

Effect of Alcohol on Visual Acuity among Commercial Drivers in Zaria, Nigeria

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Abstract

Consumption of alcohol has health and social consequences through intoxication (drunkenness), alcohol dependence and other biochemical effects of alcohol. Alcohol adversely affects performance on many tasks. This study examined the effect of alcohol on visual acuity among commercial drivers in Zaria Nigeria. A predesigned, pre-tested, self-administered questionnaire was filled by the commercial drivers, after which Visual acuity test and color vision test was done using standard Snellen's chart and Ishihara chart respectively. A total of 200 drivers were randomly selected, out of which 100 drink alcohol, while 100 do not drink alcohol. The visual acuity of those who drink alcohol and drive was significantly lower ($P < 0.001$) than those who do not drink alcohol. Drivers that had no family history of eye defects but drink alcohol also had significantly lower visual acuity values compared to their counterparts who do not drink alcohol ($P < 0.001$). Visual acuity also decreases as the drivers age ($P < 0.001$). There was however no significance difference between duration of drinking and eye defect ($P > 0.05$). From this study, alcohol decreases visual acuity in commercial drivers and as the drivers age their acuity reduces drastically. Commercial drivers should therefore be advised to reduce intake of alcohol or abstain completely, and also to quit driving commercial vehicles as they age.

Key words: Alcohol, Visual acuity, Commercial drivers, Nigeria

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I. Introduction

In addition to chronic diseases that may affect drinkers after many years of heavy use, alcohol contributes to traumatic outcomes that may result in a person being disabled at a relatively young age, resulting in the loss of many years of life due to death or disability. World health organization, ¹ reported a relationship between alcohol consumption and more than 60 types of disease and injury. Alcohol is estimated to cause about 20-30% of esophageal cancer, liver cancer and cirrhosis of the liver, homicide, epileptic seizures and motor vehicle accidents worldwide.

Visual acuity (VA) is a measure of the spatial resolution of the visual processing system, it depends upon how accurately light is focused on the retina, the integrity of the eyes neural element and the interpretative faculty of the brain ^{2,3,4}. VA has traditionally been used as the primary indicator of the magnitude of functional impairment due to vision loss ^{5,6}. Reduced acuity is the primary characteristics of peripheral vision ⁷. A number of physiological studies have shown that alcohol may attenuate or abolish lateral inhibition at the retinal level ⁸. Alcohol intake affects most perpetual and motor functions, it tends to decrease motor and cognitive function. Alcohol affects visual functions such as depth perception, contrast sensitivity, visual short term memory and visual temporal processing ⁹. Acute alcohol consumption affects visual acuity, spatial contrast sensitivity and critical flicker frequency [8]. Also there is a prolonged interhemispheric transmission, large flash lags and prolonged backward masking after alcohol intake. All these result clearly shows that alcohol slows neural processing ¹⁰.

In Nigeria, commercial vehicles are operated as business ventures. However, concern had been expressed about the lifestyle of the commercial drivers. A commercial vehicle is any type of motor vehicle used for the transportation of goods and paid passengers. Examples of commercial vehicle include trucks (articulated lorry), vans, coaches, buses, taxicabs, trailers and box truck ¹¹. Safety on the roads has been a recurring source of concern to the average Nigerian. Human factors contribute significantly to the cause of Road Traffic Accidents (RTA). To this end, the driver is seen as a major player concerning issues of safety on our roads. It is therefore pertinent to examine some of those factors in the driver that may increase or reduce his chances of road traffic accidents. Driving is inarguably a high visual task which requires several sets of abilities which include sensory ability and compensatory abilities ¹². Driving is a complex task that involves the integration and coordination of many skills and abilities. It usually involves a dynamic and continuous

interaction among the driver, the vehicle and the environment. It requires swift and accurate transfer of information, decision making on how to respond and the translation of decisions into physical actions¹³. Alcohol impaired subjects who are required to divide their attention between two tasks, tend to favor one tasks, resulting in the larger performance decrements on the non-preferred tasks¹⁴.

Alcohol adversely affects performance on many tasks on moderate and lower blood alcohol levels¹⁵. Certain skills important for driving are impaired at 0.01 to 0.02% blood alcohol content, that is at the lowest level that blood alcohol can be measured reliably¹³. A slowed perceptual speed is a component of the task performance¹⁵.

