ORIGINAL ARTICLE

Prevalence of Whiplash Associated Disorders among Interstate Bus Drivers in a Nigerian Town

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Abstract

Background: Whiplash Associated Disorder (WAD), is considered the most common outcome of non-catastrophic motor vehicle collisions.

Objectives: The study determined the prevalence of WAD among interstate bus drivers in Ondo town, Ondo State, Nigeria and examined the relationship between the WAD and some sociodemographic variables.

Method: This cross-sectional study involved 110 bus drivers recruited purposefully across the three bus parks in Ondo town. A questionnaire to assess sociodemographic data, driving history and prevalence of neck pain and its association with whiplash injuries was distributed among the bus drivers to complete and retrieved shortly after. The data was analyzed using descriptive and inferential statistics. The alpha level was set at $p<0.05$ of significance.

Results: The results showed that WAD among the respondents had a point prevalence of 13 (11.8%) and 12 months prevalence of 25 (22.7%). There was no significant association between the usage of seatbelts and the 12-month prevalence ($p=0.352$) as well as the point prevalence ($p=0.621$). There was a significant relationship between the impact of the whiplash disability and the age of the drivers ($p=0.016$). There was no significant relationship between the duration of distance driving and the impact of WAD-associated disorders. ($p=0.872$).

Conclusion: It was concluded that out of ten bus drivers, one may have a point prevalence of WAD while two bus drivers out of ten may have a 12-month prevalence of whiplash-associated disorders. The impact of WAD might increase as the age of a driver increases.

Keywords: *Whiplash, bus drivers, prevalence, neck pain, point prevalence, Ondo.*

INTRODUCTION

WAD is considered the most common outcome of non-catastrophic motor vehicle collisions (MVCs) [1]. Globally, the incidence of whiplash injuries is about 16 to 200 people per 100,000 of the population [2]. Whiplash injuries are estimated to affect about 3.8 per thousand of the population each year in the USA [3]. Roughly 300 people per hundred thousand report whiplash injuries in hospitals in Europe and North America annually [4]. In the United Kingdom, the prevalence of WAD rose from about 7.7% in 1989 to 42.8% in 1990 after the mandation of the use of seatbelts for drivers [5]. The prevalence is suspected to be higher in South Africa than in the United States and Canada due to the higher frequency of road accidents on South African roads [6].

Pieces of evidence have shown that there is an increasing number of MVCs in developing and developed countries [7-9]. Based on the World Health Organization's report, long-distance journeys embarked on by commercial vehicle drivers, especially young ones have been attributed to be the major causes of MVC incidents around the world including Nigeria [10]. Adejugbagbe *et al*., reported that the majority of the respondents in his study were between the ages of 30 and 49 years [11]. This age group has been found to possess very dangerous driving behaviors [11]. Meanwhile, risk factors for road accidents include bad roads, brake failure, slippery roads, wrongful overtaking, driving under the influence of alcohol and visual impairment of some drivers [12]. Other causes include stress, fatigue, and poor vision when it rains among others [13]. These factors make drivers to be vulnerable to more likely to be involved in motor vehicle collisions which in turn may predispose drivers to the whiplash mechanism of injury.

Whiplash-associated disorders present with a vast array of clinical presentations; a large percentage of patients with WAD initially report neck pain and headaches as the major symptoms after the whiplash injuries. Other symptoms such as concentration problems, nausea, dizziness, jaw pain, headache, extremity numbness or paresthesia, tinnitus and low back pain are also common with WAD patients but they are less prevalent than headaches and neck pain [14]. Patients may also suffer from psychological symptoms such as anxiety, sleep disturbances and depression after an injury [15].

Reports from the World Health Organization showed that African countries, including Nigeria, have a higher rate of road accidents and accident fatalities when compared to some developed countries [10]. WAD are the most common outcome among survivors of road traffic accidents. Interstate bus drivers are often at high risk of developing WADs due to several reasons such as speeding and bad condition roads. These twin factors might necessitate a sudden application of the brake to

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inhibit a vehicle's motion. Eventually, a moment of inertia might cause the neck to go into sudden flection and extension leading to cervical injury which may result in WAD. However, scarce evidence exists on the prevalence of WADs among commercial drivers in different towns of Nigeria including Ondo. The study aims to provide data about the prevalence of WADs among long-distance bus drivers in Ondo town, Nigeria.

