

PATTERN OF MEDICO-LEGAL CASES PRESENTING TO A TERTIARY CARE HOSPITAL: A RETROSPECTIVE STUDY

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Abstract

Background: Medico-legal cases (MLCs) are a critical link between emergency healthcare and the court system, necessitating prompt clinical management, precise documentation, forensic evidence preservation, and appropriate legal reporting. However, their epidemiological patterns differ according to demographic, socioeconomic, regional, and healthcare-related variables. This systematic review compiled published data on the demographics, distribution, injury patterns, and primary causes of MLCs presenting to tertiary care hospitals.

Methods: A systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) criteria. PubMed, Google Scholar, Scopus, Web of Science, and ScienceDirect were searched with terms such as medico-legal cases, tertiary care hospitals, emergency rooms, traffic accidents, assault, poisoning, burns, and forensic medicine. We considered eligible English-language hospital-based observational, retrospective, prospective, and cross-sectional studies that reported demographic or epidemiological characteristics of MLCs. Six studies out of 1,610 identified records met the eligibility criteria and were included in the narrative synthesis. Due to significant heterogeneity among trials, no meta-analysis was undertaken.

Results: All six included investigations were carried out in India, with sample sizes ranging from 455 to 12,789 cases. Young adults were over-represented, with people aged 21 to 30 accounting for 35.0% of reported cases, followed by those aged 31 to 40 (21.8%). Males predominated in the key medico-legal categories. Road traffic accidents (RTAs) accounted for 15.1-70.7% of MLCs and were the most commonly reported major category, followed by physical assaults (28.9-63.1%), poisoning (4.3-19.5%), and burns (5.8-13.2%). In assault situations, hard or blunt weapons caused 86.0% of injuries. Organophosphorus compounds were the most commonly reported poisoning agents (37.2%), followed by

organochlorine compounds (23.7%) and paraquat (11.8%); roughly 86% of poisoning cases were linked to suicidal intent. Thermal burns accounted for 44.9% of burn-related MLCs, affecting 31-70% of total body surface area.

Conclusion: Most medical-legal cases presented to tertiary care facilities are trauma-related, and they disproportionately impact young, economically productive males. RTAs and physical attacks bear the majority of the medico-legal load, whereas pesticide poisoning and burn injuries continue to be significant causes of morbidity and medico-legal complexity. The findings advocate for improved road safety initiatives, violence prevention measures, pesticide control and poison prevention programs, burn prevention, emergency trauma treatments, and standardized medico-legal documentation.

Introduction

Medico-legal cases (MLC) are an important area where health care delivery and the legal system intersect. The cases need to be promptly diagnosed and treated, have to be documented correctly, evidence should be preserved and where there is a legal investigation, the police authorities should be notified promptly. A medico-legal case is typically said to be a case that involves the attending registered medical practitioner (RMP), who, after taking a patient's history and conducting a clinical examination, decides that legal investigation is required to ascertain the cause, manner or responsibility for an injury, illness or death (Singh et al., 2024; RM et al., 2022). Good management is therefore crucial to ensure justice and patient care at a high standard in medico-legal cases.

Most medico-legal cases are likely to reach the emergency and casualty departments of tertiary health facilities, as this is where patients with emergencies such as acute trauma, poisoning, burns, assaults, road traffic accidents, and firearm injuries appear (Altaf et al., 2021). The doctors in these departments have two duties: a lifesaving duty and a duty of medico-legal obligations such as proper registration, detailed clinical examination, meticulous maintenance of records, collection and preservation of forensic evidence and preparation of medico-legal reports. Accurate documentation is an important factor, as these documents often act as evidence in police investigations and legal proceedings (Frati et al., 2025).

The range of medico-legal cases is wide and encompasses road traffic accidents, physical assault, poisoning, burns, falls, occupational

injuries, sexual offence, gunshot wounds, domestic violence, negligence and cases requiring insurance/legal certification evaluation. The distribution and occurrence of these cases is shaped by demographic, socioeconomic, cultural, urbanization, seasonal and regional legal frameworks. An understanding of these differences is necessary to forge a picture of vulnerable populations, new trends in injuries and hospital readiness and emergency response (Mina et al., 2017).

The number of medico-legal cases reported internationally has been steadily increasing in recent years as a result of rapid population growth, changes in lifestyle, urbanization and industrialization, and increasing motorization. Trauma and injury-related emergencies are a growing burden on emergency departments, forensic medicine services and health systems and have a significant impact (Kishore et al., 2017). Medico-legal cases can provide good epidemiological data on the demographic characteristics of victims (age, gender, socioeconomic status, etc.), causes and mechanisms of injuries, temporal distribution and outcomes of different medico-legal events. These data can help healthcare managers, forensic experts, public health officials and policy makers plan preventive efforts, improve trauma care, bolster medico-legal services, and ensure better hospital-to-police/military coordination (Mellouki et al., 2023; Bagher, 2017).

In addition, when case patterns are systemically analysed, the quality of the medico-legal documentation will be enhanced, and evidence-based decision making in clinical and medico-legal practice will be enhanced. It also

allows the evaluation of the deficiencies of emergency care, shows the area that needs professional training and encourages the common approach to the management of medico-legal cases. It is important, therefore, that the epidemiological profile of these cases be understood, not only to adequately manage the individual case but also to provide legal accountability, safeguard patients' rights, and assist with the justice system.

This review outlines the existing evidence on the prevalence of medico-legal cases seen in tertiary care hospitals, focusing on the demographic profile, common medico-legal cases, trends and patterns, nature of injury and implications for clinical practice, forensic medicine, hospital management and public health.

Methodology

Study Design

The study was performed as a systematic review and aimed to identify published evidence regarding the pattern of medico-legal cases presenting to tertiary care hospitals, assess it and synthesize results. The demographic characteristics, frequency and types of medico-legal cases, causes and mechanisms of injury, injury patterns, and major clinical and medico-legal characteristics reported in hospital-based studies were the focus of this review. The review process was conducted and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines.

Literature Search Strategy

A thorough literature search was undertaken through electronic databases (PubMed, Google Scholar, Scopus, Web of Science, and ScienceDirect). Relevant studies were identified by searching a combination of words for medico-legal studies, tertiary care hospitals, ED, and common injury types. The search terms were "medico-legal cases," "medico-legal profile," "tertiary care hospital," "emergency department," "casualty," "retrospective study," "road traffic accidents," "assault," "poisoning," "burns" and "forensic medicine." Appropriate combinations of keywords using the Boolean operators AND and OR were used to broaden or narrow the search. The bibliographic

references of relevant publications were also hand searched to find further eligible publications. English-language articles that were relevant to the aims and scope of the review were taken into consideration.

Eligibility Criteria

The studies were eligible if they presented medico-legal cases to tertiary care hospitals, teaching hospitals, emergency departments (EDs) or casualty departments (CDs) and reported any data related to the medico-legal cases in terms of demographics, frequency, types, causes, mechanisms, injury patterns, temporal distribution, or outcome of cases. Studies of the hospital-based type, such as retrospective, prospective, and observational or cross-sectional studies, were eligible. Studies needed to include adequate methodological details and pertinent conclusions that aligned with the goals of the review. The medico-legal events included were road traffic accidents, physical assault, poisoning, burns, falls, occupation injury, firearm injury, sexual assault, domestic violence and other trauma-related medico-legal presentations. Case reports, editorials, commentaries, letters to the editor, conference abstracts, opinion articles, duplicate publications, studies conducted outside of the hospital setting, and studies lacking adequate relevant epidemiological information were excluded. Some studies concerned solely with a specific clinical condition and not of medico-legal interest were also excluded. Experimental and laboratory studies not related to human Medico-Legal practice were not considered in the case of animals. Only articles in full text and in English were included.

