

Relationship of Alcohol Intoxication and Accidental Deaths: A Descriptive Autopsy Study in Nairobi, Kenya.

Authors

Prof Peter Wangai Kiama

Department of Pathology, Egerton University, Kenya.

Email: pkiamo1@hotmail.com

Abstract

This study aimed to determine the magnitude of fatalities resulting from accidents and their relation to alcohol intoxication to inform public health policy on the need for their prevention. Materials were all the bodies that fulfilled the criteria of violent fatal outcomes between June 1 2009, and May 31 2010. Bodies were categorized by gender and divided into 10 age groups of 10 years each. A complete forensic autopsy examination was done on each. This is a descriptive prospective study of homicidal deaths in Nairobi from June 1, 2009 –to May 31, 2010. It was carried out at the city Mortuary, Nairobi. In this study, all cases of violent deaths for twelve consecutive months were included. Alcohol level estimation was done on 400 of all the study subjects. The 400 were selected consecutively as every fifth subject. This was a purposeful sampling frame and size. Data was entered on a proforma datasheet. The date, the month, day of the week and time of death were noted. The cases were divided into male and female, and each gender divided into 8 age groups; 0-9, 10-19; 20-29; 30-39; 40-49; 50-59; 60-69 ;> 70 years. Data were analysed using SPSS. The study concluded that other accidents in Kenya are associated with alcohol intoxication, and a large percentage is contributed to by drowning. The study recommend that substance abuse should be interrogated more as a cause of self-destruction.

Key Terms: Accidents, alcohol intoxication, deaths, public health policy.

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1.0 INTRODUCTION

Violence leading to fatal trauma is a preventable leading global public health problem. However, its control and prevention depend on the magnitude and nature of the problem. An estimated 3.7 per cent of all deaths worldwide are violence-related, with suicide being the most frequent form, followed by homicide and war-related deaths (WHO, 1999; WHO, 2000). For example, in the United States, violent deaths from suicides, homicides, and accidents are the leading cause of death for people aged 1-39 years (Krug et al., 1998). In Norway, the most frequent causes of death were blunt injury, drowning, suffocation, firearm and poisoning (Nordrum et al., 1992). In South Africa, where most studies from Africa have been done, the leading causes are gunshot injuries, followed by sharp force injuries, blunt force injuries and strangulation (Butchart et al., 2000). A significant proportion of violence-related deaths worldwide are associated with alcohol (Parry et al., 1998). For example, over 20 per cent of the violent deaths in Finland are alcohol-related, with differences in epidemiologic patterns and trends for different types of violent death between sexes and age groups (Philippe et al., 2001). Therefore, this study aimed to determine the magnitude of fatalities resulting from accidents and their relation to alcohol intoxication to inform public health policy on the need for their prevention.

2.0 LITERATURE REVIEW

Violence is a significant public health problem (Hilal et al., 2005). In 1990, an estimated 1,851,000 people in the world died from violence (35.3 per 100,000). (Reza et al., 2001). For most of Africa, the Middle East and Asia, and some regions with the highest estimated violent death rates, cause of death statistics lacks even the detail required to discriminate between intentional and unintentional injury deaths (Butchart et al., 2000). Violence, in general, can be defined as the threatened or actual use of physical force or power against oneself, against another person, or a group or community that results in or has a high likelihood of injury, deprivation, or death. Categories of violent deaths are suicide, homicide and accidents. Suicide is fatal self-inflicted injuries specified as intentional; homicide is fatal injuries that have been inflicted by another person to injure or kill by any means, while overall violence would encompass all deaths from accidents (Reza et al. 2001) or it can also be defined or refer to "violent deaths" resulting from suicides, homicides, and accidental deaths "a violent death" as "caused by force: not natural." Violent deaths are those fatalities that result from injuries consequent to the use of force in cases where no natural cause can be identified (Rafindadi, 1998).

