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RESEARCH ARTICLE

Influence of Alcohol on Road Traffic Accident Morbidity and Mortality in Benin-City Nigeria. A One-Year Study between August 2003 -July 2004

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ABSTRACT

This study determines if there are high blood alcohol levels in drivers of vehicles involved in road traffic accidents RTA, and surmise blood alcohol contribution to road traffic accident injuries. Two hundred and eighty three drivers participants were recruited from two hospitals in Benin City, namely UBTH and State Specialist Hospital after ethical clearance. Investigators were alerted about traffic accident presentations. Informed consent was extracted. Questionnaire was administered. Data was analyzed using the statistical package for social sciences. Venous blood obtained from all vehicle drivers was screened for blood alcohol levels using the Sunshine and Nenad method. Blood bottles contained 1% potassium fluoride and potassium oxalate. Centrifuge spin separated plasma which used for assay of blood alcohol assay. One hundred controls had alcohol assay. Injury and morbidity patterns were studied. Control population had lower blood alcohol18.5mg/dl. Alcohol influenced 66 accident cases, with alcohol levels 50mg/dl to 110mg/dl. Cars drivers 87 cases mostly commercial (30.7%) had the highest average alcohol level 36.7mg/dl. Injuries began to feature more as alcohol approached 50mg/dl. Seven intoxicated dead drivers had average alcohol of 105mg/dl. Passengers of intoxicated drivers who died were more than non intoxicated. Fractured skull with intracranial heamorrhage remained the most common cause of death 50 (96.2%). More of the dead drivers had no license and a lack of drivers' license is associated with higher blood alcohol. Educated drivers had more alcohol than uneducated.

***KEY WORDS**: Influence, alcohol, road traffic accident, morbidity, mortality.*

INTRODUCTION

Ethanol is the active ingredient in alcoholic beverages. Available alcoholic beverages in Benin-City Nigeria include beers and wines. Fortified wines have further ethanol added to them [1]. Beer products contain between 5.2%-7.5% alcohol per volume. All these are not only freely available but are sold without any restriction in public bus stations in Benin Nigeria. Other fortified beverages includes Gin 43%/ vol (usually 70mls translating to 30.1mls of absolute ethanol/ bottle) and Aromatic Schnapps 41%/ vol. Other illicit fortified spirits peculiar to Nigeria include "Ogogoro"and "Burukutu" which have even higher amounts of alcohol whose concentration is usually in excess of 50% but varies from one locality to another. Its absorption is about the fastest in the body and occurs throughout the whole length of the gastro-intestinal system from the stomach to the colon but especially the small intestine [2]. After absorption, it is carried in the blood stream to the liver where it is metabolized to form acetyl coenzyme A, which goes to the energy pathway to yield energy, CO2 and water. At 20-50mg/dl blood alcohol concentration, the ability to see or locate moving lights correctly is diminished as is the ability to judge distances. The tendency of risk taking is increased [3]. At 50-80mg/ 100ml the ability to judge distances is reduced, so the adaptability of the eyes to changing light conditions and sensitivity to red light is also impaired. Reactions are slower and concentration span is shorter. Because of the above reasons and coupled with the general dilapidated nature of our roads we used 50mg/dl as a cut off level for alcohol influence for the purposes of this

study. By the time 80-100mg/dl is reached the drinker is five times more likely to have a driving accident than before [4]. At 100-120mg/dl euphoria sets in, and with it an over-estimation of ones abilities leading to reckless driving. The driver will begin to suffer impairment of peripheral vision resulting in accidents due to hitting vehicles in passing or impairment of perception of obstacles or ability to assess dimensions leading often to lone accidents [5,6]. At 120mg/dl the driver is ten times more likely to have an accident 7. International studies show that alcohol is estimated to be a factor in 20-30% of all accidents 7. In the United Kingdom research and statistics indicate that alcohol is a contributing factor in 20% of fatal accidents at work5. 15% of drownings6 39% of deaths in fires.
This study finds its importance by generating a prima facie evidence of the existence of drunk driving and alcohol influence on road traffic accidents and quantifies associated injury patterns associated with it in Benin City Nigeria. There is no prior documentation of alcohol related injuries sustained from road traffic accidents in our environment.