Study Selection

All records found in the electronic databases and through other sources were screened based on the predetermined eligibility criteria. Prescreening was used to eliminate duplicate records. The titles and abstracts of the remaining records were initially screened to determine the potential for relevance to the studies. Full text retrieval and evaluation of articles were conducted using full text examination and identified if they were

potentially eligible as articles. The full text of articles not included due to exclusion criteria were noted and excluded. A PRISMA flow diagram was used to show the process of the studies selected, including identification, screening, and eligibility evaluation and final selection of studies.

Data Extraction

The data from the studies included were retrieved on a standard data-extraction form. The information extracted comprised the author and the year of publication, country, setting, design, period of the study, sample size, demographic information, age and sex distribution, characteristics of the road traffic accidents, pattern of assault, poisoning agents and manner of poisoning, burn characteristics, other medico-legal presentation and the main findings reported by each study. The information obtained was tabulated and presented to compare and synthesize the findings of the studies included for analysis.

Quality Assessment

Study methodological quality and risk of bias were rated for the studies included using an appropriate standardized critical appraisal tool by study design. The methodological features and potential sources of bias of the studies included were taken into account during the assessment. The results of the quality assessment were taken into account for interpretation of the evidence and for synthesizing the results.

Data Synthesis

Medico-legal categories reported by the included studies differed in reporting, geographical setting, timeframe and sample size of the studies, and study design, so a narrative synthesis of the findings was conducted. The

evidence was arranged in terms of major themes such as demographic characteristics, overall medico-legal presentation, road traffic accidents, physical assaults, poisoning, burns and other medico-legal presentations. The results from the different studies were analysed, and patterns and variations in the demographic and clinical features of medico-legal cases presented to tertiary health care facilities were identified. Frequencies and percentages were presented as reported in the original studies, and ranges were those reported across the studies included. Due to the differences in the populations, settings, definitions and reporting of outcomes across studies, a meta-analysis was not conducted.

Reports on the Review

The study identification and selection process was reported using a PRISMA flow diagram. The numbers of records identified, duplicates removed, records screened, full-text articles assessed, articles excluded with reasons and studies included in the final review were recorded. The characteristics of the studies included are summarized in tables, and a narrative synthesis of available evidence was undertaken.

Ethical Considerations

The present systematic review was carried out using data that were gathered only from previously published scientific literature, and no human subjects were recruited nor could identifiable patient data be accessed. Thus, there was no need for informed consent. Ethical approval was not needed, as no new patient-level data were collected or accessed during this review. All information obtained from the published literature was appropriately cited.

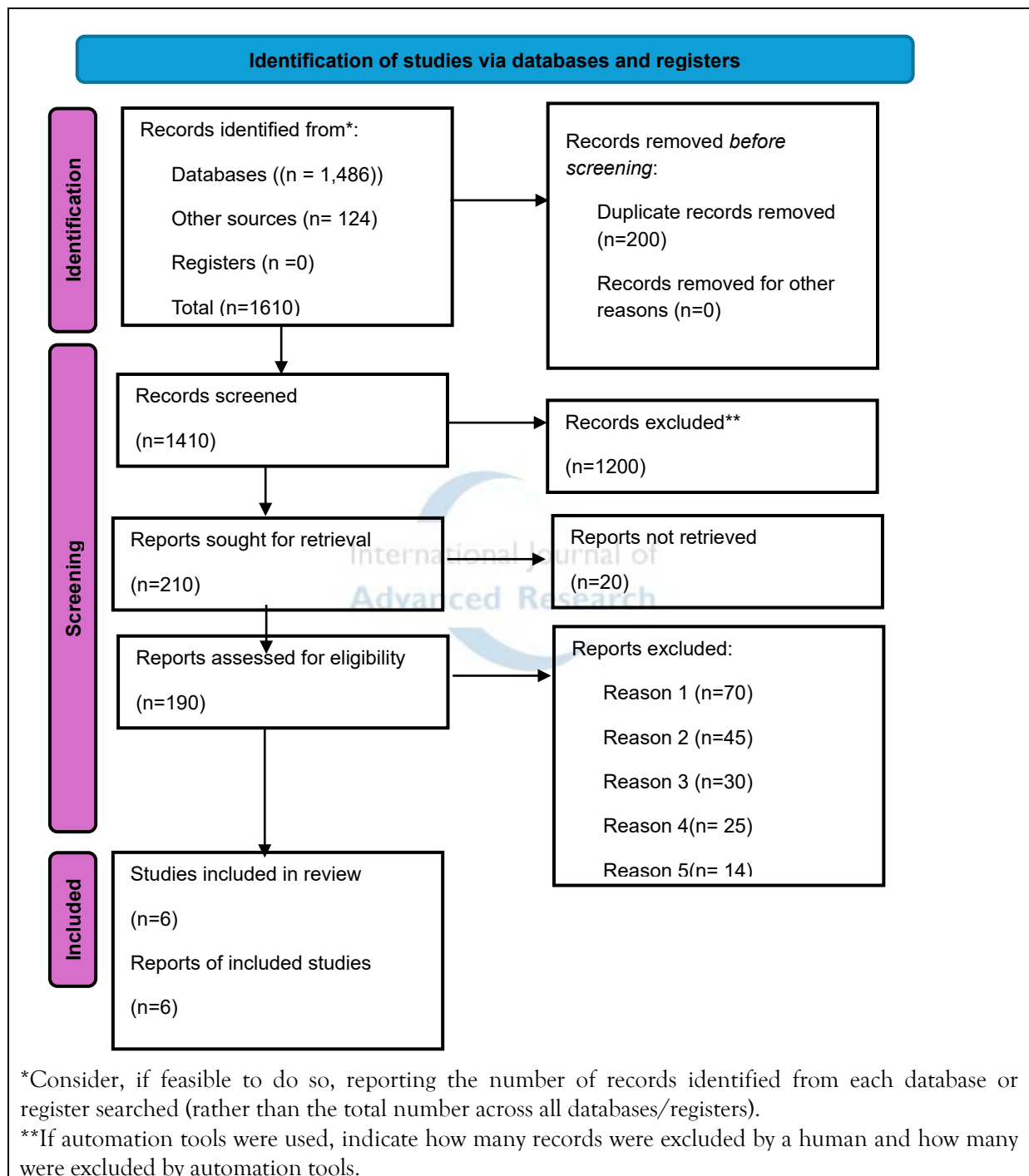


Figure 1: PRISMA flow diagram showing the identification, screening, eligibility assessment, and inclusion of studies in the narrative review.

