Original Research Article

Pattern of female deaths: An autopsy-based cross-sectional study

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Abstract

Objective: To find out the pattern of firearm deaths including its manner and demographical aspects in Islamabad and to see institutions, administrations and planning authorities are taking remedial steps to reduce firearm deaths comprising of the most of the unnatural deaths in a society. **Materials and Methods:** This is a Cross-sectional study conducted at Tertiary care teaching hospital over a period of 1 year. The major sources of information reviewed in this study were the autopsy registers and autopsy reports of the police clinic, Benin City, Edo State, over 10 years. **Results:** A total of 200 female medicolegal autopsies were performed, accounting for 17.4% of all cases. The mean age of cases was 38.20 ± 17.39. Age group of 30–39 years accounted for 14.3% (*n* = 90) of cases, closely followed by the age group of 20–29 years, which accounted for 16.2% (*n* = 80) of cases. Accidental deaths accounted for 37% (*n* = 74) of cases. RTA was the most common cause of accidental deaths (*n* = 55; 84.4%). The most common pattern of RTA was a vehicle knocking down a pedestrian as seen in 36 cases (40.4%). The most common age group involved in RTA was 20–29 years (*n* = 17; 18.8%). For homicides, shotguns were mainly used (*n* = 25; 31.3%), distantly followed by those caused by the use of sharp objects (*n* = 14; 17.4%) and most cases belonged to the age groups of 40–49 years and 30–39 years (21.2% and 16.2%, respectively). In 4 (66.8%) cases, hanging was the method of choice for suicide. A majority of suicide victims (*n* = 2; 45%) were aged between 30 and 39 years, with an average age of 36.3. Diseases of the cardiovascular system accounted for 13.1% (*n* = 10) of cases, whereas pregnancy-associated deaths (excluding criminal abortions) accounted for 10% (*n* = 8) of cases in the natural causes group. **Conclusion:** There is a need to provide basic infrastructure, formulate policies, and implement them, to reduce female MLD, which a significant number of them are preventable.

Keywords: Autopsy, Cause of death, Homicide, Suicide, Unnatural deaths, females, manner of death, medicolegal deaths.

Introduction

Death on account of any trauma to the body, any unforeseen incidence, poison, or via any other violent act, is called unnatural death. The status of peace and harmony of a region is represented by the unnatural deaths. Higher it is, poor is the law and order situation, firearms are major contributors to violence. According to World Health Organization globally two third of total homicides and one fifth of suicides are committed by firearms[1,2]. Firearms are associated with 42% of global homicides[3]. Violence is a strong prevent- able precursor of death prior to its destined time. A lot of effort is needed to be been done on part of public health and security policy makers to render violence for ensuring stability and peace in a region. It is pivotal to identify firearms and other determinants as major elements in execution of violence to cater to the situation. Substantial data by researchers, support forming policies and strategies in attaining the target to control it[4]. Conveniently accessible ammunition, its smuggling into the country, compromised and ineffective legal framework and security system all sum up to contribute to high prevalence of firearm violence in a society. Strict check should be kept on global procurement of weapons. To execute a crime firearm are the weapon of choice as enough chance is available by offender to escape from the crime scene[5].

Globally firearm homicides per 100,000 population in USA is 3.2, Canada has 0.51, Australia has 0.14, and UK has 0.07, On the contrary, Japan is a land with zero tolerance for firearm violence. It has lowest gun homicide in the world with one tenth in million.

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Almost no one possesses a gun or a sword with a few exceptions[6]. Under Japan's astringent firearm laws, only short gun and air gun for research or competition purposes are per- mitted. Prior to issue of gun license a battery of written, mental, drug test and background scrutiny is conducted. Beside annual inspection and reporting storage of weapon and ammunition is mandatory[7]. Half of all global unrelated deaths in 2016 occurred in six nations Brazil, USA, Mexico, Venezuela, Colombia and Guatemala. Pakistan rank's 17th position for total fire-arm death with 1.5% per 100000 death in 20161. Despite the execution of capital punishment for homicide in our country, it's not been able to control. It is the youth which is mostly involved in criminal activities, as they are more volatile and emotionally charged with sentiments and rage compared to aged ones.

