

## ORIGINAL ARTICLE

## Central nervous system affecting drugs and road traffic accidents among commercial motorcyclists

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## INTRODUCTION

The ability to ride and respond to changing road traffic conditions is influenced by how fit and alert the rider is. Motorcycle riding

involves some risks not encountered with driving cars and trucks. Motorcycles in motion lack the stability of cars and need to be balanced by the riders. When motorcycles encounter strong winds and rough terrain

**ABSTRACT**

**Background:** Commercial motorcyclists are popular due to the convenience associated with their use especially in areas where taxis do not ply. The financial benefits to the operators caused a boom but indirectly resulted in a lot of carnage on our roads. These accidents (RTA) have been attributed to various causes including driving under the influence of drugs that affect the central nervous system (CNS).

**Objective:** This study was aimed at determining the role of CNS affecting drugs in the causation of RTA among these motorcyclists and also to make recommendations based on the result.

**Methodology:** This is a cross-sectional survey with a multi-stage random sampling used to select 615 commercial motorcyclists in Enugu metropolis. A structured questionnaire was administered after obtaining consent from the respondents. Data were analysed with the *Statistical Package for Social Sciences (SPSS) version 11.5* and variables were tested using the *Chi square*. A *p-value* of <0.05% was considered significant.

**Results:** Amongst the motorcyclists 78% were using CNS affecting drugs while 57.7% had been involved in RTA. These were mostly in the 31-40 and 21-30 year age groups. The use of CNS affecting drugs, as well as inexperience in riding, was significantly associated with RTA. Visual impairment was not a significant cause of RTA.

**Conclusion:** The use of CNS affecting drugs is common among commercial motorcyclists. Majority of commercial motorcyclists involved in RTA use these drugs. The government of Nigeria through its agencies should enforce laws regulating motorcycle riding under the influence of drugs.

**Keywords:** Brain, influence, riders, substances

they can be forced from their positions on the road resulting in loss of control and possibly, road traffic accidents (RTA). This risk increases if the riders are riding under the influence of central nervous system (CNS) affecting drugs.

The direct and indirect costs of RTA involving motorcyclists have been highlighted by various studies.<sup>1</sup> In the United States of America, motorcycles make up 2% of the registered vehicles but account for 6% of total traffic deaths.<sup>2</sup> It is estimated that 2000 motorcyclists are killed and 50,000 injured in traffic crashes each year.<sup>3</sup> In Thailand, motorcycle related crashes accounted for 78.6% of all RTAs.<sup>4</sup> Similar results were found in Sweden and England.<sup>5,6</sup> Nigeria is said to have the worst mortality and morbidity rates from RTAs when compared with other countries.<sup>7</sup>

Various authors have noted statistically significant relationships between the use of CNS affecting drugs and RTAs among commercial motor vehicle drivers and motorcyclists, while others found no relationship between the two variables in their studies.<sup>8,9,10,11,12</sup>

Central nervous system affecting drugs which include alcohol, tobacco, kola nuts, cigarettes, marijuana, etc. affect the reactions and response of consumers in various ways which may result in RTAs amongst motor vehicle drivers.<sup>8,9,10</sup>

Alcohol depresses the higher cerebral centres inducing a driver to overestimate his abilities, underestimate his mistakes and take greater risks.<sup>13,14</sup> This impairment of judgment and skills has been shown to begin well below the legal limit of blood level of alcohol.<sup>13,15</sup> In Nigeria, some authors noted that a high proportion (20%) of drivers consumed alcohol just before commencement of driving and that statistically significant proportions (55.8%) of these drivers were involved in RTA.<sup>8,10,16</sup>

Tobacco the active ingredient in cigarettes and snuff is known to reduce vision by decreasing oxygen intake and reducing retinal sensitivity by the carbon monoxide produced from it.<sup>16</sup> Long term use may result in tobacco amblyopia, while nicotine in cigarettes is also known to depress reflex reactions.<sup>16</sup> Smoking has been associated with drinking and risky driving especially among young males.<sup>17,18</sup>

