a much higher prevalence (85.4%) of psychoactive substance mainly alcohol among taxi drivers.[25] Alcohol has a depressant effect on the central nervous system and is capable of causing impairment of mental and motor function, both of which is needed for good performance during driving. In addition, alcohol influences judgment of distance between vehicle and speed of vehicles. It can also result in blurring of vision with resultant increase in the incidence of road traffic accidents leading to loss of lives which ultimately impact on the nation's economy negatively.

Majority of the drivers had normal visual acuity. The prevalence of visual impairment observed in this study was similar to two studies carried out among commercial bus drivers in Kwara State, Nigeria which revealed a prevalence of 9.1% and 11.5%, respectively.[18, 26] A study conducted in Osun State, Nigeria also revealed a prevalence of 3.3% .[24] There is little doubt that the visual sense provides most of the information used by the driver, with some contribution from other senses. A driver's visual status largely determine how efficiently he will perform. These findings reveal that some commercial intercity bus

drivers who ought not to be driving by virtue of their visual impairment still drive, as such posing a serious danger to road users and passengers alike.

Prevalence of hypertension in this study was 2.1 %. This is in contrast with findings from a similar study done in Edo State, Nigeria among commercial bus drivers which revealed a prevalence of hypertension to be 21.4%.[27] Similar studies done in Sokoto State, Nigeria and South India reported a higher prevalence of 33.5% and 41.3% respectively.[28, 29] Drivers with these morbidities are not qualified to carry out the task of safe driving, thus posing a serious risk to road safety.[5] Nearly half of the commercial intercity bus drivers in the study were observed to be overweight and while 10.8% were obese. This was in contrast to findings in a study carried out among professional truck drivers at Israeli ports in which over 15% of the respondents were found to be obese.[30] This finding may be attributable to the nature of the job which involves long hours of driving without exercise, poor dietary habit coupled with alcohol consumption. These factors predispose commercial intercity bus drivers to increased risk of hypertension, diabetes mellitus and sleep disorders, heart disease as well as stroke. Furthermore, studies have shown an association between BMI and increased prevalence of sleep disorders. There has been reported cases of obese drivers falling asleep unintentionally; this increases their risk of involvement in road crashes.[31, 32]

In conclusion, approximately half of the drivers were unfit to drive based on the parameters studied which were beyond the acceptable limits. This emphasizes the need for proper pre-medical examination of drivers and also periodic medical examination to ensure their fitness to drive. Also the agency (Federal Road Safety Corps) responsible for road safety must conduct impromptu testing especially for BAC to find out drivers who are unfit and are driving, so as to prevent occurrence of RTAs. This will minimize the incidence of road traffic accidents and its sequelae.

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