Results

Characteristics of Included Studies

Table 1 summarizes the characteristics of the six studies included in this systematic review. All studies were conducted in India and primarily investigated the epidemiological profile of medico-legal cases presenting to

tertiary care hospitals. Of the six studies, five employed a retrospective study design, while only one was prospective, indicating that retrospective analysis of hospital records remains the predominant approach for evaluating medico-legal case patterns. Sample sizes varied considerably, ranging from 455

cases to 12,789 cases, reflecting substantial differences in study populations and institutional caseloads. Despite differences in study design and sample size, a consistent epidemiological pattern was observed across the included studies. Young adult males represented the majority of medico-legal patients in nearly all investigations, highlighting this demographic as the population most frequently involved in medico-legal emergencies.

The most common medico-legal presentations were road traffic accidents (RTAs) and physical assaults, although their relative predominance differed among studies. Similarly, RTAs and

assaults were the predominant causes of medico-legal admissions, while the findings demonstrated remarkable consistency across the included studies, indicating that trauma-related incidents, particularly road traffic accidents and physical assaults, constitute the principal medico-legal burden in tertiary care hospitals. Although the relative frequency of individual case categories varied between studies, the overall demographic profile and injury patterns remained largely comparable, emphasizing the significant contribution of RTAs and assaults to emergency medico-legal services.

Table 1: Characteristics of Included Studies

Country	Study Design	Sample Size (n)	Major Findings
India	Retrospective	8,199	Assaults were the most common medico-legal cases, followed by road traffic accidents and poisoning.
India	Retrospective	12,789	Young adult males predominated; assault and road traffic accidents were the leading cases.
India	Prospective	4,066	Road traffic accidents were the most frequent medico-legal cases, mainly among young males.
India	Retrospective	1,387	Road traffic accidents accounted for the majority of medico-legal admissions.
India	Retrospective	455	Road traffic accidents and assaults were the leading medico-legal cases.
India	Retrospective	1,850	Assaults and road traffic accidents were the most common medico-legal presentations.

Distribution of Medico-Legal Cases

As seen in Table 2, the overall distribution of the reported cases in the included studies is medico-legal cases. The frequency of each of the medico-legal conditions reported varied greatly, but there was a common trend found in the studies. Road traffic accidents were the highest percentage of medico-legal cases, ranging from 15.1% to 70.7% of total cases reported. This wide variation is due to geographical variations, traffic volumes, referral trends and hospital catchment areas. However, in almost all of the studies included, the most prevalent cause of medico-legal registration continued to be RTAs. The second highest category was physical assault, accounting for 28.9–63.1% of the medico-legal cases. Assault-related injury was observed at all times in young adult males and was a significant burden

for EDs. Additionally, poisoning was found to be another important cause of medico-legal hospitalization, accounting for 4.3–19.5% of admissions. Most poisoning cases were seen in the context of deliberate self-harm, and there were some accidental poisoning cases. The proportion of burn injuries was moderate (5.8–13.2%) and accounted for a significant number of admissions in medico-legal cases. In contrast, the proportion of fall-related injuries was 2.7–9.8%, and the proportion of snake bites and animal-related injuries was 1.1–9.0% of total reported injuries. Sexual assault, occupational injuries and firearm injuries were less common medico-legal conditions, ranging from 0.7 to 2.5%, 0.6 to 2.0% and 0.03 to 1.0%, respectively. Other miscellaneous medico-legal cases accounted for 6.5–23.7% of the total admissions (Table 2).

Table 2: Distribution of medico-legal cases reported across the included studies

Type of Medico-Legal Case	Reported Frequency (%)	Overall Trend
Road Traffic Accidents	15.1–70.7	Most common
Physical Assault	28.9–63.1	Very common
Poisoning	4.3–19.5	Common
Burns	5.8–13.2	Moderately common
Falls	2.7–9.8	Less common
Snake Bite/Animal Injuries	1.1–9.0	Occasional
Sexual Assault	0.7–2.5	Rare
Firearm Injuries	0.03–1.0	Very rare
Occupational Injuries	0.6–2.0	Rare
Other Medico-Legal Cases*	6.5–23.7	Variable

Age Distribution of Medico-Legal Cases

The agewise distribution revealed a high percentage of medico-legal cases among young adults. Individuals aged 21–30 years accounted for 35.0% of the reported cases, followed by those aged 31–40 years (21.8%) and 41–50 years (15.3%). Cases aged 51–60 years made up 9.1% and for 11–20 years 9.5%. Lower

proportions were observed among individuals aged 61–70 years (5.2%), 71–80 years (1.3%), and 0–10 years (2.6%). Only 0.2% of cases were in the 81–90 years age group. The distribution showed that predominantly young and economically active adults were involved in medico-legal cases overall (Figure 2).

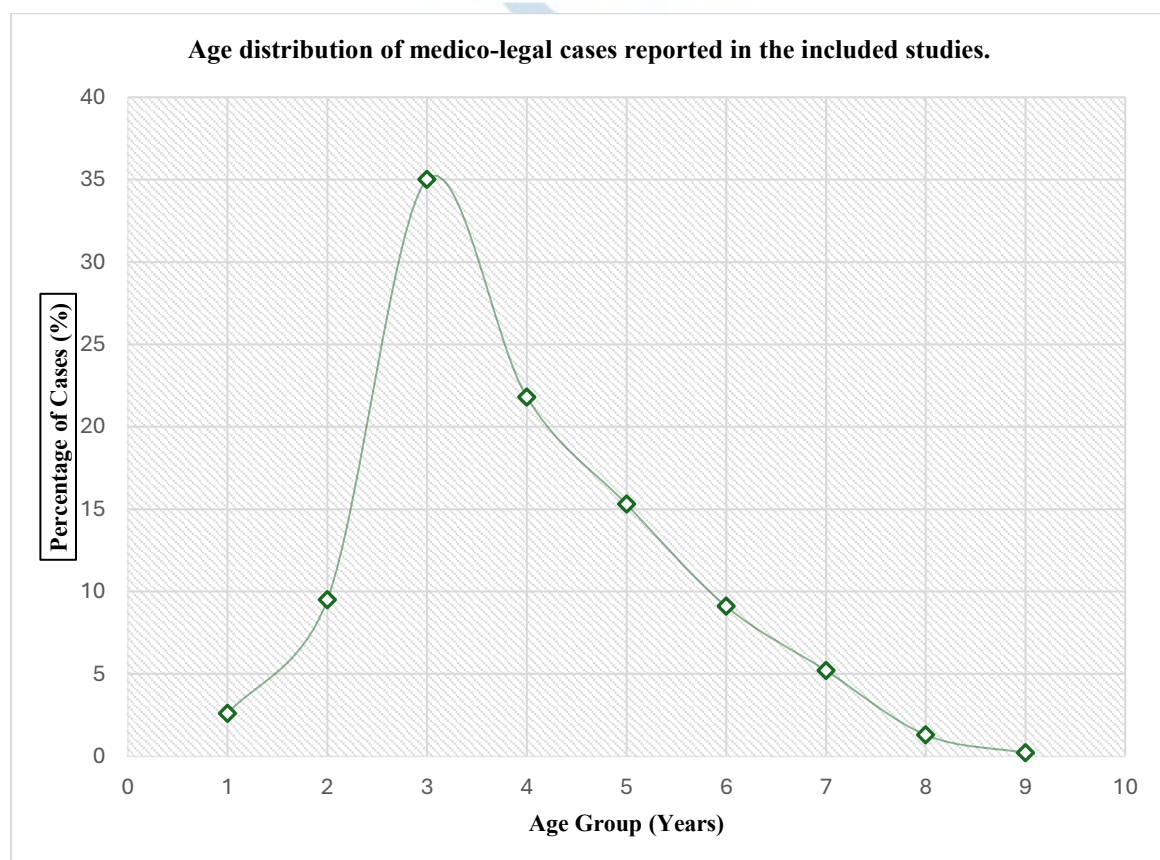


Figure 2: Age distribution of medico-legal cases reported in the included studies.

