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**ORIGINAL ARTICLE**

# Post-mortem Frequency of Unintentional Injury-related Deaths at a Tertiary Care Hospital

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## ABSTRACT

**Background:** Post-mortem investigations are important in determining the cause of death, particularly in cases of unintentional injuries. Despite the global public health concern posed by unintentional injuries, there is a scarcity of data on such deaths in the Hyderabad region of Sindh province, Pakistan.

**Objective:** To investigate the frequency and causes of unintentional injury-related deaths through forensic autopsies conducted in a tertiary care hospital.

**Study design:** Observational and prospective study

**Place and duration of study:** Medico-legal Section, Liaquat University Hospital, Hyderabad from 1st January 2021 to 31st December 2022.

**Methodology:** One hundred and seventy seven road traffic accidents and drowning emerging as prevalent causes of unintentional injury-related deaths were enrolled. Prior consent was diligently sought from the deceased individual's close relatives to ensure ethical considerations were met throughout the study.

**Results:** Road traffic accidents accounted for over 50% of the total autopsies each year, followed by drowning at more than 25%. Together, road traffic accidents and drowning contributed to approximately 80% of unintentional injury-related deaths annually.

**Conclusion:** The high prevalence of road traffic accidents and drowning underscores the need for comprehensive policies and strategies by government, public health planners, and law enforcement agencies. Addressing factors such as inadequate access to secure environments and insufficient awareness regarding drowning prevention can help reduce drowning-related deaths. Similarly, strict enforcement of traffic rules and infrastructure improvements can mitigate the incidence of road traffic accidents and related fatalities.

**Keywords:** Unintentional injuries, Road traffic accidents, Drowning.

## INTRODUCTION

Examining the body of a deceased individual through a post-mortem investigation is essential for determining the cause of death. An autopsy is a scientific procedure used to inspect the organs, cavities, and external features of the body to establish the reason behind the death.[1] A clinical autopsy involves a thorough examination of all three body cavities of a deceased individual by a physician, supported by relevant clinical information such as medical history, cause of death, and clinical details. This examination may include microscopic studies, potentially necessitating the extraction of varying numbers of tissue samples, depending on the severity of the disease.[2] In recent decades, autopsies have increasingly been utilized for quality assurance purposes in diagnosing and treating patients, which includes assessing the accuracy of previous pathology examinations.[3]

On the other hand, a forensic autopsy, sometimes referred to as a medicolegal autopsy, is a post-mortem investigation carried out to achieve medicolegal goals. The relevant legal authority in charge of looking into fatalities that are sudden, unexpected, suspicious, strange, un-witnessed, obscure, unexplained, or the subject of litigation issues guidelines that govern the procedure of doing a forensic autopsy. These comprise deaths resulting from criminal activity, fatalities occurring in the workplace, and deaths resulting from surgical or medical procedures in which accusations of medical malpractice or anesthesia-related deaths are made.[4] Essentially, any death labeled as suspicious, unexpected, or unnatural (such as a homicide, suicide, or accident) necessitates a legal inquiry that includes an autopsy as part of the evidence gathering procedure. Information gathered from both kinds of autopsies is essential for healthcare planning at a wider healthcare level.[5]

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A variety of injuries that happen without any indication of deliberate intent are included in the category of unintentional injuries. These include burns, breathing hazards, falls, mechanical and natural forces, transportation-related mishaps, and other unintended causes. These injuries are a major contributor to death and disability, which raises serious concerns about global public health, especially for low- and middle-income nations. They significantly affect life expectancy as well as quality of life, which places a heavy financial strain on people and society.[6] Remarkably, among children and young people, accidental accidents constitute the primary cause of death.[7]

While it is widely recognized that unintentional injuries disproportionately affect low- and middle-income countries[6], there is limited data on unintentional injury-related deaths in the Hyderabad region of Sindh province, Pakistan. Therefore, this study was undertaken to investigate the frequency of post-mortems conducted on deaths related to unintentional injuries at a tertiary teaching hospital in Hyderabad over a two-year period.

## MATERIALS AND METHODS

A two-year observational and prospective study was conducted January 2021 to December 2022 and forensic autopsy reports from the Medico-legal section of Liaquat University Hospital in Hyderabad were collected. These reports were further categorized into various categories including accidents, falls, vehicle-related incidents, traffic accident, workplace accidents, burns, and drowning. Autopsies that did not belong to medicolegal matters and those which involved reasons of death unrelated to unintentional injuries were purposefully excluded from the study to maintain the research's specificity. To systematically collect pertinent data, a structured form was meticulously designed to capture detailed information, particularly concerning the cause of death. Prior consent was diligently sought from the deceased individual's close relatives to ensure ethical considerations were

met throughout the study. Subsequently, analysis was conducted for descriptive statistical assessments using IBM SPSS Statistics for Windows, version 24. This statistical analysis aimed to provide a frequency distribution under various causes of unintentional injuries-related deaths, and their percentage distributions contributing to different unintentional injuries-related deaths that were identified in autopsy examinations.