MATERIAL AND METHOD

The study was a cross-sectional design of three months duration. The ethical approval was obtained with number NHREC/TR/UNIMED-HREC-Ondo St/22/06/21 from the Ethics and Health Research Committee of the University of Medical Sciences, Ondo and permission for the data collection was obtained from the chairman of the National Association of Road Transport Workers in Ondo Town. The consent of the respondents was obtained before the commencement of the study. Respondents of the study were bus long-distance drivers from Ondo town to various parts of the country. They were chosen from the different bus parks in Ondo town using purposive sample techniques. All respondents were registered bus drivers with a minimum driving experience of at least 12 months. Some respondents with recent fractures of the cervical spine or the presence of rheumatoid arthritis were excluded from the study. The presence of these fractures, rheumatoid arthritis has negated the work-related aspect of the research. The study was carried out in Ondo town. The sample size was determined using the equation:

$$n = \frac{N}{1+ (Ne^2)} \quad (1)$$

Where n = desired sample size of the study group, e = desired level of precision (margin of error) (0.05), N = population Size, 150 [16]:

$$n = \frac{150}{1+ (150*0.05^2)} = 109.09$$

n = 110 respondents.

A total number of 110 respondents were purposively recruited for the study.

The town where the University is located was Ondo and was purposively chosen based on a sample of convenience. The long-distance bus drivers were chosen because of prolonged sitting, prolonged driving, posture while driving and seatbelt usage. The total population of the registered long-distance drivers were 150 according to the record in the main office.

The following instruments were used for the study:

(i) Sociodemographic Questionnaire: This consisted of several questions regarding initials, age, higher educational status, marital status and the prevalence of WAD among the respondents. The point, 7-day and 12-month prevalence were assessed by the questions: "Do you have pain in your neck resulting in a tingling sensation, paresthesia or numbness now, in the last 7 days and 12 months?" one after the other. A "yes" to any of the questions is an indication of the presence of pain.

(ii) Quadruple Visual Analogue Scale (QVAS): This is a 4-item outcome measure that is used to assess the pain intensity of the respondents. It assesses pain at the time of evaluation, the average pain intensity, the pain at its best and the pain at its worst. Each item has a score range of 0-10 with 0 meaning no pain and 10 meaning the worst possible pain [17]. The higher the score of the QVAS, the higher the intensity of the pain [17]. The Yoruba version of QVAS according to Mbada *et al.* was used for respondents who preferred the Yoruba language [18].

(iii) Whiplash Disability Questionnaire (WDQ): The WDQ is an outcome measure used to objectively assess the disability caused by WADs and its effects across various aspects of a patient's life [19]. It contains 13 items each with a numerical scale of 0-10. The highest response is 130 points indicating complete disability and the lowest score is 0 indicating no disability [20]. It measures disabilities in various aspects such as pain intensity, personal care, work/study/housework duties, driving, sleeping, fatigue, non-athletic leisure activities, athletic leisure activities, social activity, emotional health, concentration and irritability [20].

Regarding the data collection, each respondent was given a copy of the questionnaires with 3 segments. The first segment includes a proformat which includes the respondent's socio-demographic data and questions relating to the respondents' driving history and its association with WAD. Pain Intensity was inquired and measured with a Quadruple Visual Analogue Scale. The second segment was the WDQ which assessed the disability caused by the WAD and its impacts. Completed questionnaires were collected as data for the study. Point prevalence was the number of respondents that said "yes" to the question "Do you have pain in any part of your body now? The 7-day prevalent are those that responded "yes" to the question do you have pain in any part of your body in the last 7 days? While the 12-month prevalence was a pain in any part of the body in the last 12 months.

Data Analysis

Descriptive statistics of mean and standard deviation and inferential statistics of Chi-square and Spearman Rho were used for the study. The chi-square test of

association was used to examine the association between the prevalence of WAD and the use of seat belts and socio-demographic variables. Spearman Rho was used to examine the relationship between the prevalence of WAD and the driver's years of experience. Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 23. The alpha level was set at $p<0.05$.

RESULTS

Prevalence of Whiplash Among Respondents

The result of the analysis as shown in Table **1** is the prevalence of whiplash-associated disorder among the respondents. The prevalence of WAD in 12 months was 25 (22.7%) of the respondents, with 7-day prevalence of 16 (14.5%) and point prevalence of 13 (11.8%).

Table 1: Prevalence of Whiplash Among Respondents. N=110.

Variables	Frequency (n)	Percentage (%)
12 months Prevalence		
Yes	25	22.7
No	85	77.3
Total	110	100
7 days Prevalence		
Yes	16	14.5
No	94	85.4
Total	110	100
Point prevalence		
Yes	13	11.8
No	97	88.2
Total	110	100

Educational Level of Respondents

The highest educational level of the respondents is shown in Table **2**. There were 57 (51.8%) respondents with secondary school certificates followed by primary school education with 34 (30.1%) respondents.