Distribution of Major Medico-Legal Cases across the included studies

Figure 2 shows the distribution of the major medico-legal cases by gender. Overall, there was a significantly higher proportion of males than females across all the main medico-legal categories. Males made up approximately 85% of traffic accident victims, while females made up 15%. In the same manner, there were 72% males and 27% females in the physical assault cases and 64% males and 35% females in the

poisoning cases. Males accounted for 54% of burn injuries, while females accounted for 45%. These findings point to the fact that male predominance was observed in the majority of medico-legal patients regardless of type of injury or emergency, except in the case of burn injuries, where the gender disparity was the least. As the proportion of female patients increased from road traffic accidents to burn injuries, the proportion of male patients decreased accordingly (Figure 3).

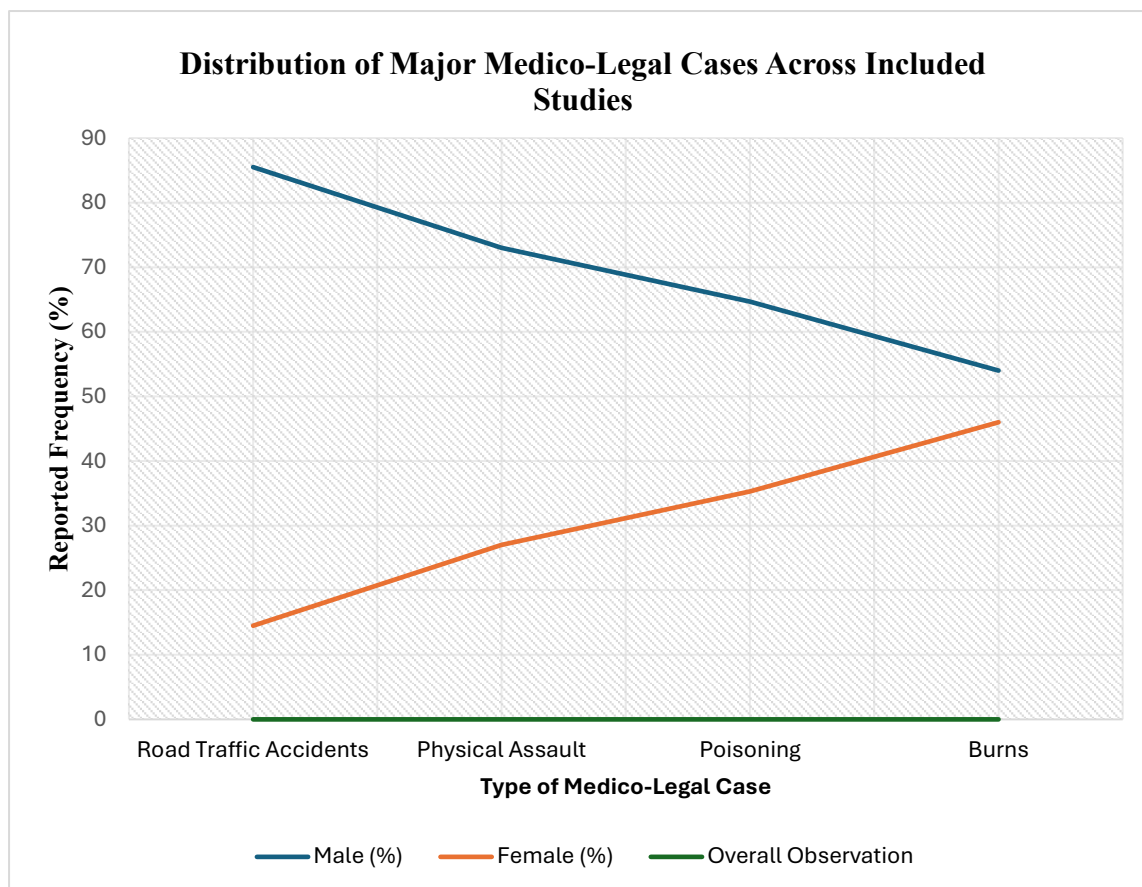


Figure 3: Distribution of Major Medico-Legal Cases across Included Studies

Pattern of Assault Cases

The distribution of assault cases according to the type of weapon used is presented in Figure 3. Hard/blunt weapons were the leading cause of injury resulting from assaults, with 86.0% of all reported injuries. Injuries from sharp weapons were only 3.7%, and pointed weapons accounted for 3.3% of injuries. In addition, 7.0% of the individuals who had been assaulted did not exhibit any physical injuries, even though they had been assaulted. The

results of this study reveal that most of the injuries sustained in an assault end up in tertiary care hospitals with a blunt trauma mechanism, while sharp and pointed weapons are relatively uncommon weapons used for assault. The rather small percentage of cases where no injuries could be identified indicates the need for comprehensive clinical assessment and medico-legal documentation when evaluating a patient (Figure 4).