II. Materials And Methods

A total of 200 male commercial vehicle drivers aged between 25-84 years in Zaria, Nigeria participated in this study after they gave their informed consent. The drivers were selected at random from different motor parks in Zaria. Out of the 200 subjects who volunteered, 100 consume alcohol regularly while 100 do not. A questionnaire was served and the procedure for the test was explained to them, after which the test was carried out and the following parameters taken for all the subjects, VA of both eyes, color vision, weight and height.

The Ishihara chart was used for the measurement of the drivers color vision, while a standard Snellen's chart was used for the measurement of the driver's VA. The driver's VA was measured at a distance six meters away from the chart. A flat surface was chosen for this measurement and the Snellen's chart was placed at vertical position with the subject's eye level. The VA was then measured for both eyes separately and was then expressed as the ratio of the distance of the subject from the chart (d) to the distance at which the letter are normally read (D), which is d/D. Chi-square analysis was used and P-value of <0.05 was considered significant.

III. Result

A total of 200 male commercial drivers aged 25-84 years participated in the study as shown in Table 1. Table 2 shows that 66.75% of participants have a VA of 6/6, 30.25% have, 5/6 and 3% have 4/6 for both right and left eye.

In Fig. 1, about 54% of drivers who take alcohol have low VA while only about 15% who do not drink have low VA. Visual defects are higher among commercial drivers who do not take alcohol (P<0.001) as compared with those that take alcohol.

The VA of commercial drivers who take alcohol are presented in Fig. 2. Low VA is higher in commercial drivers between the ages of 35-44 years, while all drivers age 65 and above have low VA

Fig. 3. About 50% of the drivers that take alcohol and have low VA have no family history of eye defects. Out of 100 drivers that alcohol, about 50% of them have low VA without family history of eye defects as seen in Fig. 3, while Table 3 shows low VA among drivers who have been on alcohol for 2yrs. and above.

Table 1. Distribution of drivers by age (n= 200)

Age	Number
25-34	47
35-44	91
45-54	37
55-64	18
65-74	5
75-84	2
Total	200

Table 2. Visual acuity test for both right and left eye

Visual acuity	Number	Percentage %
6/6	267	66.75
5/6	121	30.25
4/6	12	3
Total	400	100

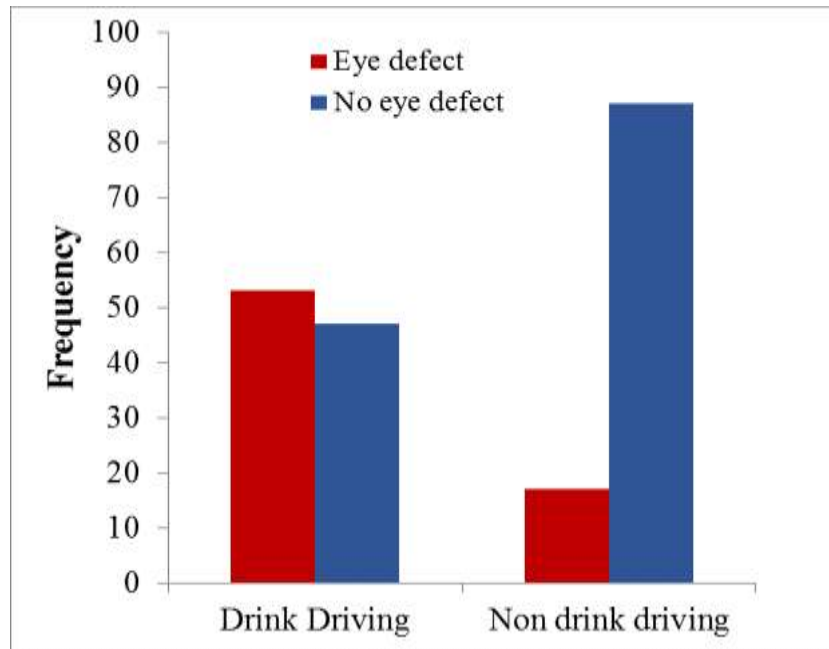


Fig. 1: VA of drivers that drink and drive.