In developed countries psychiatric and psychological conditions adds to high mortality due to use of firearm suicidal deaths[8]. Generally, weapons are associated with killing on mass level, ban on semiautomatic and automatic assault weapons, comprehensive and stiffening licensing and ownership laws supports in lessening mass shooting mortalities. USA also leads the world when it comes to mass murder. As witnessed in Australia with no firearm associated mass shoo- ting reported since 19967.

Various parameters like demographic, economical, psychiatric, emotional and religion are involved in firearm deaths. Accessing these parameters and extend of firearm violence is vital to understand the nature and reason behind such deaths and for to design policies and take adequate measures to elevate the situation. Though a fall in prevalence of firearm mortalities is observed since 1990 in certain regions of the world but still situation varies in other regions[9]. Such deaths have increased due to steep rise in the crime rate that in turn is due to unrest in society, terrorism, inflation, illiteracy, social and geo-political instability, social inequalities and unjust procurement of money in a community. Mental issues, disturbed interpersonal

relations, enmities, hostility and honor killing are some of important determinants firearm mortalities[2].

Autopsy is vital to find out the cause, manner and other associated information behind an unnatural death, it assist to reach guilty and in prevalence of justices through its data[10]. This study based upon autopsy data would help to improve the situation offered in this area because the available data on firearm death is scanty. It will help in identifying the target population and devising policies. The primary objective of this study was a comprehensive assessment of patterns of firearm mortality by medico legal and demographical aspects.

Materials and Methods

This is a Cross-sectional study conducted in the Department of Forensic Medicine and Toxicology of Tertiary care teaching hospital over a period of 1 year on all the cases of female deaths brought for autopsy. It was carried out after obtaining approval of concerned institutional ethics committee. The post-mortem examination reports and police records as well as treatment record of the cases, if available, were examined. The findings were recorded and statistically analyzed as regards to the yearly distribution of deaths, age distribution of female autopsy cases depending on the nature of death, pattern of death for both natural and unnatural deaths.

Results

A total of 200 female MLAs were done during the period under review, accounting for 17.4% of all cases. The youngest body autopsied was 5 days old and the oldest 125 years with a mean age of 38.20 ± 17.39. [Table 1] shows the distribution of cases based on the manner of death in relation to the age groups. Age group of 30–39 years accounted for most, while accidental deaths were the most common manner of death. [Table 2] shows the type of accidental deaths, whereas [Table 3] shows the distribution of the age groups in relation to the type of RTA. [Table 4] shows the weapons used to cause homicide injuries in relation to the age group of cases. [Table 5] shows the pattern of suicide. Only a 25-year-old female dropped a suicide note. [Table 6] shows the distribution of natural medicolegal female cases.

Table 1: Manner of death in relation to the age groups

	Manner of death					
Age Group	**Accident**	**Homicide**	**Suicide**	**Natural**	**Undeter-mined**	**Total (%)**
0-9	9	5	-	2	-	16
10-19	7	4	-	2	1	14
20-29	6	7	1	11	1	26
30-39	12	13	2	18	-	45
40-49	13	14	-	11	-	38
50-59	10	10	-	8	-	28
60-69	6	2	-	2	1	11
70-79	8	2	1	2	1	14
80-89	2	1	-	3	-	6
≥90	1	1	-	-	-	2
Total	74 (37)	59 (29.5)	4 (2)	59 (29.5)	4 (2)	200 (100)

Table 2: Types of accidental deaths

Type of accident	Frequency (%)
RTA	55 (84.4)
Drowning	4 (6.2)
Burns	2 (3.2)
Others	4 (6.2)

Others include a single case of the following: foreign-body aspiration, electrocution, industrial accident, fall from a tree, excess alcohol ingestion and collapsed wall. RTA – Road traffic accident.

