

Sociodemographic Risk Factors and Patterns of Medicolegal Injuries in a Tertiary Care Hospital: A Cross-Sectional Public Health Analysis

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Abstract

Objective: To identify sociodemographic and injury-related risk factors associated with medicolegal cases reported at a tertiary care hospital in Lahore, Pakistan, and to explore their implications for preventive public health strategies.

Methodology: This cross-sectional study was conducted from June to December 2024 at the Services Institute of Medical Sciences, Lahore. Data from 370 medicolegal cases were extracted using non-probability consecutive sampling from the institutional medico-legal register. A structured questionnaire collected demographic characteristics and injury-related variables. Data were analyzed using SPSS v29, with chi-square tests used to assess associations between employment status and injury characteristics. A p-value <0.05 was considered statistically significant.

Results: Among the 370 cases, the majority were male (68.1%), under 45 years of age (81.1%), from urban areas (93.8%), and worked as unskilled labourers (44.9%). Intentional injuries comprised 72.7% of cases, with physical assault being the most common mode (75.4%) and the head and neck the most frequently affected site (53.5%). Employment status was significantly associated with the nature of injury: employed individuals experienced more accidental injuries (29.3%), while unemployed individuals had a higher prevalence of intentional injuries (86%).

Conclusion: Medicolegal injuries disproportionately affect younger males and unskilled workers, with intentional physical assaults being the predominant cause. A public health approach emphasizing injury surveillance, occupational health interventions, and violence prevention strategies is essential to mitigate the burden of such injuries.

Keywords: Medicolegal injuries, Physical assault, Risk factors, public health, Sociodemographic patterns

Introduction

World Health Organization states that injuries are a leading cause of death and disability, with unintentional injuries accounting for over 4.4 million deaths annually globally.¹

Among the injuries road traffic accidents are most common resulting in morbidity, mortality and disability.² Other Intentional injuries include interpersonal violence and self-inflicted harm are also public health problem contributing significantly in global burden of disease. The associated factors of injuries can be classified into demographic risk factors, behavioral risk factors, environmental risk factors and cultural risk factors. In demographic risk factors male gender and children are more prone to injuries. Behavioral risk factors include alcohol and drug abuse. Environmental risk factors include poor road conditions, workplace hazards and unsafe housing. Certain cultural practices like using unsafe fireworks in festivities and celebratory gunfire also increase the risk.^{3,4}

A medicolegal case is any accident or illness case in which there is some criminality. Globally, medicolegal injuries are a major public health concern, especially in low- and middle-income nations where healthcare systems frequently face the combined challenges of trauma and scarce resources. Increased morbidity, mortality, and socioeconomic expenses are just a few of the far-reaching effects that these injuries which are frequently caused by violence, accidents, or self-harm have on people, families, and societies. Because these cases frequently necessitate legal inquiry and documentation, the medicolegal implications add even another level of complexity, placing further demands on the legal system and healthcare practitioners.^{5,6}

Pakistan faces significant burden of injuries as there is ongoing rapid urbanization, unemployment, socioeconomic disparities and lack of implementation of rules.⁷⁻⁹ The etiology of medicolegal injuries is multifactorial. In order to assess the burden of medico-legal cases, determine their risk, and prevent future avoidable casualties, these cases must be reported. In order to develop and implement preventive measures for medicolegal cases understanding risk factors are important. The determinants of medicolegal cases are complex and might include environmental factors like occupational risks, road safety measures, and levels of violence in the

community, as well as demographic aspects like age, gender, and socioeconomic position.¹⁰⁻¹³

From a public health perspective, addressing medicolegal injuries requires a multifaceted approach. Preventive measures, such as stricter enforcement of traffic laws, public awareness campaigns on violence prevention, and the implementation of occupational safety standards, are critical. Even while the impact of medicolegal injuries on public health is becoming more widely acknowledged, there is still a dearth of data in many contexts, especially in our regions where occupational injuries, interpersonal violence, and traffic accidents are common.^{14,15} The purpose of this study is to determine the risk variables for medicolegal injuries. By adopting a public health lens, the study seeks to uncover patterns and determinants of injuries that can inform prevention strategies and reduce the burden on both individuals and healthcare systems.

Methodology

This cross-sectional study was carried out from June to December 2024 through secondary data analysis of medicolegal cases, after obtaining clearance from the Ethical Review Board of the Services Institute of Medical Sciences, Lahore (IRB/2024/1408/SIMS). The inclusion criteria comprised all medicolegal cases involving individuals aged above 18 years, as recorded in the medicolegal register of the Department of Forensic Medicine. Cases with incomplete records were excluded. Additionally, data related to sexual abuse was excluded due to the highly sensitive nature of the information, which required strict confidentiality measures. Even anonymized data could pose a risk of identification in small sample sizes, potentially compromising privacy. The calculated sample size was 370, based on a 95% confidence interval, a 5% margin of error, and an anticipated prevalence of physical violence in medicolegal cases estimated at 40%.¹⁶

Data was obtained from the medico-legal register through complete enumeration, covering the period from May to