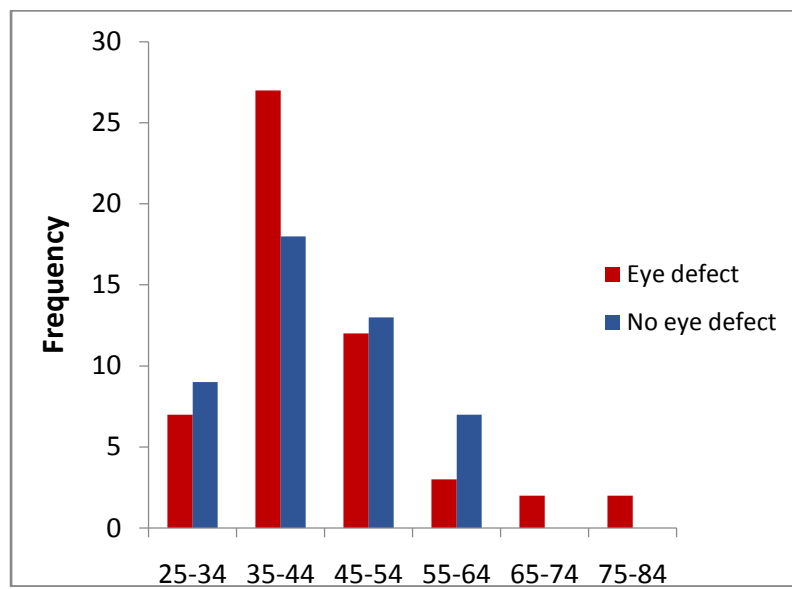


Fig.2: VA of drivers who take alcohol according to age groups (n=100)

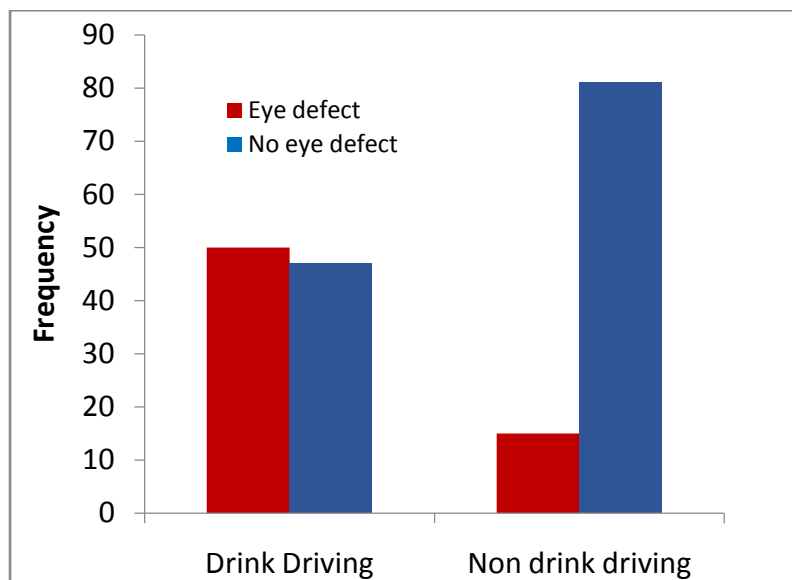


Fig.3: Drivers that drink with no family history of eye defects (n=200)

Table.3: Shows drivers that take alcohol according to duration of exposure

Duration of Exposure	0-1 yrs.	Above 2 yrs.	Total	P-value
Eye defects	5	48	53	>0.05
With no defects	7	40	47	>0.05
Total	12	88	100	>0.05

IV. Discussion

Acuity is thought to be the basis of perceived sharpness^{7,16,6}. Having good eye sight is a very important criterion for driving. Reduced acuity is of great disadvantage because legibility is limited by acuity¹⁷. Blurred vision or eye fatigue can occur during driving or reading¹⁸. A non-commercial driver pose little threat, as you will be putting only your life in danger when drunk driving or when you drink and drive, but for commercial drivers, the lives of many people are at risk. Alcohol generally affects mood, concentration, vision, alertness and color perception. Our study shows that alcohol affects vision. Negative effects of alcohol on visual acuity was earlier reported by others^{8,10,13}. Our study also shows that drivers between the ages of 65-84 all have low visual acuity, this is expected because visual acuity declines with age, which have also been reported earlier by others^{19,20,21,22,23}. Law makers should discourage drivers driving commercial vehicles after the age of 65, so as not to put their passengers at risk.

Since alcohol affects vision, alertness, mood and concentration, driving after drinking alcohol will affect the coordination and integration that is associated with driving. Because driving is a complex task which requires a continuous interaction among the driver, the vehicle and the environment. So drivers who drink and drive are often divided between many task because of mood changes, concentration and blurred vision resulting into accidents. Some road transport accident seen on our roads today, either private or commercial is due to drunk driving. In conclusion, our study shows that alcohol have a negative effect on visual acuity among commercial drivers, both on those who have family history of eye defects or not. In addition, visual acuity also declines with age in the drivers. We therefore recommend that commercial drivers should not be heavy drinkers and should be below the age of sixty-five years.

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