## RESULTS

The causes of death were broadly classified into categories such as road traffic accidents (RTA), train accidents, drowning, and burns.

Table 1: Month wise frequency of accidental unintentional injury-related autopsies in the years 2021 and 2022

| Month | 2021 | | | 2022 | | |
|---|---|---|---|---|---|---|
| | RTA | Train accident | Total | RTA | Train accident | Total |
| January | 3 | - | 3 | 4 | - | 4 |
| February | 6 | - | 7 | 4 | - | 4 |
| March | 6 | 1 | 7 | 5 | - | 5 |
| April | 5 | - | 5 | 4 | - | 4 |
| May | 2 | -- | 2 | 6 | - | 6 |
| June | 1 | 2 | 3 | 2 | - | 2 |
| July | 2 | 2 | 4 | 4 | 1 | 5 |
| August | 4 | 2 | 6 | 2 | 1 | 3 |
| September | 11 | - | 11 | 1 | 1 | 2 |
| October | 6 | 1 | 7 | 6 | 1 | 7 |
| November | 3 | - | 3 | 3 | 2 | 5 |
| December | 2 | 1 | 3 | 4 | - | 4 |
| Total | 51 | 9 | 61 | 45 | 6 | 51 |

Table 2: Month-wise frequency of drowning and burn caused unintentional injury-related autopsies in the years 2021 and 2022

| Month | 2021 | | | 2022 | | |
|---|---|---|---|---|---|---|
| | Drowning | Burn | Total | Drowning | Burn | Total |
| January | - | - | - | 1 | - | 1 |
| February | - | 1 | 1 | 1 | 1 | 2 |
| March | 6 | - | 6 | - | - | - |
| April | 2 | - | 2 | 1 | - | 1 |
| May | 2 | - | 2 | 2 | - | 2 |
| June | 5 | - | 5 | 3 | - | 3 |
| July | 5 | 2 | 7 | 2 | - | 2 |
| August | 3 | - | 3 | 3 | - | 3 |
| September | 2 | 1 | 3 | 6 | 2 | 8 |
| October | 1 | - | 1 | - | - | - |
| November | 3 | - | 3 | 2 | 1 | 3 |
| December | - | - | - | 1 | - | 1 |
| Total | 29 | 4 | 33 | 22 | 4 | 26 |

Notably, the analysis revealed that RTAs and drowning were prevalent causes of unintentional injury-related deaths. Specifically, RTA-related autopsies were conducted consistently throughout both study years (Table 1), with no month passing without an RTA-related autopsy case. Similarly, drowning emerged as a frequently identified cause of unintentional injury-related deaths (Table 2). Figure 1 illustrates that RTAs were the primary cause of unintentional injury-related deaths, accounting for over 50% of the total autopsies both years. Drowning followed closely as the second most common cause, comprising more than 25% of the deaths in years 2021 and 2022. Collectively, RTAs and drowning contributed to approximately 80% of the frequency of unintentional injury-related deaths each year.

Fig. 1: Percentage of different causes contributing to unintentional injury-related deaths

## DISCUSSION

The present study determined the frequency of post-mortems conducted on deaths related to unintentional injuries at a tertiary teaching hospital in Hyderabad over a two-year period. This study provides valuable insights into the patterns and prevalence of unintentional injury-related deaths, highlighting the significant impact of RTAs and drownings as leading causes of mortality in relation to unintentional injuries. Globally, road traffic accidents have become a significant public health concern, being a leading factor for both morbidity and mortality. Each year, approximately 1.3 million deaths and 50 million injuries result from RTAs worldwide.[8]RTAs are defined as collisions involving at least one moving vehicle on a public or private road that result in injuries or fatalities. The economic impact of RTAs is substantial, affecting individuals, families, and nations. These accidents have a notable effect on disability adjusted life years and cause economic costs directly and indirectly. The costs include expenses for treatment, loss of productivity for those injured or disabled, and the need for family members to take time off work or school to care for the injured party. In most countries, road traffic crashes account for three percent of their gross domestic product[9], with some studies reporting losses of around 1.52 percent of the country's gross national product due to RTAs.[10] The majority of RTA-related deaths occur in middle- and low-income countries, with nine out of ten reported fatalities originating from these regions. The