Kola nut, a locally grown crop in South-West Nigeria contains caffeine and is used by riders as a stimulant to delay sleep.<sup>19,20</sup> Caffeine has been shown to effectively reduce early morning driver sleepiness only for about 30 minutes.<sup>21</sup> This effect often results in extreme fatigue when it starts to wear off and riders are unable to concentrate on the task at hand. In two separate studies reported from Nigeria, abuse of kola nuts was implicated in RTA 39.1% and 12.25% of drivers.<sup>13,19</sup>

The incidence of RTA while driving under the influence of cannabis is rising, with younger drivers at particular risk.<sup>15,22</sup> Cannabis acts on specific receptors in the brain causing dose-related impairments of psychomotor performance with implications for driving, airplane piloting, and academic performance.<sup>15</sup> It has been shown that cannabis has a significant impairing effect on driving when used alone resulting in increasing number of road fatalities.<sup>22</sup> This effect is exaggerated when it is combined with alcohol.<sup>22</sup>

This study was aimed at determining the role of CNS affecting drugs, if any, in the causation of RTA among the commercial motorcyclists in Enugu State, South-East Nigeria.

## METHODOLOGY

This was a cross-sectional survey conducted among commercial motorcycle riders in Enugu metropolis using a structured questionnaire adopted and modified for the study.<sup>8</sup>

### Study Design

The study using a multi-stage random sampling design, selected 615 commercial motorcyclists who fulfilled the criteria for inclusion during the eight weeks survey in 2006.

The criteria for inclusion in the study were as follows:

1. Riders that use their motorcycles exclusively for commercial purposes
2. Riders who were officially registered as professional commercial motorcyclists with the union of commercial motorcycle riders in Enugu metropolis
3. Riders who are willing to consent to ocular examinations as well as to proffer information in the study questionnaire

### Data Collection

Relevant data was obtained using a structured questionnaire and proforma.<sup>8</sup> The questionnaire elicited information on socio-demographic characteristics like age, education, marital status, and topics relating to RTAs, its perceived predisposing factors and the use of CNS affecting drugs while riding. The proforma also included details of the ocular examination performed on the motorcyclists.

### Data Analysis

The data was analysed using SPSS version 11.5 for Windows. The relationship between the use of CNS affecting drugs and RTA, visual impairment and RTA as well as riding experience and RTA were assessed using the Chi square test. A *p-value* of <0.05% was considered statistically significant.

### Ethical Considerations

Institutional consent was obtained in writing from the University of Nigeria Teaching Hospital, Enugu Ethics Committee. While informed verbal consent was obtained from each subject who participated in the study after the details of the study was explained to them.

### RESULTS

A total of 615 commercial motorcyclists were studied during the eight-week period. The mean age noted was 38.1 years +/- 10.27. Three hundred and fifty-five of the motorcyclists (57.7%) have been involved in one form of RTA or another as at the time of the study. One hundred and twenty-two (34.4%), were in the 31-40year age group while ninety-two (25.9%) were in the 21-30year age group.

Four hundred and eighty (480) motorcyclists use CNS affecting drugs. Of these, 390 (81.3%) admitted to taking alcohol. One hundred and sixty-two (41.5%) of these take alcohol alone, 114 (29.2%) take alcohol and kola nuts, 78 (20%) take alcohol and also smoke cigarettes, while 36 (10%) take all three. Only one subject (0.2%) admitted to taking marijuana, the rest 47 (9.8%), 41 (8.5%) and 1 (0.2%), take tobacco (snuffing), kola nut alone and cigarette/kola nuts, respectively. The relationship between use of CNS affecting drugs and RTAs is as follows:

Table 1. Association between use of alcohol and RTA among the riders

	Motorcyclists Involved in RTA			
	NO	YES	TOTAL	
Use of Alcohol	NO	90	45	135
	YES	123	267	390
	TOTAL	213	312	525

$$\chi^2 = 51.326; \quad p\text{-value} = 0.000$$

The relationship between use of alcohol and RTA among the riders was statistically significant.