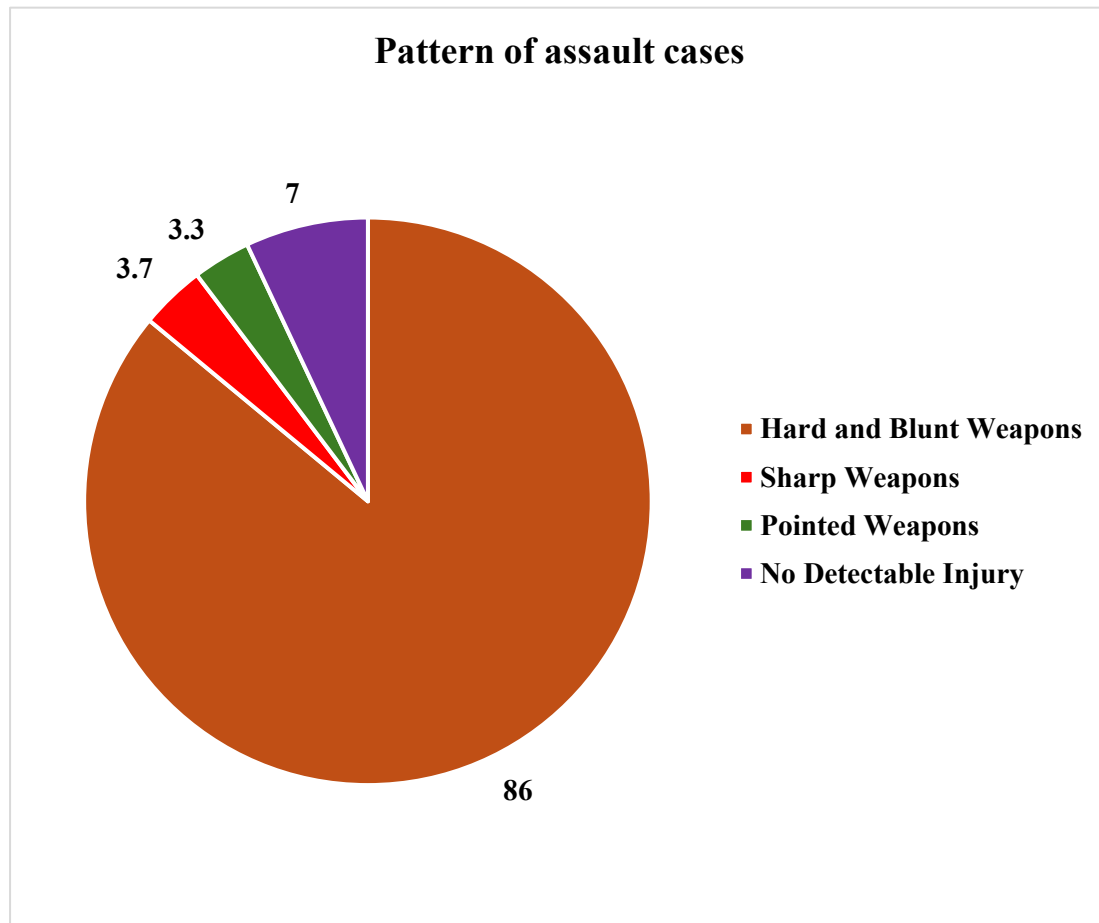


Figure 4: Distribution of Weapon Types Used in Assault Cases

Road Traffic Accident Cases

The results on Road Traffic Accidents are presented in tabular form in Table 3. RTAs were one of the most common medico-legal emergencies in all the studies included, with a range of 15.1–70.7% of all medico-legal emergencies. Economically active age groups (aged 21-30 and 31-40 years) were more likely to be victims than other age groups, with young adults aged 21-30 years being the largest group of victims. The male to female ratio was found to be approximately 4:1 to 6:1, and a marked male predominance existed. Motor vehicle

collisions, motorcycle crashes, pedestrian accidents and bicycle-related injuries were the four primary types of injuries. Motorists and motorcycle operators were the most common victims, followed by passengers and pedestrians. The results indicate that the contribution of motorization and heavy road traffic are significant factors in medico-legal emergencies attending tertiary hospitals. Table 3 summarizes information that emphasizes the need to improve road safety measures and services for trauma care.

Table 3: Summary of Road Traffic Accident Cases Reported in Included Studies

Parameter	Summary of Findings
Frequency	15.1-70.7% of all medico-legal cases; RTAs were among the most frequently reported medico-legal emergencies across studies.
Common Age Group	21-30 years, followed by 31-40 years.
Male-to-Female Ratio	Approximately 4:1 to 6:1 (male predominance).
Mechanism of Injury	Predominantly motor vehicle collisions, motorcycle crashes, pedestrian

	injuries, and bicycle accidents.
Type of Victims	Drivers/riders were most commonly affected, followed by passengers and pedestrians.

Distribution of common poisoning agents

Figure 5 shows the distribution of reports of various types of poisoning agents in the studies included in this report. Organophosphorus (OP) compounds were the most commonly reported type of poisoning agent, making up 37.2% of all poisoning cases. Organochlorine (OC) compounds and paraquat (11.8%) were the second most common agents. The unknown substance caused 7.6%, and the rat poison caused 5.9% of the poisoning cases. Kerosene poisoning accounted for 2.9% of

reported cases, while chlorophenoxy compounds accounted for 4.9% and phenol accounted for 4.5%. Other less common poisons were detergents (0.6%), sedatives (0.6%), battery acid (0.3%) and formalin (0.2%). Overall, the findings suggest that pesticide poisoning is the most important cause of medico-legal admissions for poisoning cases, mostly from organophosphorus and organochlorine compounds, and indicate the widespread availability and use of agricultural chemicals (Figure 4).

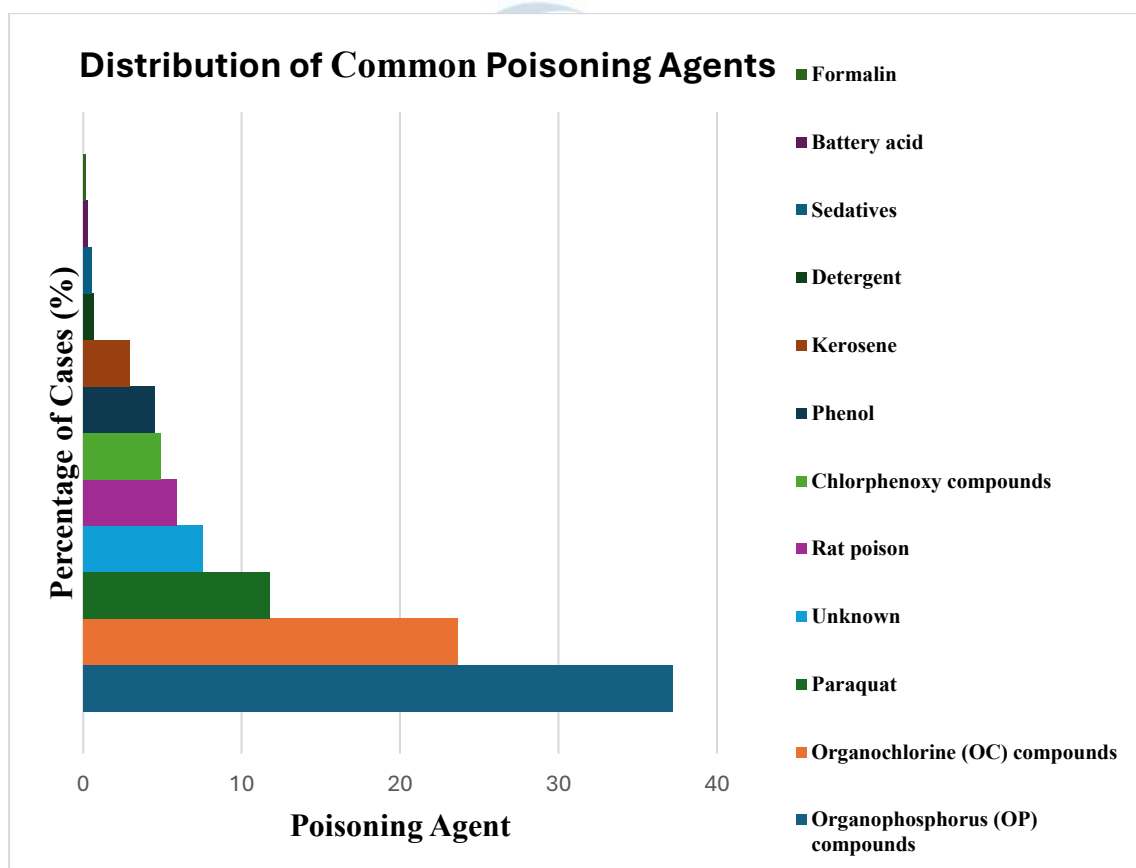


Figure 5: Distribution of common poisoning agents reported in the included studies.

