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Original Research Article

THE INVESTIGATION LOOKS AT CHEST INJURIES RESULTING FROM BLUNT TRAUMA THROUGH A PROSPECTIVE AUTOPSY ANALYSIS A SINGLE-CENTER STUDY

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Abstract: *Chest trauma is a significant public health concern, accounting for 15-20% of all trauma-related deaths. The purpose of this study was to examine chest injuries resulting from blunt trauma, with a focus on autopsies. The study aimed to evaluate the epidemiological characteristics of the victims, including their age, gender, and the type of trauma they experienced, as well as identify the leading causes of mortality in these cases. The study was conducted at the Department of Medicine at MTI, LRH, from March 2020 to March 2021 and examined 112 blunt trauma patients. The study collected comprehensive epidemiological data on the victims, including their age, gender, type of trauma, injuries, and other relevant case-related factors. A thorough form was created to record the historical and epidemiological data systematically. The study carefully examined every deceased person, including both external and internal injuries, as well as a detailed evaluation of the thoracic region's bones and joints. The average age of the victims was 31.7±5.41 years, with 16 (14.3%) in the age range of 1-20 years, 62 (55.5%) in the age range of 21-40 years, 18 (16.1%) in the age range of 41-60 years, and 16 (14.3%) in the age range of over 60 years. Of the 112 cases examined, 80 (71.4%) were related to road traffic accidents, 14 (12.5%) were falls from height, 12 (10.7%) were assaults, and 6 (5.4%) were miscellaneous incidents. Male victims constituted 92 (82.1%) of the cases, while female victims were 20 (17.9%). Motorcycles were the most common type of vehicle involved in road traffic accidents, accounting for 72 (64.3%) of the cases. In most cases, the survival rate was less than six hours, with 76 (67.9%) cases falling into this category. The primary causes of death were shock and bleeding, followed by suffocation and coma. In conclusion, the study found that road traffic accidents were the most common cause of chest injuries, likely due to the prevalence of automobiles. Shock and bleeding were the leading causes of death, followed by suffocation and unconsciousness. Most victims had a survival rate of less than six hours.*

Keywords: Blunt Trauma, Chest Injuries, Autopsy

Introduction

According to an earlier study, trauma is still a significant cause of death for those under 40. The idea that deaths from trauma occurred in three separate peaks—a phenomenon called trimodal distribution—included deaths from penetrating and blunt injuries (Hemmila et al., 2010). According to reports, the primary cause of death in these situations is bleeding, along with shock (Battistella et al., 1997; Shafi et al., 2009). The history of trauma dates back to the time of human development, when the chest was thought to be one of the most vulnerable bodily parts and to be seriously damaged (Cardenas et al., 2004). The contemporary era's rapidly growing industry, increasing vehicle traffic, altering social patterns, high-rise buildings, and rising crime rates all contributed considerably to the increased frequency of trauma accidents (Cifu et al., 1999). Vital organs like the heart, lungs, and main blood arteries are in the chest cavity (Clark et al., 2004).

Damage to the heart, lungs, or blood vessels may harm a person's life and integrity. Because of their position and size, they continue to be a common site of injury in RTA. Chest-related crush injuries are continuing on the rise, even with improvements in vehicle safety and the availability of sophisticated control techniques (Jencks et al., 2009). In addition, most fatalities caused by trauma have legal ramifications. Thus, it is necessary to ascertain the cause of death to pursue damages from the government or insurance providers. Approximately 10% of trauma-related deaths and 15% of disability-adjusted life years (DALYs) are caused by chest injuries (Ladha et al., 2011; Malhotra et al., 2009). Interestingly, in pediatric trauma patients, they are the second most common cause of mortality (Morris et al., 2011). However, it is still difficult to precisely determine the entire degree of chest injuries and the consequences that go along with them since there is a lack of available data. The study and interpretation of these injuries are hampered by the lack of data, which makes it challenging to create efficient defenses, assessments, and preventative plans. There is a lack of trustworthy epidemiological data primarily about trauma induced by blunt mechanisms, despite the significant societal effect of trauma.

