

Profile of Autopsy Cases at Government Medical College Kanpur: A Retrospective Study

Soni Verma

Associate Professor, Department of Forensic Medicine and Toxicology, GSVM Medical College Kanpur.

How to cite this article: Soni Verma. Profile of Autopsy Cases at Government Medical College Kanpur: A Retrospective Study. Medico Legal Update / Volume 24 No 1, January-March 2024.

Abstract

Background: The profiling of medico-legal cases is imperative in order to avert preventable casualties in the future and to analyze the authentic crime rate within a specific region. Presently, road traffic accidents are the primary cause of casualties, resulting in numerous fatalities. **Objective:** The objective is to establish a comprehensive profile of deaths caused by either natural or unnatural factors, thereby enabling us to channel rigorous efforts towards mitigating their occurrence.

Materials and Methods: A retrospective analysis was conducted on the mortality cases subjected to medico-legal postmortem examination at the Mortuary, Government Medical College, Kanpur, U.P., India, during the year 2022. Throughout this duration, a total of 2326 autopsy cases were conducted.

Results: October had the highest number of autopsy cases. Males accounted for 63.23% of cases, with most falling in the 21-30 age group. Injury-related deaths were the largest proportion (47.36%), followed by natural deaths (19.93%), violent asphyxial deaths (10.48%), thermal injuries (9.89%), and poisoning (9.04%).

Conclusion: The analysis reveals that road traffic accidents are the most common cause of death, potentially due to the increased frequency of transportation. Specifically, vehicular accidents resulting in head injuries were the leading cause of death.

Key Words: Autopsy, Unnatural Deaths, Injury, Burns, Violent Asphyxial Death, Poisoning

Introduction

The profiling of medico-legal cases emerges as a crucial undertaking in the realms of forensic science and public health, extending beyond documenting past incidents to actively preventing future casualties. Its significance lies in providing a comprehensive understanding of morbidity and mortality dynamics, benefiting stakeholders such as policymakers, healthcare professionals, law enforcement, and researchers¹.

Road traffic accidents (RTAs) represent a

harrowing issue, causing preventable casualties with far-reaching consequences—loss of life, physical injuries, emotional trauma, and economic burdens. Understanding the contributing factors to RTAs becomes imperative for effective interventions, making comprehensive profiling an essential tool for crafting strategies to mitigate these incidents. The primary objective of this research is to establish a comprehensive profile of deaths from natural and unnatural causes. This holistic approach aims to channel collective efforts toward curtailing tragic events, delving into the intricacies of human existence and societal dynamics beyond statistical data².

Corresponding Author: Soni Verma, Associate Professor, Department of Forensic Medicine and Toxicology, GSVM Medical College Kanpur.

E-mail: sverma16@gmail.com

Submission date: Nov 29, 2023

Revision date: Dec 14, 2023

Published date: Feb 14, 2024

India, particularly the city of Kanpur, grapples with challenges stemming from rapid industrialization and urbanization. Challenges include unemployment, income disparities, substance abuse, traffic density, inadequate infrastructure, and various morbidities, leading to a notable increase in medicolegal cases. The study's significance lies in its intersection of health, justice, and social issues, offering insights into the etiology and nature of underlying causes. The research in Kanpur seeks to unravel the intricate tapestry of medicolegal cases, understanding the stories behind each case, societal contexts, and systemic issues perpetuating them. It goes beyond statistical analysis, providing a foundation for evidence-based policymaking to address root causes and tailor interventions³.

The profiling of medicolegal cases transcends disciplines, intersecting with public health, criminal justice, and social welfare. Its value lies in its potential to save lives, alleviate suffering, and improve overall well-being. Through comprehensive research and analysis, it aims to pave the way for a safer, more

equitable, and healthier future for the people of Kanpur and beyond⁴.