METHODS

Participants were recruited from two major government hospitals in Benin City, namely University of Benin Teaching Hospital and the State Specialist Hospital Benin City after ethical clearance was sought and obtained. We were alerted when road traffic accident cases were brought to the hospital, from where our study began after patient's informed consent was extracted. A structured questionnaire administered either to the victims and/or the eye witnesses that brought them. Data was collated and analyzed using the statistical package for social sciences. Samples of venous blood were taken from all vehicle drivers involved in road traffic accident and screened for blood alcohol levels using the Sunshine and Nenad method [7] also called Conway's method [8] and Hargers method [9].Blood was collected into bottles of 1% potassium fluoride and potassium oxalate used as preservatives and anticoagulant. Fluoride stops the action of alcohol dehydrogenase in RBC while oxalate is an anticoagulant. It was spurn to separate plasma and red blood cells. Plasma was used for assay of blood alcohol levels. One hundred controls also had blood alcohol assay, these were fellow drivers who drove under the same conditions as the accident victims but were uninvolved in road traffic accident. Injury and morbidity patterns were then studied.

RESULTS

A total of two hundred and eighty three drivers were involved in road traffic accidents.
The control population had significantly lower blood alcohol levels when compared with those of drivers of vehicles involved in an accident and sustained injuries (Table 1).
Drivers having a blood alcohol concentration of 50-100mg/dl were classified at driving under alcohol influence (Table 2).
Categories of all vehicle drivers involved in accident / average blood alcohol levels (Table 3), highlights that motorbike riders were involved in 51 accidents (18%) with the second highest average alcohol blood level of 24.6mg/dl. Cars drivers 87 cases, representing 30.7% had the highest average blood alcohol level of 36.7mg/dl. Buses were involved in 61 cases, representing 21.7%,and had the third highest average blood alcohol level of 18.0mg/dl.

Table.1: Average blood alcohol level for the Control Population.

Age Range	Frequency	Average Blood Alcohol Levels	Percentage
15-44 Years	89	18.5mg/%	89%
45-60 Years	11	10mg/%	11%
TOTAL	100		100%

Among the dead car/ bus drivers (table 4), 4 had no traceable blood alcohol and 7 intoxicated drivers had an average blood alcohol of 105mg/dl. Passengers of intoxicated drivers who died were 12. Dead drivers of the second involved vehicle were 7. Motorbike riders were split into 9 non-intoxicated ones and 8 intoxicated riders with an average blood alcohol level of 70mg/dl. There was only 1 intoxicated pedestrian who died with a blood alcohol level of 70mg/dl (table 4).

Table 2: The breakdown of drivers with blood alcohol levels varying from 50mg/dl to 100mg/dl who sustained road traffic injuries and their documented cause of accident.

Category of Users	Frequency	Average Alcohol Blood Levels	Morbidity		Mortality	
			No	Percentage	No	Percentage
LONE CAR ACCIDENT	31	100mg/dl	31	100%	20	64.5%
CAR Vs BURST TYRE	1	50mg/dl	1	100%	-	-
MOTOR BIKE Vs CAR	12	70mg/dl	12	100%	12	100%
MOTOR BIKE Vs CAR	2	50mg/dl	2	100%	-	-
CAR Vs CAR	3	53.5mg/dl	3	100%	-	-
CAR Vs LORRY	2	90mg/dl	2	100%	2	100%
LORRY (BURST TYRE)	2	55mg/dl	2	100%	-	-
PEDESTRIAN Vs CAR	1	70mg/dl	1	100%	1	100%
BUS Vs TRAILER	1	70mg/dl	1	100%	1	100%
CAR LONE ACCIDENT	1	70mg/dl	1	100%	-	-
UNSPECIFIED	10	50mg/dl	10	100%	-	-

Table 3: Distribution of vehicle type and average blood alcohol levels of its drivers**.**

Vehicle Type	Frequency	Percentage	Average Alcohol Blood Level Per Vehicle Category
Motor bike	51	18%	24.61mg/dl
Car*	87	30.7%	36.7mg/dl
Bus (all commercial)	61	21.7%	18.0mg/dl
Trailer	8	2.8%	0mg/dl
Pedestrian	44	15.6%	11.6mg/dl
Lorry	21	7.4%	20mg/dl
Pail loader	2	0.7%	0mg/dl
Not specific	6	2.1%	6mg/dl
Bicycle	3	1.6%	7.33mg/dl

* Commercial cars were 76 out of 87 cars (87%) of car morbidity.