December 2023. Data extraction form was used to extract the data from register. The first part of the data extraction form consisted of demographic details. The second part consisted of factors like Mode of Injury, Cause of Injury, Location of Injury, Mechanism of Injury and Time to come to healthcare facility after injury. In this study; mode of injury was categorized into Physical Assault (including both blunt trauma, penetrating trauma and falls), Road traffic accident, Firearm Injury or Burn Injury. The cause of injury was categorized into accidental, intentional, and self-inflicted. Accidental injuries result from unplanned events like falls or traffic accidents. Intentional injuries were harm caused by others and self-inflicted injuries were harm done by themselves. Location of injuries were classified as: head and neck, thoracic, abdominal, back, upper limb (arms), and lower limb (legs). The mechanism of injury was classified as blunt, sharp, firearm, thermal or chemical burns.

To ensure confidentiality and privacy, name and other identifiers were not recorded. The data was entered and analyzed using the statistical package for the social sciences version 29. Qualitative variables were computed in the form of frequencies and percentages. Chi square is used to find association between injury-related variables with employment status. P value less than 0.05 was taken as significant.

Results

A total of 370 cases were included in the study. The socio-demographic profile of study respondents is shown in Table 1. Most of the cases were aged less than 45 years 300 (81.1%), were from urban sector 347(93.8%), were males 252 (68.1%) and were unskilled workers 166(44.9%). Injury related factors are shown in table 2. The majority of the medicolegal cases were intentional 269 (72.7%) and the major mode of injury was physical assault 279 (75.4%). Out of the respondents' head and neck was the most frequent site of injury 198 (53.5%).

Table 1: Sociodemographic Profile of Study Participants

Variable	Category	Frequency (n)	Percentage (%)
Age	Less than 45 years	300	81.1
	Equal or greater than 45	70	18.9
Place of residence	Urban	347	93.8
	Rural	23	6.2
Gender	Male	252	68.1
	Female	118	31.9
Occupation	Skilled Workers	97	26.2
	Unskilled Workers	166	44.9
	Unemployed	107	28.9

Table 2: Injury related Characteristics of Study Participants

Variable	Category	Frequency (n)	Percentage (%)
Cause of Injury	Accidental	90	24.3
	Intentional	269	72.7
	Self-inflicted	11	3.0
	Physical Assault	279	75.4
Mode of Injury	Road traffic accident	62	16.8
	Firearm Injury	19	5.1
	Others (including burn injuries)	10	2.7
Location of Injury	Head & Neck	198	53.5
	Thoracic	12	3.2
	Abdominal	11	3.0
	Back	10	2.7
	Upper Limb(Arms)	92	24.9
	Lower Limb(Legs)	47	12.7
Mechanism of Injury	Blunt	306	82.7
	Sharp	25	6.8
	Firearm	19	5.1
	Thermal or chemical burn	18	4.9
	Others	2	0.5
Time to Reach Healthcare after Injury	Within 06 hours	226	61.1
	06-12 hours	84	22.7
	12-24 hours	52	14.1
	24-48 hours	1	0.3
	More than 48 hours	7	1.9

The location of injury is shown in Figure 1. Most common site of injury in medicolegal cases was head and neck (198 ,53.51%).

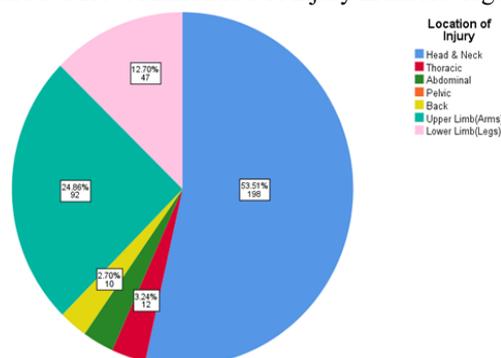


Figure 1: Location of Injury in Medicolegal Cases (n=370)

Chi-square test was applied to compare employment status (Employed including Skilled and Unskilled workers and unemployed) with injury characteristics in the respondents. It shows that employed individuals (both skilled and unskilled workers) and unemployed individuals have similar distributions for most injury types, with no significant differences in mode of injury, location of injury, or mechanism of injury (p -values > 0.05). However, cause of injury significantly differs, with accidental injuries being more common among employed individuals ($p = 0.001$), while intentional injuries are more prevalent among the unemployed. The duration to reach a healthcare facility shows no significant difference between the groups.