Materials and Methods

This retrospective study encompasses all instances of mortalities presented for postmortem examination at the mortuary of Government Medical College, Kanpur, Uttar Pradesh, India, spanning from the commencement of January 1st, 2022, until the culmination of December 31st, 2022. The primary objective of this investigation pertains to ascertaining the overall count of deceased cases, discerning the gender distribution of the individuals, and comprehending the distribution pattern across different months. The comprehensive analysis of the variables related to the cause of death entails the consideration of age, gender, day and month of incidence, causative agent, and the cause of death determined through autopsy. The meticulous collection and systematic tabulation of data were executed to determine the frequency and proportion of these fatalities, with outcomes subsequently expressed in the form of percentages.

Result

Table 1: Age and gender wise distribution of cases

Age Group	Male	Female	Total	Percentage
0-10	110	124	234	10.060
11-20	164	161	325	13.972
21-30	508	198	706	30.353
31-40	311	194	505	21.711
41-50	186	80	266	11.436
51-60	98	65	163	7.008
61-70	76	23	99	4.256
>71	20	8	28	1.204
Total	1473 (63.33%)	853 (36.67)	2326	100

Table 2: Distribution of cases according to cause of death

	Cause of death	Percentage
1	Injury	47.36
2	Natural	19.93
3	Asphyxia deaths	10.48
4	Burns	9.89
5	Poisoning	9.04
6	Electrocution	2.03
7	Unknown	1.27
	Total	100

Table 3: Distribution of cases according to various types of injury

	Type of mechanical injury	Percentage
1	Head injury	67.38
2	Multiple injury	28.94
3	Spinal cord injury	2.45
4	Stab injury	0.79
5	Cut throat	0.24
6	Firearm injury	0.2
	Total	100

Table 4: Distribution of cases according to natural cause of deaths

	Natural deaths by disease	Percentage
1	Respiratory system	42.34
2	Cardiovascular system	28.86
3	Septicemia(multiorgan failure)	21.10
4	GIT system	4.87
5	Blood system	2.04
6	Cerebral	0.46
7	Nonviable	0.32
8	Stillborn	0.1
	Total	100

Table 5: Distribution of cases according to violent asphyxial deaths

	Violent asphyxial death	Percentage
1	Hanging	50.72
2	Drowning	24.54
3	Strangulation	8.89
4	Choking	15.85
	Total	100

Table 6: Types of unnatural death irrespective of the manner of death

	Unnatural death	Percentage
1	Head injury	41.75
2	Multiple injury	21.86
3	Asphyxial	17.32
4	Burns	8.21
5	Poisoning	6.39
6	Electrocution	2.06
7	Spinal cord injury	1.24
8	Unknown	0.62
9	Stab injury	0.38
10	Cut throat	0.14
11	Firearm injury	0.03
	Total	100

During a span of one year, a comprehensive examination of 2326 deceased individuals was conducted. It was observed that the months of October and September exhibited the highest frequency of cases, while the months of March and February corresponded to the lowest number of occurrences. The study revealed that male individuals accounted for 63.33% of the subjects. The investigation further noted that the highest proportion (30.35%) of autopsy

cases, spanning both genders, fell within the age range of 21-30 years. This was followed by the age group of 31-40 years, while the lowest proportion of cases (1.2%) was observed in individuals aged over 70 years.

Table 2 presents the data indicating that the largest number of cases recorded pertained to deaths caused by mechanical injuries, specifically those resulting from road traffic accidents (RTA). This was followed by deaths from natural causes, violent asphyxiation, burns, and poisoning incidents. In the specific month of October, there were a total of 91 cases attributed to deaths caused by mechanical injuries, with natural deaths, violent asphyxiation, and burn-related deaths following closely behind. The highest number of cases in the mechanical injury category can be attributed to blunt trauma resulting from road traffic accidents. Furthermore, it is worth noting that a small percentage of cases, 1.27% to be precise, are currently under investigation, and the exact cause of death for these cases is yet to be determined.