Distribution of Other Medico-Legal Cases

The distribution of less common medico-legal cases is shown in Figure 5. Of all these conditions, snake bites reported the most, accounting for 2.5% of all Medico-Legal cases. Sexual assault was 0.7%, and workplace injuries were approximately 0.5%. Domestic

injuries accounted for 0.4%, while animal attacks accounted for 0.3%. Injuries from firearms were relatively rare, accounting for 0.03% of all injuries reported. Attempted hanging (0.2%) and suspected criminal abortion (approx. 0.1%) were other less common medico-legal presentations. They were

all individually minor components of the overall medico-legal burden but are of clinical significance due to their complex medico-legal

implications, their requirement for specialized forensic appraisal, and for detailed medico-legal record-keeping (Figure 5).

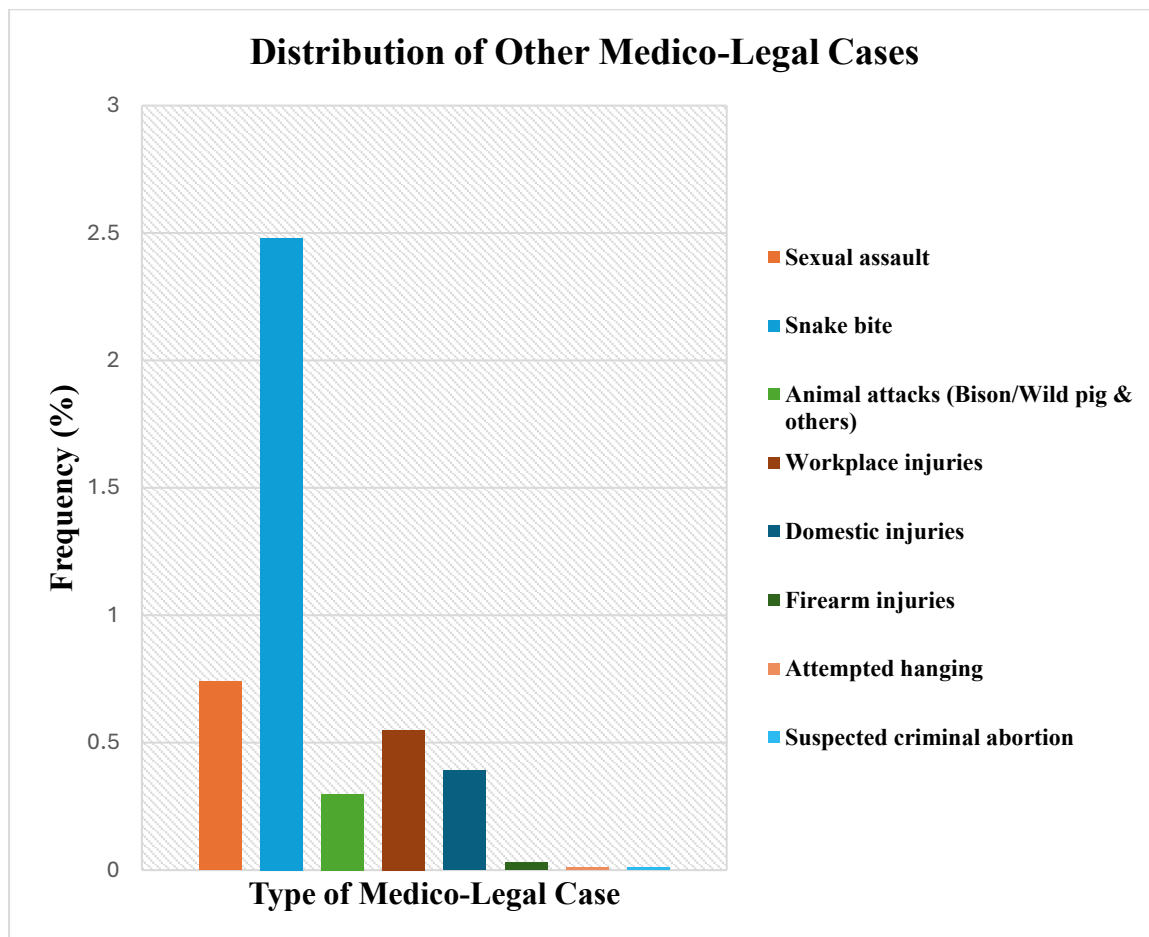


Figure 6: Distribution of other medico-legal cases reported in the included studies.

Poisoning Cases

Table 4 shows the features of poisoning cases. Organophosphorus (OP) compounds were the most common type of poison reported (37.2%). Organochlorine compounds (23.7%) and paraquat (11.8%) were the next most common chemicals. Poisoning by other agents reported were rat poison (5.9%), chlorophenoxy compounds (4.9%), phenol (4.5%), kerosene (2.9%), detergents (0.6%), sedatives (0.6%), battery acid (0.3%), and formalin (0.2%), and poisoning by unknown agents was 7.6%. It was also shown during the review that approximately 86% of the cases were reported to be suicidal poisons, and approximately 14%

were reported to be accidental poisoning. There were a small number of reports of homicidal poisoning. The age group that was most commonly observed with poisoning was 21-30 years, followed by 31-40 years. Males represented approximately 65% of the poisoning cases, while the remaining 35% were females. The seasonal variation was inconsistently reported in the studies included, and therefore, this was not possible to determine. In general, the results show that agricultural pesticides continue to be the most common reason for poisoning-related medico-legal admissions (Table 4).

Table 4: Summary of poisoning cases reported in the included studies.

Parameter	Summary of Findings
Common Poisoning Agents	Organophosphorus (OP) compounds (37.2%) were the most frequently reported agents, followed by organochlorine (OC) compounds (23.7%), paraquat (11.8%), rat poison (5.9%), chlorphenoxy compounds (4.9%), phenol (4.5%), kerosene (2.9%), detergents (0.6%), battery acid (0.3%), formalin (0.2%), sedatives (0.6%), and unknown agents (7.6%).
Suicidal vs. Accidental Poisoning	Suicidal poisoning predominated ($\approx 86\%$), while accidental poisoning accounted for $\approx 14\%$. Homicidal poisoning was rarely reported.
Age Distribution	Poisoning was most common among 21–30-year-olds, followed by the 31–40-year age group.
Sex Distribution	Males were more frequently affected ($\approx 65\%$) than females ($\approx 35\%$).
Seasonal Trends	Seasonal variation was not consistently reported across the included studies.

Burn Injuries

The burn results are presented in Table 5. Thermal burns were the most frequent burns, followed by chemical and electrical burns. In terms of burn severity, 44.9% of patients had burns covering between 31 and 70% of the total body surface area (TBSA), 31.9% of patients had burns covering 1–30% of the TBSA and 23.2% of patients had extensive burns covering 71–100% of the TBSA. Most of

the burn injuries were accidental (63.1%), and 36.9% were suicidal. Only in rare instances were homicidal fires reported. Females made up 46% of the burns, while males made up 54% of the burns. As seen in other MLDs, burn injuries were seen to be mostly in the age group of 21–30 yrs, followed by 31–40 yrs. The findings highlight the significant clinical and forensic burden of burn injuries in tertiary health care (Table 5).