Table 4: Blood alcohol distribution of dead drivers along with their vehicle type.

CLASS OF ROAD USERS	NON INTOXICATED	INTOXICATED ROAD USERS	AVERAGE ALCOHOL LEVEL	PASSENGERS OF INTOXICATED ROAD USERS	DRIVERS IN ANOTHER VEHICLE	PEDESTRIAN	**TOTAL DEATHS**
CAR/ BUS DRIVERS	4	7	105mg/dl	12	6	-	29
MOTOR CYCLE RIDER	9	8	70mg/dl	-	-	-	17
PEDESTRIAN	-	1	70mg/dl	-	-	5	6
TOTAL							52

Distribution of predominant post mortem findings as a cause of death with average blood alcohol level (Table 5), showed fractured skull with intracranial heamorrhage remained the most common pathologic cause of death accounting for 50 (96.2%). The average blood alcohol level of fatal cases was 54.16mg/dl, as against that of survivors of head injury that had an average blood alcohol concentration of 20mg/dl.

Table 5: Showing predominant post mortem findings as cause of death with average alcohol blood levels**.**

Predominant Post Mortem Findings As Cause Of Death	**Frequency**	**Percentage**	**Average Blood Alcohol level**
FRACTURED SKULL WITH INTRACRANIAL HEAMORRHAGE	50	96.2%	54.16mg/dl
RUPTURED VISCERA OR AMPUTATION WITH HEAMORRHAGIC SHOCK	2	3.8%	0mg/dl

Distribution of license among dead drivers, to average blood alcohol level (table 6) Five (5) of dead drivers, had license while 29 drivers had no license. Distribution of educational status and blood alcohol levels in dead drivers (table 7) showed dead graduate drivers were 6 with an average blood alcohol level of 90mg/dl. Drivers with school certificate and below were 16 with an average blood alcohol level of 30mg/dl. Drivers with diploma were 2 with an average blood alcohol level of 95mg/dl.

Table 6: Possession of valid drivers license to blood alcohol levels.

License	**Frequency**	**Blood Alcohol Level**	**Average Years of Experience**
YES	5	73.75mg/dl	15 years
NO	29	27.43mg/dl	< 1year
TOTAL	34		

The man on picture 1 of this page left a drinking pub at 8 30pm on a working day and died at a lone accident 10 minutes later, on a federal high way on his way to work. He was a broadcaster. Blood alcohol level was 110mg/dl.Picture 1 shows wreckage of car from which patient was extracted.

Table 7: Educational statuses of drivers compared with blood alcohol levels.

Educational Status	Frequency	Blood Alcohol Level
GRADUATES	6	90mg/dl
SCHOOL CERTIFICATE/ BELOW	16	30mg/dl
DIPLOMA	2	95mg/dl
TOTAL	34	

DISCUSSION

Despite the difficulties encountered, this study presents for the first time in Edo State, Benin- City a picture of the influence of alcohol on road traffic morbidity and mortality. Alcohol related accidents have been reported not to occur at random [7].

Significantly the control population drivers had lower blood levels 18.5mg/dl than the total average of that all of drivers involved in road traffic accidents which was 50mg/dl.