Table 3: Bivariate analysis of Injury-related Variables with Employment Status

Variable	Employed n (%)	Unemployed n (%)	p-value
Mode of Injury			
Physical Assault	194 (73.8)	85 (79.4)	0.299
Firearm Injury	12 (4.6%)	7 (6.5)	
RTA	50 (19)	12 (11.2)	
Others	7 (2.7)	3 (2.8)	
Location of Injury			
Head & Neck	144 (54.8)	54 (50.5)	0.225
Thoracic	11 (4.2)	1 (0.9)	
Abdominal	6 (2.3)	5 (4.7)	
Back	6 (2.3)	4 (3.7)	
Upper Limb	67 (25.5)	25 (23.4)	
Lower Limb	29 (11.0)	18 (16.8)	
Cause of Injury			
Accidental	77 (29.3)	13 (12.1)	0.001
Intentional	177 (67.3)	92 (86.0)	
Self-inflicted	9 (3.4)	2 (1.9)	
Mechanism of Injury			
Blunt	215 (81.7)	91 (85.0)	0.053
Sharp	20 (7.6)	5 (4.7)	
Firearm	12 (4.6)	7 (6.5)	
Thermal/ Chemical Burn	16 (6.1)	2 (1.9)	
Others	0 (0)	2 (1.9)	
Duration to Reach Health Care Facility			
Within 24 hrs	258 (98.1)	104 (97.2)	0.588
After 24 hrs	5 (1.9)	3 (2.8)	

Discussion

This study highlights the associated factors of medicolegal injuries coming to a tertiary care hospital of Lahore. These injuries have a significant implication on health of individual, family and legal systems. The findings from this article show the sociodemographic and environmental risk factors contributing in medicolegal injury which can serve as a foundation for developing preventive strategies.

The findings revealed that individuals below 45 years of age (81.1%) and males (68.1%) were disproportionately affected, consistent with global trends where younger males are more engaged in high-risk activities and occupations. These groups often bear the brunt of occupational hazards, interpersonal violence, and road traffic accidents. Supporting this, a previous study in emergency departments reported males as more frequent victims of injuries.¹⁷ This highlights the necessity of gender- and age-specific interventions, such as workplace safety protocols and awareness campaigns targeting risky behaviors.

Employment emerged as a critical factor influencing injury patterns. While unskilled workers comprised the largest occupational group affected (44.9%), employed individuals were more likely to experience accidental injuries (29.3%, Table 3). A study done in medicolegal department at Sri Lanka has shown that most of the patients presenting are unskilled workers.¹⁸ This suggests exposure to hazardous work environments, underscoring the urgent need for implementing occupational safety regulations. By contrast, unemployed individuals demonstrated a significantly higher prevalence of intentional injuries (86%), reflecting the psychosocial stress and potential involvement in interpersonal conflicts often linked to unemployment. This finding resonates with existing research, which associates unemployment with heightened risks of violence and mental health challenges.¹⁹ A study in France has shown that road traffic accidents while commuting to workplace are showing a rising trend and are a cause of concern.²⁰

The mode of injury predominantly involved physical assault (75.4%), followed by road traffic accidents (16.8%, Table 2). This aligns with studies from similar contexts, where physical assault reflects societal issues such as interpersonal violence, substance abuse, and inadequate conflict resolution mechanisms.²¹ The location of injuries showed a predominant involvement of the head and neck (53.5%, Figure 1), which can be attributed to the vulnerability of these regions during physical assaults or accidents. A study from Nepal corroborates these findings, reporting that head and neck injuries are common in physical assaults due to punches, kicks, and blunt objects.²²

The findings of this study can be generalized to populations with similar socio-economic and healthcare contexts, particularly in low- and middle-income countries. The overrepresentation of younger males and unskilled workers among victims aligns with global trends, highlighting universal risk factors such as occupational hazards, interpersonal violence, and risky behaviors. A multifaceted approach is required for preventing medicolegal injuries which can include community-based initiatives, prevention of drug addiction and substance abuse. Strict enforcement of rules and regulations should be done

for injury mitigation. Additionally, establishing robust injury surveillance systems is vital to monitor trends of medicolegal injuries. Collectively these measures can reduce the burden of medicolegal injuries. The strengths of this study are that it is a comprehensive analysis of medicolegal cases, providing insights into the socio-demographic and injury-related characteristics of individuals seeking health care. Additionally, the exclusion of highly sensitive cases, such as sexual abuse, demonstrates ethical consideration and ensures data privacy.

Limitations

However, the study also has limitations that must be acknowledged. The reliance on secondary data from medicolegal registers may introduce reporting bias. Furthermore, the exclusion of sexual abuse cases, while ethical, limits the comprehensiveness of the analysis. Finally, certain variables, such as socio-economic status and underlying health conditions, were not explored in detail, which could have provided additional context to the findings.

Conclusion

This study demonstrates the significant demographic and injury-related factors associated with medicolegal cases. Younger males, particularly those engaged in unskilled labor, were disproportionately affected. The most common causes, including intentional injuries via physical assault and blunt trauma to the head and neck, highlight critical areas for intervention.

Recommendations

First of all, stronger enforcement of occupational safety regulations is needed, especially for unskilled workers who are most at risk of accidental injuries. Providing safety training and protective equipment can help reduce workplace hazards. Secondly, community-based violence prevention programs should target unemployed individuals, focusing on conflict resolution, mental health support, and education to reduce interpersonal violence. Lastly, enhancing injury surveillance systems is crucial for better tracking of medicolegal injuries, enabling evidence-based strategies to prevent and mitigate injuries more effectively.

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