Table 3 displays the various types of mechanical injury that were discovered and analyzed in this particular study. Among the assortment of injuries, it was observed that head injury and multiple bodily injuries were the most prevalent, with spinal cord injury, stab injury, cut throat injury, and firearm injury following suit. In terms of the nature of death, a natural demise occurred in 19.93% of the cases. Within this subset, it was noted that the maximum number of cases were attributed to respiratory system-related deaths, with cardiovascular causes, septicemia, gastrointestinal tract (GIT) causes, and other factors ranking subsequently. This is further elucidated in **Table 4**.

During the course of the entire year, the autopsies conducted amounted to a total of 2,326 cases, and it was found that a percentage of 10.48% of these cases were attributed to violent asphyxial deaths. Upon examining **Table 5**, it becomes apparent that within the category of violent asphyxial deaths, the highest number of occurrences was reported in cases of hanging, accounting for approximately 50.72% of the total. Following closely behind were incidents of drowning, which constituted approximately 24.54% of the cases. Lastly, there were instances of ligature

strangulation, throttling, and choking, which were documented in **Table 5**.

Discussion

Among the total number of autopsy cases, which amounted to 2326 in total, it was found that the male cases accounted for 1473, constituting approximately 63.33% of the total, while the female cases accounted for 853, making up around 36.67% of the total. This finding aligns with the results obtained from various studies conducted by Radhakrishna *et al.*, Sharma *et al.*, Wasnik, Shrivastava *et al.*, Zine *et al.*, Qasim *et al.*, and Afandi. These researchers all arrived at a similar conclusion, further strengthening the validity of this result. The higher prevalence of male cases can potentially be attributed to the fact that male individuals tend to have greater exposure to the external environment. This can be attributed to the socioeconomic structure of our community, wherein men often serve as the sole breadwinners and have more freedom to venture outdoors, while women typically stay indoors⁵.

The age group that was most commonly involved in all types of cases was found to be individuals between the ages of 21 and 30, encompassing both males and females. This discovery aligns with the findings of various studies conducted by Radhakrishna *et al.*, Wasnik, Zine *et al.*, Qasim *et al.*, and Afandi. In the research conducted by Sharma *et al.*, it was observed that the age group predominantly affected was individuals between the ages of 21 and 25, followed closely by those between the ages of 26 and 30. An interesting observation that can be made is that the majority of victims were young adults, highlighting the vulnerability of this particular age group. This information sheds light on the significance of focusing on this demographic in order to develop effective interventions and preventative measures. Overall, these findings emphasize the need for targeted efforts aimed at protecting and supporting young adults, as they are particularly susceptible to various types of cases. The majority of cases consisted of deaths resulting from injuries, with the highest frequency observed in this category. Subsequently, deaths caused by natural causes ranked second in terms of prevalence. Furthermore, deaths resulting from violent asphyxiation, such as strangulation or

suffocation, were also present among the reported cases. Additionally, deaths caused by burns, either accidental or intentional, were identified as another significant category. Moreover, cases of deaths caused by poisoning, whether accidental or intentional, were also reported. Finally, deaths resulting from electrocution and those with an undetermined cause were among the identified categories of mortality⁶.

Among the instances of fatalities resulting from injuries, it is noteworthy to mention that the primary cause of demise was head injury, accounting for a substantial 67.38% of cases, followed by multiple body injuries at a rate of 28.94%. Additionally, spinal cord injuries contributed to 2.45% of the total, while stab injuries accounted for a relatively lower percentage of 0.79%. Furthermore, the occurrence of cut throat injuries represented a mere 0.24% of cases, with firearm injuries constituting a minute 0.2%. A study conducted by Vij established that head injury cases encompassed a staggering 69.5% of all fatal road traffic accident (RTA) cases. This dominance can be attributed to the head being the primary target of injury in the majority of physical assaults. These findings aligned closely with the results obtained by various other researchers, with the exception of Afandi's study, wherein it was observed that the leading cause of death stemmed from blunt and sharp forces, rather than RTAs. This discrepancy can be attributed to the fact that in Afandi's country, medicolegal autopsies are not required for cases involving RTAs⁷.