Table 5: Summary of Burn Injuries Reported in Included Studies

Parameter	Summary of Findings
Type of Burns	Thermal burns were the most common, followed by chemical and electrical burns.
Percentage of Body Surface Area (TBSA) Involved	1–30%: 31.9%; 31–70%: 44.9%; 71–100%: 23.2%
Manner of Burns	Accidental: 63.1%; Suicidal: 36.9%; Homicidal cases were rarely reported.
Sex Distribution	Males: 54.0%; Females: 46.0%
Most Affected Age Group	21–30 years, followed by 31–40 years.

Discussion

Overview of the Included Studies

The present narrative review aimed to analyse and synthesize the published data from six studies undertaken in hospital settings from 2015 to 2025 to assess the epidemiological profile of medico-legal cases reported to tertiary care hospitals. The studies included, although with different designs, sample sizes, and geographical sampling, showed very similar results in terms of the demographic characteristics and causes for medico-legal admissions. The studies used were most often

retrospective, with the number of patients studied ranging between 455 and 12,789, demonstrating the appropriateness of hospital records to assess medico-legal trends. Road traffic accidents (RTAs), physical assaults, poisoning, and burn injuries were consistently found to be the major medico-legal cases handled in tertiary healthcare (Trangadia et al., 2014; Khurana et al., 2023; Mandal et al., 2025; Bhujel et al., 2025). The fact that most of the studies were retrospective reflects the value of hospital medico-legal documentation as an excellent source of epidemiological data,

enabling the identification of injury trends and the development of public health preventive strategies.

Distribution of Major Medico-Legal Cases

The present review showed that the major medico-legal cases were road traffic accidents (15.1–70.7% admissions), physical assaults (28.9–63.1% admissions), poisoning (4.3–19.5% admissions) and burn injuries (5.8–13.2% admissions). Other less common presentations were falls, snake bites, animal-related injuries, firearm injuries, occupational injuries and sexual assault.

This association of road traffic accidents with the majority of accidents is consistently reported in international and national literature. The same finding of the importance of RTAs was observed by Mohammed et al., 2019; Peden, 2008; Sharma, 2008). Road traffic accidents are acknowledged as one of the main causes of death and disability in young adults globally (WHO, 2023). Major factors contributing to this growing burden are rapid urbanization, rising motorization, poor road infrastructure, low enforcement of traffic laws, speeding, alcohol consumption and low compliance with helmet and seatbelt use.

The second most common medico-legal category was physical assaults. Assault-related injuries were observed to be a significant percentage of medico-legal cases by Brahmkar and Sharma (2017) and Malik et al. (2017). The prevalence of assault-related injuries in tertiary hospitals can be attributed to an increase in interpersonal violence, domestic violence, alcohol abuse and socioeconomic stress. The results highlight the importance of establishing effective strategies for preventing violence and ensuring that the analysis of the event is recorded by standardized medico-legal documents to ensure judicial proceedings.

Poisoning and burn injuries made smaller contributions to the number of medico-legal cases than RTAs and assaults but were still significant due to the morbidity and mortality rates of these injuries when they did occur. Patil et al. (2020) also reported similar findings, indicating that poisoning and burn are still not

spared of public health problems in developing countries.

Age Distribution of Medico-Legal Cases

This review revealed that most medico-legal cases were in the 21–30-year-old age group (35%), 31–40-year-old age group (22%) and 41–50-year-old age group (15%). Lower frequencies were observed among 11–20 years (10%), 51–60 years (9%), 61–70 years (5%), 0–10 years (3%), and 71–80 years (1%). There was a very low level of cases reported in the 81–90 age group (0.2%), suggesting that medico-legal cases were mostly reported for the younger and economically active age groups. From the above findings, it can be observed that the medico-legal emergencies are more severe among the economically productive age groups.

Young adults were the most vulnerable group identified by (Grima et al., 2017; Larouche et al., 2023; Melo & Gomes, 2017). The high prevalence of this age group can be explained by several factors, including more exposure to the occupation, more trips, more involvement in outdoor activities and more interpersonal problems. Furthermore, the World Health Organization has always stated that injuries are one of the most common causes of death for people aged 15–44 years worldwide (WHO, 2023). The high proportion of medico-legal cases in this productive age group also has important socioeconomic consequences, as injuries can lead to chronic disability, loss of productivity and cost of health care.

Gender Distribution of Medico-Legal Cases

The gender distribution of the major medico-legal cases indicated that males predominated in all the major cases. The largest number of road traffic accidents, that is, 85.5%, occurred in males, while 14.5% occurred among females. Likewise, the rates of physical assault cases involving males were 73.0% compared to 27.0% for females. In the context of poisonings, males accounted for 64.7% and females 35.3%. The gender difference is also smaller in burn cases (54.0% males and 46.0% females). Overall, males were the majority in all main categories of medico-legal cases, with a smaller male/female split in the burn category.

These observations are consistent with previous studies performed by Albedewi et al. (2021), Alipour et al. (2020), Mehta et al. (2022), and Peck and Toppi (2019), who concluded that males were the predominant group in medico-legal cases. Bolandparvaz et al. (2017), Biswas et al. (2021), and O'Neil et al. (2018) injury surveillance reports have also reported similar findings. A higher ratio of males to females has been explained by occupational exposure, motor vehicle use, higher rates of outdoor and high-risk activities, and interpersonal violence.

Road Traffic Accidents

Road traffic accidents (RTAs) were found to be the most common cases in the present review, ranging from 15.1–70.7% of all reported cases that come into the medico-legal setting. Most victims were young adults (21–30 years, then 31–40 years), and there was a clear male predominance (4:1 - 6:1). Motor vehicle drivers and motorcycle riders accounted for the highest percentage of injuries, and motor vehicle collisions, motorcycle crashes, pedestrian injuries and bicycle accidents were the leading mechanisms of injury. These results show that RTAs are still a large burden on ED services and on forensic medicine services, especially for those at economically productive age.

The majority of the RTAs identified in this review are similar to previous hospital-based studies in India and other LMIC countries Babu et al. (2019), Vinish et al. (2023), and Bhattarai et al. (2023). The World Health Organization (2023) also stated that globally, road traffic crashes are among the top causes of death for people aged 5–29 years, especially in developing countries where the high level of injury is fuelled by rapid urbanization, high vehicle ownership, poor infrastructure, excessive speeds, distracted driving, and low adherence to traffic rules. Increasing the effectiveness of road safety laws, emergency trauma services, enforcement of helmet and seatbelt wearing and the effectiveness of evidence-based prevention strategies are also critical to lowering the burden of road traffic injuries (Bachani et al., 2017; Goel et al., 2024; Mohan et al., 2020).

Assault Cases

The second most common category of medico-legal admission was physical assault, ranging from 28.9% to 63.1% of admissions reported. When analysing the pattern of assaults, hard and blunt weapons caused 86% of injuries, while sharp weapons (3.7%) and pointed weapons (3.3%) caused a much smaller proportion of injuries. Moreover, 7% of assault patients were taken to the ED without a physical injury being detected despite allegations of assault, emphasizing the need for thorough medico-legal evaluation.

The results are similar to those obtained by (Iqbal et al., 2025; Kumar & Joshi, 2020; Madadin et al., 2021), who also found that assaults were one of the major reasons for medico-legal registration in tertiary care hospitals. Blunt force injuries could be explained by the availability of common items such as sticks, stones, iron rods and fists in the hands of people when fighting. Previous studies have indicated that interpersonal violence, alcohol use, socioeconomic stress and domestic problems are significant factors in injuries from assault (Gunarathne et al., 2023; Kolbe & Büttner, 2020; Mayshak et al., 2022; Tennakoon et al., 2020). In addition, cases where no physical injuries were seen illustrate the need for careful clinical assessment, photographic documentation and/or forensic evidence to assist in court proceedings and to accurately report the case.