Methodology

The study focused on autopsies of individuals who suffered chest injuries due to blunt trauma. It utilized a retrospective

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observational design, which allowed for a thorough examination of epidemiological characteristics and causes of mortality associated with such injuries.

The research was conducted at the Department of Medicine at MTI, LRH, and covered one year from March 2020 to March 2021. This duration allowed for a comprehensive data collection on sufficient cases.

A total of 112 cases of blunt trauma resulting in chest injuries were included in the study. Although the selection criteria were not explicitly mentioned, it can be inferred that the cases were likely selected based on the availability of complete autopsy records for the specified time frame.

Comprehensive epidemiological data were collected for each case, including age, gender, type of trauma, injuries sustained, survival time, and causes of death. A thorough and systematic data recording process created a detailed form with sections for each data parameter. This facilitated consistent and standardized data collection across all cases. The data collection process involved meticulously examining historical, external, and internal factors related to each deceased person.

Each deceased person underwent a comprehensive autopsy. External injuries were examined, and a detailed evaluation of bones and joints in the thoracic region was conducted. Internal injuries, likely including organ damage, were thoroughly assessed. This step ensured a detailed understanding of the nature and extent of injuries sustained. While not explicitly mentioned, it can be inferred that statistical analysis was conducted to derive average age, percentage distributions, and other relevant findings. Descriptive statistics, such as mean and percentages, were likely used to summarize and present the collected data.

The study adhered to ethical principles concerning autopsies and medical research. Respect for confidentiality, privacy, and adherence to ethical standards in autopsy procedures were assumed.

Results

The average age of all individuals was 31.7±5.41 years. Age-specific patient distributions were as follows: 16 (14.3%) in 1-20 years, 62 (55.5%) in 21-40 years, 18 (16.1%) in 41-60 years, and 16 (14.3%) in >60 years. There were 80 (71.4%) road traffic accidents, 14 (12.5%) falls from height, 12 (10.7%) assaults, and 6 (5.4%) miscellaneous incidents. Twenty (17.9%) females and 92 (82.1%) guys were present. In 72 (64.3%) occurrences, motorcycles were the most common RTAs. Less than six hours was the survival rate for most cases, 76 (67.9%). The leading causes of death were shock and bleeding, suffocation, and coma.

The mean age was 31.7±5.41 years. Patient's distribution based on their age were as follows: 8 (14.3%) in 1-20 years, 31 (55.5%) in 21-40 years, 9 (16.1%) 41-60 years, and 8 (14.3%) in >60 years. The incidence of road traffic accident, fall from height, assault, and other was 40 (71.4%), 7 (12.5%), 6 (10.7%), and 3 (5.4%) respectively. There were 46 (82.1%) males and 10 (17.9%) females. Motorbike was the most prevalent RTA type in 36 (64.3%) cases. In most cases, 38 (67.9%) had a a survival rate of less than 6 hours. Shock and hemorrhage were the prominent causes of mortality, followed by asphyxia and coma. Table I presents the demographic information of the patients. It was noted that 4 cases (42.9%) of victims experienced rib fractures, with combined bony fractures occurring in 20 cases (35.7%) (Table 2, Figure 1).

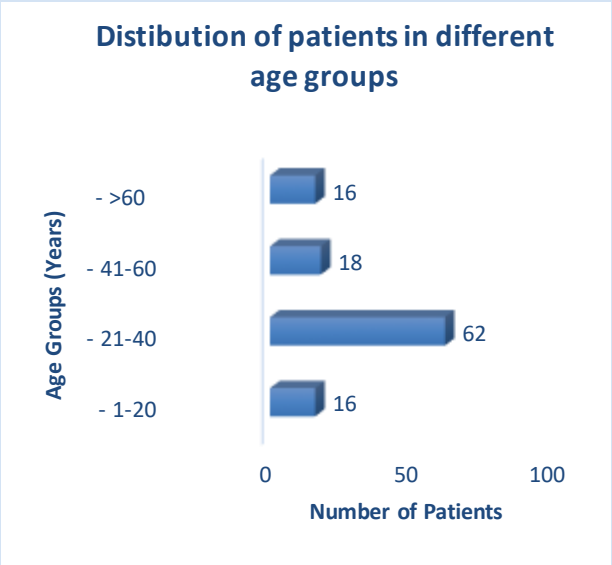

Figure 1: Distribution of patients in different age groups

Table 1: Demographic Details of Patients (N=112)