In this particular investigation, a notable percentage of the cases, specifically 19.93%, were determined to be the result of natural causes leading to death. Within our comprehensive examination, it was observed that deaths associated with the respiratory system, accounting for a significant proportion of 42.34%, surpassed those linked to the cardiovascular system, which amounted to 28.86%. This finding closely aligned with the research conducted by Shrivastava *et al.* Furthermore, it is crucial to note that Radhakrishna *et al.* study yielded contrasting results, as they identified a higher number of deaths attributable to the cardiovascular system compared to those related to the respiratory system. Interestingly, the two aforementioned causes of death were succeeded by multiorgan failure, accounting for

21.10% of the cases, followed by deaths associated with the gastrointestinal tract system, amounting to 4.87%, and hematological diseases, which constituted 2.04% of the total cases. It is noteworthy to mention that within this study, nonviable and stillborn fetuses were classified as a natural type of death⁸.

Violent asphyxial deaths, which encompassed 10.48% of the total cases, exhibited a distinct composition. Of these occurrences, hanging cases dominated, accounting for 50.72% of the total, while drowning cases comprised 24.54%, strangulation cases accounted for 8.85%, and choking cases made up 15.85%. These observed figures align closely with the findings of previous studies conducted by Wasnik and Shrivastava *et al.*, highlighting a consistency in the prevalence of these types of deaths. Among the unnatural deaths, regardless of the specific manner in which they occurred, a significant majority consisted of injury-related deaths. These cases were primarily attributed to road traffic accidents (RTAs) and rail accidents, wherein a substantial number of fatalities ensued from head injuries and multiple injuries. Following this category, deaths resulting from asphyxial causes represented 10.48% of the total cases, while burns accounted for 9.89%, poisoning for 9.04%, and electrocution for 2.03%, as depicted in **Table 6**. This distribution mirrors the patterns observed in previous studies conducted by Radhakrishna *et al.*, Sharma *et al.*, Wasnik, Shrivastava *et al.*, and Zine *et al.*, thereby supporting the consistency of these findings across various investigations. The reasons underlying this distribution can be attributed to several factors. Firstly, the presence of faster modes of transportation has contributed to an increase in traffic accidents, as individuals are able to travel more frequently and cover longer distances. Consequently, this heightened exposure to vehicular hazards has resulted in a notable rise in injury-related deaths. Moreover, the prevalence of industrial and occupational hazards has further contributed to the occurrence of fatalities related to asphyxial causes, burns, poisoning, and electrocution. The combination of these factors underscores the need for increased awareness and preventive measures in order to mitigate the risks associated with violent asphyxial deaths and other forms of unnatural deaths⁹.

Among 2326 autopsy cases, 6.39% were attributed to poisoning, prompting further investigation.

Notably, 0.62% involved unidentified poisons, posing a challenge for forensic experts. Acid ingestion was the most prevalent, followed by organophosphate (OP) and aluminium phosphide (ALP) poisonings, snake bites, and other factors. This aligns with previous studies, suggesting a consistent pattern. The prevalence is linked to the rural population's reliance on agriculture, increasing agrochemical poisoning incidence. This underscores the need for dedicated attention and intervention in addressing poisoning cases, particularly in agricultural settings, to ensure community well-being¹⁰.

During the analysis of thermal injuries, burns constituted 9.89% of cases, and electrocution accounted for 2.03%, emphasizing the significance of burns in the studied population. In this investigation, burns ranked fourth in frequency of deaths, following injury-related deaths, natural deaths, and violent asphyxial deaths, indicating their substantial role in mortality outcomes. Notably, a study by Zine *et al.* identified burns as the second leading cause of death, consistent with this research. Findings from studies by Wasnik and Qasim *et al.* add credibility and consistency to the recognition of burns as a significant contributor to mortality. The specific investigation period revealed only one firearm-related injury, differing from Qasim *et al.*, study attributing higher numbers to firearms as a choice in homicides. This underscores the impact of weapon selection on injury patterns, urging comprehensive research. Analysis of thermal injuries, specifically burns and electrocution, offers valuable insights into their prevalence and impact on mortality, with consistent findings across studies. Emphasizing the importance of addressing these injuries, preventive measures are crucial. Further research is imperative to understand contributing factors and develop effective strategies for prevention and management in this field¹¹.