Table 2: Educational Levels of Respondents N= 110.

Variables	Frequency (n)	Percentage (%)
Highest Educational Level		
None	4	3.6
Primary	34	30.9
Junior Secondary School	9	8.2
Senior Secondary School	57	51.8
Ordinary National Diploma	4	3.6
Higher National Diploma	2	1.8
Total Number	110	99.9

Descriptive Variables of the Respondents

The descriptive variables of respondents are shown in Table **3**. The minimum age of the bus drivers was 25 years and the maximum age was 74 years with a mean age of 49.06 ± 9.67 years. The mean years of experience was 26.18 ± 11.02 years and the mean distance covered per day was 207.27 ± 180.78 km.

Table 3: Descriptive Variables of the Respondents. N= 110.

Variables	Minimum	Maximum	Mean±SD
Age/years	25	74	49.06±9.67
Years of driving/years	5	57	26.18±11.02
Distance driven/km	43.30	1295.90	207.27±180.78
Frequency of Travel/ Weekly	1.00	7.00	4.96±1.58
Onset of Neck pain	0	10	0.38±1.53
Whiplash Disability Questionnaire	0	96	4.26±15.4

Association between Seatbelt Usage and Prevalence of WAD

The result shown in Table **4** is the association between the usage of seatbelts and the prevalence of whiplash. There was no significant association (X^2=0.352, p=0.352) between the usage of seatbelts and 12 months' prevalence of WAD. Also, there was no significant association (X^2=0.733, p=0.621) between the usage of seatbelts and the point prevalence of WAD.

Table 4: Association Between Seatbelt Usage and the Prevalence of WAD Using Chi-square. N=110.

Variables	Yes n(%)	No n(%)	X^2	P
12 months				
Yes	16(64)	9(36)	1.659	0.352
No	47(53.4)	41(46.6)		
7 days				
Yes	9(56.2)	7(43.8)	0.349	0.730
No	54(55.7)	43(44.3)		
Point Prevalence				
Yes	6(46.2)	7(53.8)	0.733	0.621
No	57(57)	43(43)		

Relationship between Sociodemographic Variables and Impact of WAD on Respondents

Table **5** below shows the relationship between sociodemographic variables and the WAD on respondents. There was a significant relationship (r=0.227 at P=0.016) between WAD and the age of the drivers. There was a significant positive relationship (r=0.919, P=0.000) between WAD and the onset of neck pain. There was also a significant relationship between the WAD and the frequency of neck pain (r=0.860, P=0.000).

Table 5: Relationship Between Sociodemographic Variables and Disability of Respondents Using Spearman Rho N=110.

Variables	WDI	
	R	P
Age	0.227	0.016*
YD	0.207	0.028*
DD	0.015	0.872
FT	0.037	0.697
OP	0.919	0.000**
Frp	0.860	0.000**

Abbreviations: *WDI=Impact of Whiplash Disability, YD= Years of Driving FT= Frequency of Travel, DD= Distance of Driving, OP= Onset of Neck Pain, Frp= Frequency of Neck pain, **= Significant at p<0.01, *= Significant at p<0.05.*

Relationship between the Sociodemographic Variables and the Prevalence of WAD

The result of the analysis as shown in Table **6** is the relationship between the sociodemographic variables of the drivers and the prevalence of WAD. There was no significant relationship (r=0.070, p=0.463) between the 12-month prevalence of whiplash-associated disorders and the age of the drivers. Also, there was no significant relationship between the 7-day prevalence of WAD and the age of the drivers (r=0.092, p=0.330) and there was also no significant relationship between the point prevalence of WAD and the age of the drivers (r=0.144, p=0.128).

DISCUSSION

This study found the prevalence of WAD among interstate bus drivers in Ondo town, assessed the association between the usage of seatbelts, and determined the relationship between various socio-demographic variables and the impact of WAD among interstate bus drivers.

From the results of this study, it was observed that the majority of the bus drivers in Ondo town are of middle age with an average age of less than 50 years. This was slightly higher than what was found in a study at Lagos by Okafor *et al.*, [13] who found the average age of the drivers to be around 45 years old implying that drivers in this part of the world are at the productivity age. This might indicate that a majority of bus drivers in Nigeria are middle-aged. It has to be noted that driving connotes concentration, commitment and focus, especially long-distance driving. Therefore, individuals with advanced age may be unable to drive for long hours. Similarly, a very young person with little experience can pose a danger on the roads. Most of the respondents had the highest educational level of Senior Secondary School. This low educational status could be because driving does not require a higher level of education to learn, nevertheless, if one could have the basic skills of reading and writing, such individuals might probably be able to operate more efficiently as a driver.