In this study we state that significant blood alcohol intake did not cause accidents in isolation, but did so by acting in concert with other identified causes. This is in agreement with already established data indicating that as blood alcohol level reaches 50mg/dl it affects the adaptability of the eyes and the ability to judge distances is reduced, so the adaptability of the eyes to changing light conditions and sensitivity to red light is also impaired. Reactions are slower and concentration span is shorter [7] Because of the above reasons and coupled with the general dilapidated nature of our roads we used 50mg/dl as a cut off level for alcohol influence for the purposes of this study. This study documents 66 cases of alcohol influenced road traffic accidents with blood alcohol levels ranging from50mg/dl to 110mg/dl, which was considered significant. At 50mg/dl there was an increase in the tendency to have an accident especially with another vehicle, with minor morbidity. Such accidents may be termed "alcohol influenced", while as blood alcohol levels rises to 70mg/dl and above, lone accidents became more frequent with an increase in mortality. The percentage alcohol involvement was therefore 23.32%, which agrees with the findings of Honkanen 1993, that alcohol consumption is estimated to be a factor in 20-30% of all accidents [8]. Our findings of an increase in morbidity and mortality as blood alcohol concentrations constituted 51 (18%) of accident cases which is lower than figures published in Kampala by C.N Andrews [9].Most of the car drivers were commercial drivers (87%),alcohol influenced road traffic accidents and its attendant injuries are therefore more common with commercial vehicle drivers than with their private counterparts. In Nigeria other studies done, especially the data published by Asogwa *et al* using a sample size of 32 in 1982 indicate a 56% prevalence rate for alcohol influenced drivers[10]. Noticeably also car drivers tended to have higher blood alcohol levels than other vehicle Drivers. Amongst the dead drivers very high blood alcohol levels was seen in seven of them with averages of 105mg/dl. Eight commercial motor-bike riders also registered blood alcohol levels averaging 70mg/dl. The significant cause of death in all these cases was mostly fractured skull with intracranial hemorrhage further buttressing the age long observation that alcohol and head injury don't mix. Senerick and Ryan illustrated this in a study of 102 brain-injured survivors admitted to a trauma center in the United States in which it was found that those who have been under the influence of alcohol at the time of admission were -:

- More agitated-for a long period of time.
- Discharged with lower cognitive abilities.
- More neurologically and behaviorally affected by their injury.
- More apt to ultimately die at a young age.

In addition, the ingestion of alcohol also increases the chance to have a seizure in this Population [11].

It is also worthy of note that the acquisition of experience with drivers license was associated ironically with an increased blood alcohol level probably due to over confidence imparted by both alcohol and experience. While a significant number of drivers plying the roads unhappily still do not have valid drivers license.

Our study also found that more educated drivers in fact had increased tendency to drink and drive compared to their less educated counterparts .

In conclusion road traffic accidents morbidity and mortality were higher in those whose blood alcohol levels were above 70mg/dl.

REFRENCES

[1] Olsen L, K,Pedian, K.J.Baffi, C.R.:Health today,3rd Edition.(1970).Simon and Schuster Custom Publishing,Massachusetts.19:153-157.

[2] Laurence D.R.,Bennett P.N:Clinical pharmacology.7th edition. (1987). Churchill Living stone,Edinburgh.:13-36.

[3] Fact sheet. (2003).Alcohol and accidents.www.alcohol.concern.org.UK/information /fact sheet/new fact sheet 9.htm.1-5.

[4] Honkanen R: (1993). Alcohol in home and leisure activities.Addiction.;88:939-944.

[5] Hutcheson G.D,Henderson M.M and Davis J.B. (1995). Alcohol in the work place,cost and responses.University of Strathclyde,Glassgow.1995.1-5.

[6] Andrews C.N,Kobusingye O.C.,Lett R,:Road traffic accident injuries in Kampala.East African medical journal.April 1999;76:4;189-194.

[7] Harold Varley.(1969). Practical clinical biochemistry.4th edition.ELBS.The white friars press limited, London and Tonbridge.

[8] Conway E. (1957). Micro diffusion analysis and volumetric error.4th edition. Crosby, Lockwood: 249.

[9] Hager R.N. (1961). In toxicity, edited by C.P Stewart and A Stolman.Academic press. New York. 2:86.

[10] Asogwa S.E. (1992). Road traffic accidents in Nigeria. A review and a reappraisal. *Accid.Annal*, Prev.1992 April; 24 (2); 149-155.

[11] Senelick R.K., Ryan. (1991). Living with head injury: A guide for females. Washington DC:Rehab hospital services corporation.1:1.