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Prevalence of Violent Deaths

Violent deaths (suicides, homicides, and accidents) are the leading cause of death of people aged 1-39; overall, they are the third leading cause of death, behind cardiovascular disease and cancer, respectively (Hollinger, 1980). In South Africa mortality rate due to violence is nearly eight times the global rate (WHO Global Burden of Disease study, 2000), which is 72 per 100,000 and varies between cities such that it is highest in Cape Town, 66 per 100,000 and lowest in Pretoria/Tshwane 24 per 100,000 (National Injury Mortality Surveillance, 2005). In East Africa, a single study in Uganda reveals that 25 per cent of all deaths in Kampala are due to violent injuries (Sudha et al., 2011). Scientists have long been interested in self-destructive tendencies among human beings. Most studies of self-destructiveness; however, have tended to concentrate only on suicide, that is, overt self-destructiveness. Various studies show that the prevalence of violent deaths depends on the cause (Suaia et al., 1995).

Accidents

The prevalence of other types of accidents was for drowning 7 per cent (Prasad & Prasad, 2003) and 17.4 per cent (Nordrum et al., 1998), burns 2 per cent (Prasad & Prasad, 2003) and 7.8 per cent (Hanifa et al., 2006), while a single study revealed the prevalence of accidents from animal bites at 3 per cent (Prasad & Prasad, 2003). Various studies demonstrate that violent deaths predominantly involve males. The prevalence is 93.3 per cent. In Dar es Salaam Tanzania (Out Water et al., 2008), 82.6 per cent in Northern Norway (Nordrum et al., 1998), 60 per cent in Manipal, Southern India (Mohan et al., 2006). However, one study reveals female predominance of 73 per cent in Trakya, Turkey (Derya, 2006)

Prevalence by Age

Majority of studies reveal age group 21-40 to be the dominant, Kinyanda et al. (2004), 20-24; 31 per cent, Kumar et al. (2005), 20-39; 63.6%, Hilal et al. (2005), 21-40; 72.7 per cent, Derya (2006), 21-30; 27 per cent, Mohanty et al. (2007), 21-30; 34 per cent, Gouda and Aramani (2010), 21-30; 32.5 per cent and Karn et al. (2011), 21-40; 52 per cent.

Relationship with Alcohol Intoxication

Alcohol is involved to a considerable extent in all major categories of violent deaths for all age cohorts, especially for road traffic victims aged 35 years and under; 48.6 per cent of the traffic accidents, the victims had been drinking, 45.2 per cent of homicides and 35.4 per cent of suicides. Distribution by age in the age

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group 15-19, 42.7 per cent of violent deaths were alcohol-related, while in the age groups 20-24, 25-34, 35-44 and 45-54, the finding was 51.1 per cent, 48.6 per cent, 49.1 per cent and 47.2 per cent, respectively (Abel & Zeidenberg, 1985).

3.0 METHODS

Estimation of Exogenous Alcohol in Vitreous Humour

Sample Collection and Materials: Vitreous humour was obtained with an 18-gauge needle and syringe. The eye was cleaned with antiseptic, the eyelids drew apart, and the needle was inserted through the lateral canthus to the vitreous chamber. For alcohol estimation, two milliliters of the sample were preserved in a fluoride bottle sealed with cello tape. It was transported in a cooler box and stored at temperatures of -4 degrees Celsius until the time of analysis. Vitreous humour was cultured at the point of collection to avoid the need for transport media; thus, culture media is part of the materials used. For bacteriology, the materials required are those for Gram stain and biochemical tests.

Method of Alcohol Estimation: The machine used was the Gas-liquid chromatography machine at the government chemists; the analysis was done in batches of ten. The method was quantitative. The specifications were-

- 1) Gas Chromatograph Varian 3700
- 2) Injection Temperature at 100 degrees Celsius
- 3) Column Temperature at 80 degrees Celsius
- 4) Detector Temperature at 140 degrees Celsius
- 5) The detector used FID (Flame Ionisation Detector)
- 6) Column support used: Carbowax 20m

Reagents: All reagents were anhydrous and of analytical reagent grade.