Table 2. Association between use of cigarette/tobacco and RTA among the riders

Motorcyclists Involved in RTA				
	NO	YES	TOTAL	
Use of cigarette/ tobacco	NO	90	45	135
	YES	40	122	162
TOTAL	130	167	297	

$\chi^2 = 52.715$ ;  $p\text{-value} = 0.000$

The relationship between use of cigarette/tobacco and RTA among the riders was statistically significant.

Table 3. Association between use of kola nut and RTA among the riders

Motorcyclists involved in RTA				
	NO	YES	TOTAL	
Use of kola nut	NO	90	45	135
	YES	66	126	192
TOTAL	156	171	327	

$\chi^2 = 33.132$ ;  $p\text{-value} = 0.000$

This association was statistically significant.

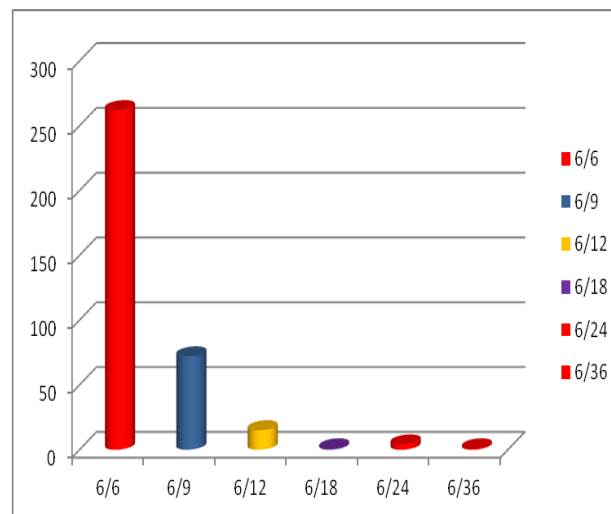
Table 4. Association between use of marijuana and RTA among the riders

Motorcyclists involved in RTA				
	NO	YES	TOTAL	
Use of marijuana	NO	90	45	135
	YES	0	1	1
TOTAL	90	46	136	

$\chi^2 = 1.971$ ;  $p\text{-value} = 0.160$

The relationship between use of marijuana and RTA among the riders was not statistically significant.

Figure 1. A bar chart showing visual acuity in the better eye of 355 motorcycle riders involved in RTA in Enugu metropolis



### CATEGORIES OF MOTORCYCLE RIDERS AND THEIR RIDING HABITS

Four hundred and twenty-two (68.5%) motorcyclists were full time owner-riders, while 150 (24.4%) were fulltime hired riders. Others, 43 (6.8%) were part-time riders of both categories.

Five hundred and five (82.1%) of these riders worked 10-12hours each day. Among these, only 184 (29.9%) rested for up to 1hour during the period of work.

Table 5. Association between riding experience and RTA among 615 motorcycle riders in Enugu metropolis

	years	RTA		
		No	Yes	Total
RIDING EXPERIENCE	0-5	140	222	362
	6-10	51	116	167
	11-15	43	12	55
	16-20	15	0	15
	21-25	8	3	11
	26-30	3	2	5
<b>Total</b>		<b>260</b>	<b>355</b>	<b>615</b>

$\chi^2 = 65.713$ ;  $p\text{-value} = 0.000$

The relationship between riding experience and RTA was statistically significant.