Southeast Asia region has experienced a significant increase in morbidity and mortality due to transportation issues, resulting in approximately 18.5 deaths per 100,000 individuals annually, with one-third of these deaths attributed to motorized two-wheelers. Even in high-income countries, individuals from lower socioeconomic backgrounds are more prone to being involved in road traffic accidents.[11]

A report from United States outlined the patterns in mortality rates related to unintentional injuries and focused on the top three causes of unintentional injury-related deaths - motor vehicle accidents, drug overdoses, and falls; the data from the years 1999 to 2017.Between 1999 and 2017, the age-adjusted death rate for unintentional injuries surged by 40%, climbing from 35.3 deaths per 100,000 standard population to 49.4 deaths per 100,000. Moreover, motor vehicle traffic fatality rates experienced a rise across all urbanization levels from 2014 to 2017, with the most substantial increase observed in small metropolitan areas.[12]

The two-year average yearly number and rate of unintentional injury mortality among children and youth in the United States between 2010 and 2019 were examined in detail in a report. The analysis took into account variables like age, sex, race/ethnicity, injury mechanism, county urbanization level, and state. Various age groups showed differences in the rates and primary causes of fatalities from unintentional injuries. Suffocation was the greatest cause of unintentional injury deaths for infants under one year old (27.2 per 100,000 population), whereas drowning was the major cause for children between one and four years old (1-4 years). For children between the ages of five and nine, motor vehicle traffic accidents have been found to be the primary cause of unintentional injury mortality.[13]

A retrospective cross-sectional survey from Peshawar, Pakistan, reported 503 injuries among participants. The road traffic injuries were found to be the most prevalent cause (39%), followed by burns (18%) and falls (n=79, 16%). Contrary to the present study, drowning contributed least to unintentional injuries (7.1%). This might be because of the selected age population in reported study.[14] A plenty of research from Pakistan has reported a considerable link between fatality and RTAs.[15-17] Various factors can influence RTAs, including poor infrastructure, vehicle conditions, distracted drivers, speeding, harsh environmental conditions, and noncompliance with road safety rules.[18,19]

The WHO has classified drowning as a serious public health emergency, which is the process of suffering from respiratory impairment as a result of immersion or submersion in liquid. There are three possible outcomes from drowning: no illness, morbidity, or death. About 300,000 drowning deaths are reported worldwide each year, making it the leading cause of unintentional injury-related deaths worldwide. Males, children, and people from low- and middle-income nations are disproportionately impacted by this problem.[20] The seriousness of the risk to public health is indicated by a large number of research on drowning-related deaths and autopsies of drowning-related deaths from Pakistan.[21]

An analysis of trends in fatal unintentional drowning rates in the United States from 1999 to 2020 concluded the need of improving policies for continuous lessening in rates of the fatal unintentional drowning rates.[22] Accurate and timely data play a crucial role in guiding the allocation of public health resources and monitoring interventions for the ongoing implementation of drowning prevention programs.[20]

The significant prevalence of RTAs and drowning in the autopsies conducted during this study underscores the necessity for the government, public health planners, and law enforcement agencies to formulate comprehensive policies and strategies. The frequency of drowning incidents may indicate inadequate access to secure environments, insufficient awareness regarding drowning prevention, and a lack of accessible rescue and healthcare services. These factors can be improved to decrease drowning-related deaths. Similarly, strict enforcement of traffic rules, infrastructure improvements, and standardizing the vehicle safety can help reduce RTAs and RTAs-related fatalities.

## CONCLUSION

Road traffic accidents and drowning were the most common causes of unintentional injury-related deaths found in autopsy reports conducted for two years at tertiary care hospital. RTAs were responsible for more than half of all autopsies performed each year, with drowning contributing for over a quarter. Combined together, RTAs and drowning made up around 80% of unintentional injury-related deaths on an annual basis. The significant prevalence of RTAs and drowning in the autopsies that were observed in this study highlight the necessity for comprehensive policies and strategies to address these issues. The high frequency of drowning incidents suggests potential shortcomings in access to secure environments, drowning prevention awareness, and availability of rescue services. To mitigated drowning-related deaths, improvements in access to secure environments, raising awareness about drowning prevention measures, and improving the availability of rescue and healthcare services. Similarly, the substantial occurrence of RTAs underlined the critical need for strict enforcement of traffic rules, infrastructure improvements, and standardized vehicle safety measures. These policies and change actions can contribute to reducing the incidence of RTAs and associated fatalities.

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