Age Group (years)	Number of Patients	Gender	Type of Trauma
1-20	16	8 M, 8 F	Road Traffic Accident (RTA) - 8, Fall from Height - 4, Assault - 3, Other - 1
21-40	62	54 M, 8 F	RTA - 46, Fall from Height - 7, Assault - 6, Other - 3
41-60	18	9 M, 9 F	RTA - 16, Fall from Height - 1, Assault – 1
>60	16	16 M	RTA - 12, Fall from Height - 3, Assault - 1To
Total	112	92 M, 20 F	RTA - 80, Fall from Height - 14, Assault - 12, Other – 6

Table 2: Summary of Variables in the Study

Variable	N	(%)
Age Groups (years)		
- 1-20		16 (14.3%)
- 21-40		62 (55.5%)
- 41-60		18 (16.1%)
- >60		16 (14.3%)
Type of Trauma		

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- Road Traffic Accidents (RTA)		80 (71.4%)
- Falls from Height		14 (12.5%)
- Assault		12 (10.7%)
- Miscellaneous Incidents		6 (5.4%)
Gender		
- Male		92 (82.1%)
- Female		20 (17.9%)
Survival Rate (hours)		
- <6 hours		76 (67.9%)
- ≥6 hours		36 (32.1%)

Discussion

Using prospective autopsy analysis, the current study investigated the chest injuries resulting from blunt trauma and discovered that, since so many cars are engaged in these types of situations, road traffic accidents were the most frequent cause of chest trauma. The survival rate was Less than six hours in most instances (Masini et al., 2011). Shock and bleeding were the primary causes of death, with suffocation and unconsciousness coming in second and third. According to a previous Study, the impact of multiple trauma to death rates has dramatically reduced in the past several decades as the healthcare system has advanced (Morris et al., 2011). In this study, only individuals with a particular kind of trauma were included. The following were the main conclusions of our analysis: Trauma victims were classified according to their unique method of death. Roughly speaking, the majority of victims passed away from their wounds at the scene, with a consistent decline seen over the post-traumatic period (Gunst et al., 2010). Head and thoracic injuries were the most common kinds of injuries seen in our Study, and they also happened to be the leading causes of mortality. On the other hand, trauma related to the abdominal and pelvis was classified as less severe. Furthermore, characteristics like location and injury patterns that affect the overall death pattern among trauma patients were emphasized by our study of cumulative mortality data that took into account different periods (Baker et al., 1980).

In the last several decades, a number of studies have examined the distribution of death rates among instances of severe trauma (Trauma Trunkey, 1983). However, as many studies have pointed out, the mechanism of trauma and the specific kind of damage are what matter when it comes to determining when trauma-related fatalities occur (Demetriades et al., 2005). Surprisingly, little Study has been done on the patterns and reasons behind RTA death, mainly as the majority of studies have also included penetrating trauma patients (Demetriades et al., 2004). Our Study showed an unimodal distribution of death, notably for individuals with blunt injuries from traffic crashes. According to earlier studies, blunt trauma deaths often occur later, during the post-traumatic period, while penetrating trauma deaths occur shortly after the occurrence (Pang et al., 2008). A previous multi-investigation study found that a notable proportion of on-scene mortality was also present in deaths from blunt trauma (Sauaia et al., 1995).

The question of whether early trauma fatalities, especially those that happen in the first hours after the occurrence, may be prevented has been discussed in a number of Studies (Meislin et al., 1997). The most frequent cause of blunt chest trauma was found to be road traffic accidents (RTAs), which is in line with findings from other studies (Bamvita et al., 2007). The study also showed that those in the age range of 21 to 30 had the most significant frequency of blunt chest injuries, followed by people in the age range of 31 to 40. Previous investigations revealed similar results. This tendency may be explained by the fact that, in contrast to the extreme age, young adults—who make up the bulk of the workforce—spend more time outside (Trunkey and Lim, 1974).