## DISCUSSION

Alcohol consumption at a prevalence of 68.5% was significantly associated with RTA in this study. Similarly, Oladehinde, *et al*, also noted a statistically significant relationship with RTA among 55.8% of the motor vehicle drivers who participated in their study.<sup>10</sup> Their subjects consumed alcohol just prior to embarking on their driving duty. The difference in the values between the two studies may be attributed to the fact that our study did not specifically ask for those who consumed alcohol on the days they were involved in RTAs. Other studies had similar findings where the non-use of CNS affecting drugs appeared to be associated with a reduction in RTAs even though not significantly.<sup>8,10,13,15,16</sup>

There was a statistically significant association between cigarette smoking and RTA (75.3%). Oladehinde, *et al*, in South-West Nigeria, also documented that 36.5% of subjects who were involved in RTA smoked cigarettes. This finding was also significant but markedly lower than the 75.3% noted in our study. The higher value in our study may be explained from the results which showed that about a quarter (20%) of the motorcycle riders who smoked cigarettes also consumed alcohol, while another 10% consumed alcohol, smoked cigarettes and used kola nuts.

The fact that smoking had been associated with drinking and risky driving has been established in other studies, as well.<sup>17,18</sup> It is, therefore, somewhat difficult to differentiate the effect of one drug from the other. For the drivers of motor vehicles, the divided interest which comes with smoking and driving, and the obscuration of vision from the fumes have been implicated as the direct cause of RTA among these drivers.

One hundred and twenty-six (65.6%) riders involved in RTA took kola nuts. The association between the use of kola nuts and RTAs was statistically significant as in other studies.<sup>8,10</sup> Most drivers used kola nuts to

delay sleep but this usually impacts negatively on them when the effect starts to wear off.

The use of marijuana, a CNS stimulant, was not significantly associated with RTAs as in other studies.<sup>12</sup> This is hardly surprising as individuals who use these stimulants hardly admit to it openly.<sup>10,11,12,13</sup> It is considered to be a social vice. Only one subject in this study admitted to using marijuana. However, Oladehinde, *et al*, had noted a significant relationship in their study. This difference could be attributed to the fact that they studied the use of kola nuts and marijuana together while we considered them separately.<sup>10</sup>

Visual impairment has been found to be significantly associated with RTAs among motor vehicle drivers in various studies.<sup>8,12</sup> However, in this study, visual impairment did not contribute significantly to RTAs ( $p$  0.333). In fact, majority of the riders (73.8%) involved in RTA had a visual acuity of 6/6 in their better eyes. So, visual impairment could not have been a confounder in the RTA noted among these riders. The non-visual factors implicated in riding such as alcohol, cigarettes, cannabis, and kola nuts as well as fatigue, and inattention, however, had more significant effects on RTA among these riders as also noted in other studies.<sup>8,13,11</sup>

We also noted that 82.1% of these riders put in 10-12 hours in a day but only 29.9% rested for up to 1 hour during the period of work. Some, 11.2% observed no period of rest. This probably implies that they were riding even when tired. Fatigue on its own may adversely affect the rider resulting in RTA. It is possible that these riders were using CNS stimulants to enhance their natural abilities, but the cumulative effect may result in RTA. This is in agreement with findings in other studies.<sup>8,11,20</sup>

Experience in riding was another key factor noted among these motorcyclists as significantly contributing to RTAs. The prevalence of RTAs was observed to decrease

with increased number of riding years up to 20 years. Beyond a 20-year riding experience, there appeared to be a gradual increase in RTAs (Table 5). This corroborated the findings of previous authors.<sup>5</sup> It is likely that with increasing experience and maturity up to a certain age, the tendency to getting involved in RTAs drops. Beyond 20 years of riding, age related factors may explain the observed gradual increase in RTAs. Riding experience and its role in RTAs may have been a confounder in this study as it may have also contributed to the increase in RTAs noted among these riders in spite of their obvious consumption of CNS affecting drugs.

## CONCLUSIONS

Majority of the participants in this study used CNS affecting drugs, and the use, with the exception of marijuana, was significantly associated with RTAs. Visual impairment was also not significantly associated with RTAs. Riding experience contributed significantly to RTAs among commercial motorcyclists as well as fatigue and inattention and these may have been confounders.

There is need for the Federal Road Safety Corps of Nigeria to actively test for and discourage the use of CNS affecting drugs among road users particularly riders and drivers.

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