Table 3: Relationship of road traffic accident types to the age groups

	RTA type						
Age Groups (Years)	Car Vs Car	Motor Bike Vs Car	Car Vs Pedestrian / Hawkers	Motor bike vs Pedestri-an	Lone car acci-dent	Others	Total (%)
0-9	2	-	5	-	-	-	7 (7.8)
10-19	1	-	6	-	-	-	7 (7.8)
20-29	5	3	7	-	2	-	17 (18.8)
30-39	4	4	1	-	4	-	13 (14.3)
40-49	7	2	3	-	1	1	14 (15.5)
50-59	3	1	4	1	2	1	12 (13.4)
60-69	3	-	3	-	1	1	8 (8.9)
70-79	-	-	6	1	1	-	8 (8.9)
80-89	-	-	2	-	-	-	2 (2.3)
≥90	-	-	-	1	1	-	2 (2.3)
Total (%)	25 (27.9)	10 (11.3)	36 (40.4)	3 (3.5)	12 (13.4)	3 (3.5)	90 (100)

Others include: 2 cases of car versus bicycle and a case of car versus tricycle. RTA – Road traffic accident.

Table 4: Major instruments/weapons used in committing homicides

	Instruments	Age Group					Total (%)				
	0-9	**10-19**	**20-29**	**30-39**	**40-47**	**50-59**	**60-69**	**70-79**	**80-89**	**≥90**	
Shot gun	1	2	3	3	6	6	2	1	1	-	25(31.3)

Sharp object	1	1	1	2	2	2	3	2	-	-	14 (17.4)
Blunt object	-	-	2	2	3	1	2	-	-	-	10(13.3)
Stabbing	-	1	2	3	1	-	-	-	-	-	7(8.2)
Rifle gun	-	1	-	1	2	1	2	-	-	-	7(8.2)
Acid bath	-	1	3	1	-	-	-	-	-	-	5(6.1)
Strangulation	-	1	-	1	1	-	1	-	-	1	5 (5.3)
Burning	2	-	1	-	-	-	-	-	-	-	3 (3.1)
Others	1	-	1	-	2	-	-	-	-	-	4(7.1)
Total (%)	5 (6.3)	7 (8.8)	13 (16.2)	13 (16.2)	17 (21.2)	10 (12.5)	10 (12.5)	3 (3.7)	1 (1.3)	1 (1.3)	80 (100)

Others include: 2 cases of criminal abortion and 2 cases of poisoning. It also includes a case each of a combination of sharp and blunt objects injury, suffocation and pushing off from a moving vehicle.

Table 5: Age group in relation to the suicide method used

Suicide method	Age groups (years)			Total (%)
	20-29	30-39	70-79	
Hanging	1	2	1	4 (66.8)
Substance ingestion	1	-	-	1 (16.6)
Both methods combined	-	1	-	1 (16.6)
Total	2	3	1	6 (100)

Table 6: Pattern of natural deaths

System involved	Frequency (%)
Cardiovascular	11 (13.1)
Myocardial infarction	9 (11.1)
Hypertensive heart disease	7 (8.8)
Cerebrovascular accident	3 (3.7)
Congestive cardiac failure	3 (3.7)
Others	2 (2.6)
Pregnancy related	8 (10)
Respiratory	7 (8.8)
Pneumonia	4 (5.1)
Tuberculosis	2 (2.6)
Others	4 (5.1)
Neoplasia	4 (5.1)
Myeloproliferative	2 (2.6)
Ovary	2 (2.6)
Breast	4(5.1)
Gastrointestinal tract	3 (3.7)
Others	5 (6.3)
Total	80 (100)

Five cases of others include, malaria (1), gangrenous foot with septicemia (1) and a case each of the following: retroviral disease, meningitis, chronic renal failure with severe anemia. COPD – Chronic obstructive pulmonary disease.

Discussion

Accurate and comprehensive research into the pattern of MLD in an area plays a vital role in assisting policymakers and concerned authorities in formulating policies, its introduction and evaluation that helps to reduce such unwanted waste of life.[4] Most female deaths in the index study were seen in the fourth decade, with almost 50% occurring between 20 and 49 years. This is different from findings in India where the third decade accounted for most female deaths.[5],[6],[9],[10],[11] This is the active age group and our females these days are actively involved in economic empowerment pursuit. This is similar to finding in Warri, Nigeria.[3] In India, the younger age group was mainly due to dowry related issues, especially in very young brides. Furthermore, in India, the young females were prone to maladjustment and ill-treatment by in-laws, which also lead to their deaths.[5],[6],[9],[10],[11].