The current investigation found that the most common causes of injuries were thoracic, brain, and a combination of both. These wounds, which were often accompanied by other lesions at the same time, most certainly contributed significantly to the patients' deaths. Interestingly, traumatic brain injuries are still quite significant today; a review of the literature suggests that trauma ranks second in terms of cause of death (Potenza et al., 2004). The second most common cause of death from thoracic or abdominal injuries was exsanguination (Cothren et al., 2007). Bleeding was the most often reported cause of death in instances of penetrating trauma, while severe bleeding along with brain damage was the cause of blunt trauma mortality (Shackford et al., 1993).

Conclusion

Because so many cars are engaged in these types of situations, road traffic accidents were the most prevalent cause of chest injuries. Less than six hours was the survival rate in most of the instances. Shock and bleeding were the primary causes of death, with suffocation and unconsciousness coming in second and third.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned.
Consent for publication
Approved
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Not applicable

Conflict of interest

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The authors declared absence of conflict of interest.

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References

Baker, C. C., Oppenheimer, L., Stephens, B., Lewis, F. R., and Trunkey, D. D. (1980). Epidemiology of trauma deaths. *The American Journal of Surgery* **140**, 144-150.

Bamvita, J.-M., Bergeron, E., Lavoie, A., Ratte, S., and Clas, D. (2007). The impact of premorbid conditions on temporal pattern and location of adult blunt trauma hospital deaths. *Journal of Trauma and Acute Care Surgery* **63**, 135-141.

Battistella, F. D., Torabian, S. Z., and Siadatan, K. M. (1997). Hospital readmission after trauma: an analysis of outpatient complications. *Journal of Trauma and Acute Care Surgery* **42**, 1012-1017.

Cardenas, D. D., Hoffman, J. M., Kirshblum, S., and McKinley, W. (2004). Etiology and incidence of rehospitalization after traumatic spinal cord injury: a multicenter analysis. *Archives of physical medicine and rehabilitation* **85**, 1757-1763.

Cifu, D. X., Kreutzer, J. S., Marwitz, J. H., Miller, M., Hsu, G. M., Seel, R. T., Englander, J., High Jr, W. M., and Zafonte, R. (1999). Etiology and incidence of rehospitalization after traumatic brain injury: a multicenter analysis. *Archives of physical medicine and rehabilitation* **80**, 85-90.

Clark, D. E., DeLorenzo, M. A., Lucas, F., and Wennberg, D. E. (2004). Epidemiology and short-term outcomes of injured medicare patients. *Journal of the American Geriatrics Society* **52**, 2023-2030.

Cothren, C. C., Moore, E. E., Hedegaard, H. B., and Meng, K. (2007). Epidemiology of urban trauma deaths: a comprehensive reassessment 10 years later. *World journal of surgery* **31**, 1507-1511.

Demetriades, D., Kimbrell, B., Salim, A., Velmahos, G., Rhee, P., Preston, C., Gruzinski, G., and Chan, L. (2005). Trauma deaths in a mature urban trauma system: is "trimodal" distribution a valid concept? *Journal of the American College of Surgeons* **201**, 343-348.

Demetriades, D., Murray, J., Charalambides, K., Alo, K., Velmahos, G., Rhee, P., and Chan, L. (2004). Trauma fatalities: time and location of hospital deaths. *Journal of the American College of Surgeons* **198**, 20-26.

Gunst, M., Ghaemmaghami, V., Gruszecki, A., Urban, J., Frankel, H., and Shafi, S. (2010). Changing epidemiology of trauma deaths leads to a bimodal distribution. *In* "Baylor University Medical Center Proceedings", Vol. 23, pp. 349-354. Taylor & Francis.

Hemmila, M. R., Nathens, A. B., Shafi, S., Calland, J. F., Clark, D. E., Cryer, H. G., Goble, S., Hoeft, C. J., Meredith, J. W., and Neal, M. L. (2010). The Trauma Quality Improvement Program: pilot study and initial demonstration of feasibility. *Journal of Trauma and Acute Care Surgery* **68**, 253-262.