This study reported that about ten percent of interstate bus drivers in Ondo town had a point prevalence of WAD. The 12-month prevalence was found to be about twenty percent. This suggested that although they had whiplash injuries 12 months before this study was carried out, the disorders had subsided at the time the inquiry was made. The prevalence of WAD looks low for the point and 12 months. This could be because long-distance drivers in this environment might have started the driving profession when they were younger. In Nigeria, the average age of completing secondary school in Nigeria is 18 years, the age most drivers started driving. With this, each driver can master the terrains of the road, develop more skills in driving and learn some safety methods which could have been gained from repetitive practices in the job knowing full well the problems on Nigeria roads [19]. It is logical to assert that most of these drivers own the vehicle and therefore they have to drive with caution to prevent damage to the vehicle. All these would have prevented the sudden application of brake, head-on collision and some other risk factors leading to whiplash disorder.

This study found that there was no significant association between the usage of seatbelts and the occurrence of whiplash injuries and subsequent occurrence of WAD. This is in contrast with the result of the study carried out by Holman et al., [4]. It should however be noted that the reality of the usage of seatbelts by the bus drivers could not be ascertained as the majority of them were more likely to respond positively to the usage of seatbelts

Table 6: Relationship between the Sociodemographic Variables and the Prevalence of Whiplash Associated Disorders.

Variable	Age		YD		DD		OP	
	r	p	r	p	r	p	r	p
Prevalence								
12 months	0.070	0.463	-0.003	0.977	0.073	0.441	0.460	<0.001**
7 days	0.092	0.330	0.074	0.433	0.057	0.546	0.603	<0.001**
Point	0.144	0.128	0.078	0.410	0.097	0.309	0.709	<0.001**

Abbreviations: *YD: Years of driving, DD: Distance driven OP: Onset of neck pain, **= Significant at p<0.01.*

because of fear of a penalty by law enforcement agents. The usage of the seatbelt is paramount in driving a vehicle because it prevents sudden jack of the body and the neck, especially during sudden application of brakes when the vehicle is in motion. Meanwhile, the federal government of Nigeria is enforcing the usage of seatbelts for drivers, violation attracts a fine. This has made drivers compelled to accede to the enforcement of the law to avoid being sanctioned.

The majority of the bus drivers that reported WAD were between the ages of 50 to 65 years and a significant association was found between the ages of the bus drivers and the impact of WAD on respondents, which suggests that the older a person is, the more prone he is to have WAD and the slower they are likely to recover from WAD. This could be because degeneration sets in with age and repetitive injuries from driving such as whiplash might occur more frequently the more a person ages and drives. This could cause more pronounced injuries, higher levels of disabilities from the injuries and slower recovery. This is supported by a study from Suissa *et al*, [21] who found that older age was one of the factors associated with a slower recovery from whiplash.

It was discovered that there was a significant relationship between the years of driving and the impact of WADs which also might suggest that the more a person drives, the more he is at risk of whiplash injury. This could cause severe disabilities with time due to the accumulated effects of the injuries.

CONCLUSION

It was concluded that out of ten bus drivers, one may have a point prevalence of whiplash-associated disorders and two bus drivers out of ten may have a 12-month prevalence of whiplash-associated disorders. The impact of whiplash-associated disorders might increase as the age of the driver increases.

ETHICAL APPROVAL

Ethical approval was obtained from the Research Ethics Committee of the University of Medical Sciences, Ondo, Nigeria (REF letter No. NHREC/TR/UNIMED-HREC-Ondo St/22/06/21 Dated: 3rd June, 2022). All procedures performed in studies involving human participants were following the ethical standards of the institutional and/ or national research committee and the Helsinki Declaration.

CONSENT FOR PUBLICATION

Written informed consent was taken from the participants.

AVAILABILITY OF DATA

The data set may be acquired from the corresponding author upon a reasonable request.

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Declared none.

CONFLICT OF INTEREST

There was no conflict of interest from any author regarding the publication.

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AUTHORS' CONTRIBUTION

Prof A.O Ojoawo: Conceived the idea, analyze the data, interpreted the data and did the critical reading to get the work ready for publication. He is the lead and correspondence author.

Amzat Teslim Opeyemi: Collected the data, and did the skeletal write up.

Awotipe Ayomide Ayotunde: Assisted in the data collection, supply the literature and assisted in the critical reading to make the work ready for publication.

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