Accidental deaths (with RTA accounting for 84.4%), was the most predominant MLD in this series. RTA in Sub-Saharan countries is the 13th leading cause of death in females, compared with the 18th globally. Deaths due to RTA in females in Western sub-Saharan Africa (where Nigeria is located) is more than twice the global average and almost five times the rate in Western Europe.[12] According to the World Health Organization (WHO), RTA led to 1.24 million deaths in 2010, with half of these deaths seen mostly among pedestrians, cyclist, and motorcyclist.[13] Africa is said to have the highest road traffic fatality rate, with the age group of 15–44 years old accounting for about 50% of all RTA deaths.[12],[13] Globally speed, drink–driving and nonuse of helmets, seat-belts, and child restraints are the major risk factors for RTA.[12] In addition to these internationally identified factors, poor road network, riddled with potholes, is a major contributory factor in our environment.

Hemorrhagic shock was the most common cause of RTA deaths identified. In all studies except that by Mandar and Ananda in South Bangalore, India, (that reported suicides as the most common), accidents accounted for most in the range of 35%–67.3%.[3],[4],[5],[6],[7],[8],[9],[10],[11] Accidental deaths are predominant due to the involvement of females like their male counterparts in many outdoor activities such as pursuit for education, employment, and other activities that could lead to a better standard of living.[8],[9] In 35.9% of RTA cases in the index study, pedestrians were knocked down by vehicles and an additional 2.7% knocked down by motorbikes. This was seen in all age groups. These pedestrians were mainly hawkers on the road, petty traders in small makeshift stalls that are very close to the road and people that were trekking. Pedestrians are the most neglected in transport and planning

policy, among all road users.[13] The index rate of 40.8% is similar to the finding of a 40% pedestrian involvement in a more comprehensive Sub-Saharan study, which identified pedestrian deaths in Western Sub-Saharan Africa to be eight times the rate in Western Europe.[12] This rate is higher than the global average rate of 30%. To reduce such accidental deaths, hawking on the traffic should be prohibited, proper markets built and the roads should be repaired with proper sidewalk areas and proper markings indicating zebra crossing and other caution signs. In crowded areas with busy traffic, footbridges should be provided. Furthermore, driving licenses should be issued to only those that have been properly certified to drive.

Homicidal deaths ranked second, accounted for 25.6% of cases, and involved all age groups. This is different from all Indian studies were homicides ranked a distant third (ranging from 2.1% to 9%) after accidents and suicides.[5],[6],[8],[9],[10],[11] In Sri Lanka, though it ranked; third, it accounted for 21% of cases. In Warri, Nigeria, homicides ranked second, with a rate of 40.9% and not all age groups were victims as observed in the index study. The homicide victims in this study were mostly between the age group of 20–49 years, just like the predominant age groups involved in accidental deaths. We observed that >69 years old, death by murder in our females drastically reduced, just as was observed in Warri, Nigeria, and in South Africa.[3],[15] This contrasts the UNODC finding which stated that female victims are more evenly distributed across all age groups.[14]

All sorts of agents/mechanisms were used to commit homicide in our setting (including pouring of acid and pushing off from a moving vehicle). Firearm injury was the most common cause of homicidal death in this series, just as was also observed in Warri; Nigeria, and South Africa.[3],[15] In Sri Lanka and in all studies from India except one, there was no homicide due to firearm injury.[4],[5],[6],[8],[9],[10],[11] The common sites of firearm and stabbing deaths were chest, followed by the abdomen, while blunt object injuries were mainly to the head. Genital injuries were not seen. These are similar to observations in South Africa.[15] In general, countries where gun access is restricted are known to have lower levels of gun violence.[16] In Nigeria, despite a policy against gun access, there are still guns in the hands of unlicensed individuals; hence, there is a need to introduce and use alternative strategies than just policy.

Of late, in Nigeria, there is proliferation and the use of light weapons, which has been attributed to purchase of guns by politicians for their thugs to be used in intimidating opponents during elections.[17] Usually, after elections, these guns are not retrieved from these thugs. Other identified reasons for light arm proliferation are increasing youth restiveness in Oil-rich Niger Delta zones of the country and the activities of armed herdsmen and increasing banditry in Northern zones of the country.[18] In Nigeria, it is only unformed agencies that are allowed to use rifle guns, but seeing some cases in the index study shot with such rifle guns calls for concern. There should be serious mop-up exercise to retrieve these guns from these unlicensed users. There should be strict control at all entry points into the country to prevent illegal gun movement into Nigeria.