- 1) Combined alcohol and acetone stock reference solution: Dilution of 3.0ml each of anhydrous ethanol and methanol, 2.0ml of Isopropanol and 1.0 ml of anhydrous acetone to 100.0ml with deionized water was. At 20 degrees Celsius, this provided reference concentrations of ethanol 23.7g/l, methanol 23.7g/l, isopropanol 15.7g/l and acetone 8.0g/l
- 2) Combined alcohol and acetone working calibrators: Dilution separately 1.0, 2.0, 4.0, 8.0 and 16.0 of the combined stock solution to 100.0ml with deionized water was done.

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3) Internal standard solution: Dilution of 0.5ml of *n*-propanol to 1L with deionized water saturated with sodium chloride was done.

Procedure: 10 Microlitres of the sample were mixed with 250 ml of internal standard (propanol) of known concentration. 1-2 microliter of the mixture was then injected into the gas chromatograph. Calculation; since the molecular weight of ethanol, methanol and propanol are different; there was clear separation from the resultant chromatograph. The peak height ratio (or peak area) of the unknown to the internal standard, *n*-propanol was done and was compared with the ratio obtained for the corresponding calibrators the concentration of alcohol was given as g/L.



Figure 1: Alcohol Analyser Machine at the Government Chemist.

Quality Assurance: The focus of this study was exogenous alcohol. The studies on microbiology were used as quality control to rule out endogenous alcohol formed by putrefaction. Sample collection was done after cleaning the eye with antiseptic. Transport of the samples was done in a cooler box, and storage of the samples for alcohol estimation was at temperatures of -4 degrees Celsius. The alcohol estimation was

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carried out at the Government chemist, the laboratory used for all the public forensic work in Kenya. An internal standard was used when the samples were being analysed.

Microbiological Investigations

Specimen collection: Specimens for microbiological analysis were inoculated into the culture media: Blood agar, Macconkey and Robertson's cooked meat media, and Soubourounds Dextrose agar. This was done at the mortuary upon procurement of the specimen and then transported to the microbiology laboratory of the school of medicine, University of Nairobi.

Conditions of Incubation: Blood, MacConkey and Sobourounds Agars have been incubated aerobically for 24-48 hours and examined at 24 hours and finally at 48 hours. Robertson cooked meat media was initially incubated at 37 degrees Celsius for 18-24 hours, thereafter sub cultured onto blood agar and incubated under anaerobic conditions using Gas pack anaerobic systems. This was incubated for 48 hours before being examined. Where organisms were isolated, the identification was carried out according to the (Manual of Clinical Microbiology, 1996).

Data entry, analysis and presentation: Data was entered on a proforma datasheet. The day of the week, month, date and time of death were noted. The cases were divided into male and female, and each gender divided into 8 age groups; 0-9, 10-19; 20-29; 30-39; 40-49; 50-59; 60-69 ;> 70 years. Data were analysed using SPSS.

4.0 RESULTS AND DISCUSSION

Autopsies were conducted on 2566 bodies over a period of one year. In Table 1, 2442 cases were analysed for violent deaths; 186 were females, and 2256 were males. 82 cases were analysed for natural deaths and 42 cases were the unascertained.

Table 1: Distribution of deaths by categories in Nairobi.

Cause	Number	Percentage (%)
Violent deaths	2442	95.2
Natural Death	82	3.2
Unascertained	42	1.6
Total	2566	100

Violent Deaths: The causes of death were distributed among all the known causes of violent deaths, namely homicide 47.3 per cent, accidents 43.6 per cent and suicide 9.1 per cent.

Table 2: Distribution of violent deaths by category in Nairobi.