Poisoning Cases

Across the studies included in this review, poisoning was a significant cause of emergency hospitalization, varying between 4.3 and 19.5% of the total number of admissions. The most frequent agents of poisoning were organophosphorus compounds (37.2%), organochlorine (23.7%), paraquat (11.8%), unknown (7.6%) and rat poison (5.9%). Eighty-six percent of poisoning cases were from suicide attempts, and 14% of the cases were accidental. The majority of the patients were aged between 21 and 30 years old, with males accounting for approximately 65% of the poisoning cases.

This review shows the prevalence of pesticide poisoning, which is similar to previously

published studies in agricultural communities where pesticides are still readily available Eddleston (2020), Boedeker et al. (2020), and Karunarathne et al. (2020). Organophosphorus pesticides are still the most common cause of hospital admission due to poisoning, being widely used on farms and highly toxic. The same finding was reported by Jonker et al. (2025) when studying the intentional ingestion of pesticides as a cause of suicide-related mortality in low- and middle-income countries. The results highlight the importance of better mental health care, safer storage of dangerous chemicals, better control of highly hazardous pesticides, and better public awareness about poison prevention. Early diagnosis and rapid toxicology treatment with interdisciplinary communication between emergency physicians, toxicologists, psychiatrists and forensic specialists continue to be key to the best outcomes for patients and proper medico-legal documentation.

Burn Injuries

In the current review, burn injuries were one of the important causes of hospitalization and made up 5.8–13.2% of all medico-legal admissions. Thermal burns constituted the major type of burn injuries, followed by chemical and electrical burns. A total of 44.9% of patients had burns covering 31%–70% of the total body surface area (TBSA), 31.9% had burns covering 1%–30% of the TBSA, and 23.2% had extensive burns covering 71%–100% of the TBSA. In addition, 63.1% of the burn injuries were accidental, and 36.9% were caused by suicide attempts. Approximately 54% of the burn patients were males, and 46% were females, with the majority being 21–30 years old.

The results obtained in the present review are consistent with earlier epidemiological studies that also showed that accidental thermal burn was the most common type of burn injury in developing countries (Rybarczyk et al., 2017; Golshan et al., 2013; Dissanaik & Rahimi, 2009; Peck, 2011). Limited access to mental health services, psychiatric disorders, domestic violence and the relatively high proportion of suicidal burns in the studies reviewed may be due to underlying socioeconomic stress. Burn

injuries also remain an important public health issue due to the associated morbidity and mortality, prolonged hospitalizations, and psychological effects, as emphasized by Jeschke et al. (2020), Barrett et al. (2019), and Merchant et al. (2025). These findings emphasize the need to promote burn prevention public education campaigns, improve domestic fire safety, improve workplace safety regulations, and ensure that burn care specialist units are available to lower the burden of burn-related medico-legal scenarios.

Other Medico-Legal Cases

The present review revealed several other less frequent medico-legal conditions that are responsible for the deaths of children, such as snake bites (2.5%), sexual assault (0.7%), workplace injuries (0.5%), domestic injuries (0.4%), animal attacks (0.3%), attempted hanging (0.2%), suspected criminal abortion (0.1%), and firearm injuries (0.03%). Each of these conditions had a small percentage of overall medico-legal activity, but taken together, they accounted for a significant part of the complexity of medico-legal practice due to the complexity of the clinical presentations and medico-legal implications.

The abovementioned previous hospital-based studies have also confirmed that these rare medico-legal cases are best addressed by a multidisciplinary approach including emergency physicians, forensic specialists, surgeons, psychiatrists, obstetricians and law enforcement agencies (Byrd et al., 2020; Jain, 2018; Viciano et al., 2022). Sexual assault cases must be investigated thoroughly, and evidence must be properly collected, while snake bites and animal attacks, in addition to medico-legal documentation, may require emergency medical treatment. Similarly, firearm injuries and attempted hanging require thorough clinical evaluation given the often criminal investigation and judicial proceedings that surround them. While such cases are relatively rare, they do require standardized forensic protocols, proper documentation and specialized training to facilitate the proper medico-legal reporting and administration of justice.

Strengths and Limitations of the Review

The major strength of this review is that it included hospital-based studies that were carried out in various regions, which enables a comprehensive evaluation of the epidemiological profile of the medico-legal cases that are met in tertiary care hospitals. The review incorporated evidence from studies undertaken on 455 to 12,789 medico-legal cases, thus offering a wide spectrum of demographic information, injury patterns, and common factors leading to medico-legal admissions. In addition, graphical and tabular summaries allowed for comparisons between studies and the identification of consistent trends in epidemiology.

While the strengths are noted, there are also a number of limitations to consider. The majority of studies included were retrospective and were prone to incomplete records, reporting bias and missing clinical information. There was a high degree of variability across studies with regard to the length of the period studied, the number of subjects, the hospital context and the definition of the medico-legal cases, which restricted direct comparison of studies. Furthermore, only published English studies were included in the review, and there may be publication bias. Thus, there is a need for future multicenter, prospective studies with standardized reporting guidelines to provide more solid epidemiological evidence and increase the generalizability of results.

Conclusion

This systematic research identifies a consistent epidemiological pattern of medico-legal cases presented to tertiary care hospitals, with trauma-related emergencies affecting young and economically active populations. The most common medico-legal presentations were road traffic accidents and physical assaults, with poisoning and burn injuries accounting for significant additional morbidity and medico-legal workload. The prevalence of young males, the high proportion of motor vehicle and motorcycle-related injuries, and the significant incidence of blunt-force assault all point to key potential for focused prevention and increased emergency readiness. Pesticide poisoning, particularly with organophosphorus and

organochlorine substances, continues to be a serious medical and legal concern, with suicide poisoning accounting for the vast majority of documented instances. Burn injuries also pose a significant clinical and forensic difficulty due to their severity and the requirement for precise assessment of injury extent and conditions. Less common presentations, such as sexual assault, snake bites, occupational injuries, domestic injuries, animal attacks, attempted hanging, suspected criminal abortion, and firearm injuries, while uncommon in number, necessitate specialized multidisciplinary assessment and thorough forensic documentation. The findings emphasize the importance of integrated initiatives that include road-safety enforcement, violence prevention, safer pesticide management, poison-prevention measures, burn-safety programs, standardized medico-legal documentation, and reinforced emergency and forensic services. Future multicenter, prospective studies should use standardized case definitions, reporting frameworks, and outcome measures to generate more robust and comparable epidemiological evidence, as well as to support evidence-based clinical practice, forensic investigation, hospital planning, and public health policy.

Declarations

Consent for publication

All subjects gave their “informed consent” for the publication of details within the text (“informed consent”) to be published in the above Journal and Article. Written “informed consent” was obtained from all authors for the publication of this manuscript.

Availability of data and materials

Data are provided within the manuscript or supplementary information files.

Competing Interest

All authors declare that there are no competing interests.

Conflict of interest

All the authors declare no conflicts of interest.

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