Although suicides are preventable, every 40 s a person dies by suicide somewhere in the world and many more attempt suicide.[19] Suicides occur in all regions of the world and throughout the lifespan. For every suicidal death, there are many suicidal attempts that did not result in death. A total of 6832 suicides were recorded in Nigeria in 2012, with 1584 of them been females.[19]

Only 5 (1.9%) cases of suicide were seen, which is markedly small compared to 32% in Sri Lanka and a range of 24.8%–88.2% observed in various Indian studies [4],[5],[6],[8],[9],[10],[11].

Although the rate is low in the index study, this may not be a true reflection of the suicidal deaths presently in the society as is common to hear on the electronic media of loss of lives through suspected suicides at regular intervals. Females are believed to use less violent and less harmful methods during suicides like poisonous substance ingestion and drowning, while men usually employ hanging and the use of firearm.[20] Common methods used by Nigerian females are hanging, poisonous substance ingestion, or a combination of both[3,21].

Suicide notes are rarely written; hence, the reasons for suicide are not known except for the different postulations of family members, relatives, or neighbors. In Sri Lanka and India, identified reasons for suicide in females include; family reasons, love affairs, and dowry-related issues.[4],[10],[11] In addition to hanging and poisonous substance ingestion, a popular method in some parts of India is setting oneself ablaze (burning).[10],[11] The high rate of suicidal burning in India has been queried, with a belief that a good number of them were homicidal dowry burning that were made (rearranged) to look like suicides or accidents to avoid the weight of the law ("so-called mysterious stoves or stove burst theory" in India").[22] To attempt to prevent suicide, the WHO has advised countries to employ a multi sectoral approach that comprehensively addresses suicide, bringing together the different sectors and stakeholders most relevant to each context.[21],[22] Mental health evaluation should be made popular in Nigeria and all suicidal attempts should be taken serious.

Heart- and pregnancy-related pathologies accounted for >68% of MLD due to natural causes in this study. In the past, it was thought that myocardial infarction (MI) was rare in Nigeria and other Sub-Saharan African countries.[23],[24],[25] Recently, MLA-based studies have shown that MI is responsible for a significant number of sudden deaths in Nigerians.[21],[26] Fifty percent of the cardiovascular system-related deaths in females was due to MI, whereas 21% was due to hypertensive heart disease. Health education on routine health checks will help to slow the tide.

Universally pregnancy and childbirth are celebrated, though, for many women, it may lead to their untimely death.[27] According to the WHO, maternal mortality is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.[28] Nigeria, including five other developing countries (Democratic Republic of Congo, Ethiopia, Pakistan, India, and Afghanistan) accounts for more than 50% of the global maternal deaths.[29] The maternal mortality rate in Nigeria is estimated to be about 704 deaths/100,000 live births, with a range of about 165 deaths/100,000 live births in the southwest region to 1549 deaths/100,000 live births in the northeastern sub-regions of the country.[30] Postmortem examination has been shown to be an invaluable tool in accurately determining the cause of maternal death and also aids in its prevention.[31],[32]

Preeclampsia/eclampsia (31%), postpartum hemorrhage (due to uterine rupture, uterine atony, and cervical laceration) (27.6%), and sepsis (13.8%) in this order caused most deaths in this series. These three were the most common causes of maternal death in all Nigerian studies.[32],[33],[34],[35],[36] Similar maternal autopsy studies from other developing countries such as Mozambique and India also reported hemorrhage, sepsis, and preeclampsia as common causes, though the rate of preeclampsia was a distant third.[27],[37],[38] These kinds of deaths will reduce when functional primary health centers with good referral systems are established. In addition, periodic health education about these causes of maternal death and preventive methods should be given to adults (males and females) in various places such as market, churches, and mosques.

The major limitations of this study are the lack of historical/precipitating factor (underlying reasons) for suicides and homicides, lack of knowledge of the marital status of these females, and the relationship of the perpetrator to the victim in homicide. Also not documented was the parity and facilities where the women went to deliver.

Conclusion

A second MLA in females in Nigeria has been documented and this will serve as a raw material for a future more comprehensive meta-analysis of female MLA in Nigeria.

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