Cause of Death	Numbers	Percentage (%)
Homicide	1154	47.3
Accident	1064	43.6
Suicide	224	9.1
Total	2442	100

Accidents: These comprised 43.6 per cent of violent deaths. The accidents were caused by road traffic accidents 87.3 per cent, while other accidents were 12.7 per cent.

Table 3: Distribution of other accidents cases by categories in Nairobi.

Categories of other accidents	Number	Percentage (%)
Burns	67	41.4
Drowning	42	25.9
Falling	24	14.8
Electrocution	20	12.3
Falling from a height	9	5.6
Total	162	100

Relationship between Alcohol Intoxication and Violent Deaths

400 study subjects were randomly selected from 2566 autopsied and studied for violent deaths. Alcohol levels in the vitreous humour were measured. Out of the 400, 26.3 per cent were found to have alcohol in the vitreous humour. Further, 91.4 per cent had died violently. They were classified based on the level of alcohol intoxication as follows: Lightly intoxicating 13.5 per cent, moderately intoxicating 16.7 per cent, heavily intoxicating 28.1 per cent, very heavily intoxicating 14.6 per cent and stuporous doses 27.1 per cent as shown in the table 3 below.

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Table 3: Alcohol Distribution by the Level of Intoxication

	Number	Percentage (%)
Lightly	13	13.5
Moderately	16	16.7
Heavily	27	28.1
Very heavily	14	14.6
Stuporous	26	27.1
Total	96	100

They were further classified by the cause of violent death, homicide at 39.6 per cent, accidents at 52.1 per cent and suicide at 8.3 per cent as shown in figure 2 below.

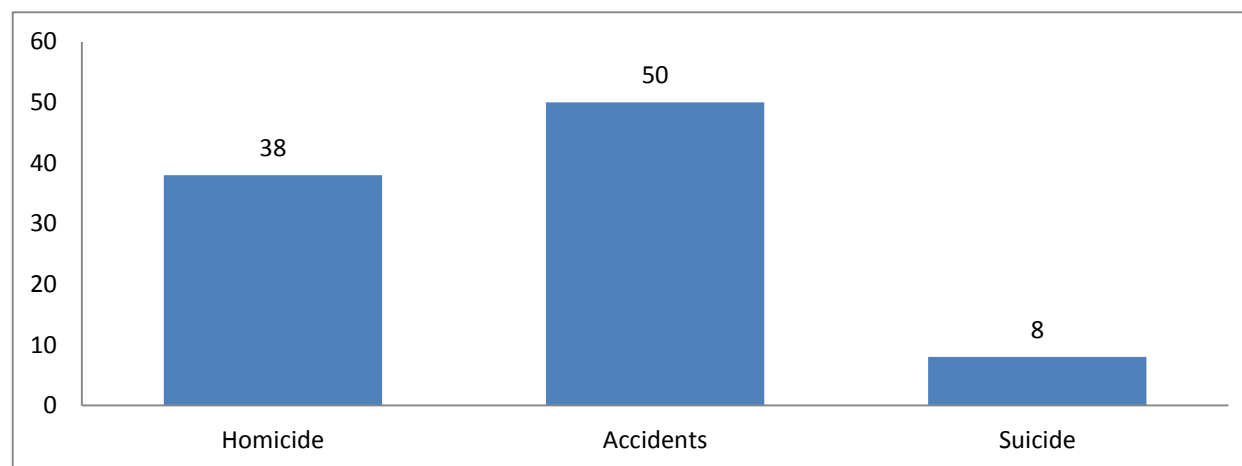


Figure 2: Alcohol distribution by cause

5.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions: Other accidents in Kenya are associated with alcohol intoxication, and a large percentage is contributed to by drowning.

Recommendations: The current study reveals that deaths due to accidents are a major problem in Nairobi, Kenya and as such, public health measures and policies need to be put in place to address this malady. Similarly, substance abuse should be interrogated more as a cause of self-destruction and alcohol measures to be enhanced. Additionally, males were more prone to violent deaths; society should address the plight of the male child.

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