Road Traffic Accidents (RTA) are a tragic and preventable cause of high mortality. Advocacy for early education on traffic rules and awareness is crucial, coupled with stringent law enforcement. Natural deaths, often due to coronary insufficiency, rank as the next leading cause. Violent asphyxial deaths and burn cases follow closely. Poisoning, notably organophosphorus (OP) poisoning, is prevalent, exacerbated by the agricultural reliance

of the majority. Prevention strategies include personalized counseling and the introduction of online services for poison treatment. These measures aim to reduce the impact of RTAs and other leading causes, emphasizing education, enforcement, and accessible support services¹².

Conclusion

This research on medicolegal autopsy cases at a government hospital contributes vital insights for policymakers, law custodians, and the community. It emphasizes the need for health awareness on stress management, traffic regulations, and motor vehicle laws to reduce casualties. Recommendations include improving road infrastructure, enforcing safety regulations, establishing emergency services, and trauma care centers. Addressing the population's exponential growth is crucial to mitigate the escalating number of accidents, highlighting the importance of comprehensive measures for community well-being.

Acknowledgement: I acknowledge to Dr. Pravesh Verma and Dr. Navneet Yadav to help in referencing of manuscript.

Conflict of Interest: Authors do not have any conflict of interest.

Source of funding: No funding provided.

Ethical clearance: No ethical required for the work.

References

1. Raveesh BN, Nayak RB and Kumbar SF. Preventing medico-legal issues in clinical practice. *Annals of Indian Academy of Neurology* 2016; 19: S15-s20.
2. Eftekhari A, Dehghani Tafti A, Nasiriani K, et al. Management of Preventable Deaths due to Road Traffic Injuries in Prehospital Phase; a Qualitative Study. *Archives of academic emergency medicine* 2019; 7: 32.
3. Mokhtar M, Azab SMS, Hassan S, et al. Study of handling of medico-legal cases in governmental hospitals in Cairo. *Journal of forensic and legal medicine* 2018; 60: 15-24.
4. Alabdulqader S, Alabdulqader R, Madadin M, et al. Emergency Physicians' Awareness of Medico-Legal Case Management: A Cross-Sectional Study from Saudi Arabia. *Saudi journal of medicine & medical sciences* 2023; 11: 60-66.
5. Saurav C, Aayushi G, Behera C, et al. Medico-legal autopsy of 1355 unclaimed dead bodies brought to a tertiary care hospital in Delhi, India (2006-2012). *The Medico-legal journal* 2014; 82: 112-115.
6. Goli S, Gautam A and Rana MJ. Is unintended birth associated with physical intimate partner violence? Evidence from India. 2020; 52: 907-922.
7. Frankel HL, Coll JR, Charlifue SW, et al. Long-term survival in spinal cord injury: a fifty year investigation. *Spinal cord* 1998; 36: 266-274.
8. Di Maio VJ and Di Maio DJ. Natural death as viewed by the medical examiner: a review of 1000 consecutive autopsies of individuals dying of natural disease. *Journal of forensic sciences* 1991; 36: 17-24.
9. Sharma BR, Harish D, Sharma V, et al. Poisoning in northern India: changing trends, causes and prevention thereof. *Medicine, science, and the law* 2002; 42: 251-257.
10. Patel J, Leach-Kemon K, Curry G, et al. Firearm injury-a preventable public health issue. *The Lancet Public health* 2022; 7: e976-e982.
11. Vijayakrishnan G, Priyadarshini P, Ramraj B, et al. Factors associated and knowledge on road traffic accidents, rules among private university students in Chengalpattu district, Tamil Nadu, India - A cross-sectional study. *Journal of education and health promotion* 2022; 11: 148.
12. Plainis S, Murray IJ and Pallikaris IG. Road traffic casualties: understanding the night-time death toll. *Injury prevention : journal of the International Society for Child and Adolescent Injury Prevention* 2006; 12: 125-128.