Jencks, S. F., Williams, M. V., and Coleman, E. A. (2009). Rehospitalizations among patients in the Medicare fee-for-service program. *New England Journal of Medicine* **360**, 1418-1428.

Ladha, K. S., Young, J. H., Ng, D. K., Efron, D. T., and Haider, A. H. (2011). Factors affecting the likelihood of presentation to the emergency department of trauma patients after discharge. *Annals of emergency medicine* **58**, 431-437.

Malhotra, A. K., Martin, N., Jacoby, M., Tarrant, J., Guilford, K., Wolfe, L. G., Aboutanos, M. B., Duane, T. M., and Ivatury, R. R. (2009). What are we missing: results of a 13-month active follow-up program at a level I trauma center. *Journal of Trauma and Acute Care Surgery* **66**, 1696-1703.

Masini, B. D., Owens, B. D., Hsu, J. R., and Wenke, J. C. (2011). Rehospitalization after combat injury. *Journal of Trauma and Acute Care Surgery* **71**, S98-S102.

Meislin, H., Criss, E. A., Judkins, D., Berger, R., Conroy, C., Parks, B., Spaite, D. W., and Valenzuela, T. D. (1997). Fatal trauma: the modal distribution of time to death is a function of patient demographics and regional resources. *Journal of Trauma and Acute Care Surgery* **43**, 433-440.

Morris, D. S., Rohrbach, J., Rogers, M., Sundaram, L. M. T., Sonnad, S., Pascual, J., Sarani, B., Reilly, P., and Sims, C. (2011). The surgical revolving door: risk factors for hospital readmission. *Journal of Surgical Research* **170**, 297-301.

Pang, J.-M., Civil, I., Ng, A., Adams, D., and Koelmeyer, T. (2008). Is the trimodal pattern of death after trauma a dated concept in the 21st century? Trauma deaths in Auckland 2004. *Injury* **39**, 102-106.

Potenza, B. M., Hoyt, D. B., Coimbra, R., Fortlage, D., Holbrook, T., and Hollingsworth-Fridlund, P. (2004). The epidemiology of serious and fatal injury in San Diego County over an 11-year period. *Journal of Trauma and Acute Care Surgery* **56**, 68-75.

Sauaia, A., Moore, F. A., Moore, E. E., Moser, K. S., Brennan, R., Read, R. A., and Pons, P. T. (1995). Epidemiology of trauma deaths: a reassessment. *Journal of Trauma and Acute Care Surgery* **38**, 185-193.

Shackford, S. R., Mackersie, R. C., Holbrook, T. L., Davis, J. W., Hollingsworth-Fridlund, P., Hoyt, D. B., and Wolf, P. L. (1993). The epidemiology of traumatic death: a population-based analysis. *Archives of surgery* **128**, 571-575.

Shafi, S., Nathens, A. B., Cryer, G. H., Hemmila, M. R., Pasquale, M. D., Clark, D. E., Neal, M., Goble, S., Meredith, W. J., and Fildes, J. J. (2009). The trauma quality improvement program of the American College of Surgeons Committee on Trauma. *Journal of the American College of Surgeons* **209**, 521-530e1.

Trauma Trunkey, D. (1983). Accidental and intentional injuries account for more years of life lost in the US than cancer and heart disease. Among the prescribed remedies are improved preventive efforts, speedier surgery and further research. *Sci Am* **249**, 28-35.

Trunkey, D. D., and Lim, R. C. (1974). Analysis of 425 consecutive trauma fatalities: an autopsy study. *Journal of the American College of Emergency Physicians* **3**, 368-371.

[Citation: KHAN, Z., KHAN, A.M., BASIT, A., KHAN, M.A, ALI, A. (2023). The investigation looks at chest injuries resulting from blunt trauma through a prospective autopsy analysis a single-center study. *Biol. Clin. Sci. Res. J.*, **2023***: 585*. doi: https://doi.org/10.54112/bcsrj.v2023i1.585]

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