

Study of the Mechanical Causes of Death in Fatalities Referred to the Department of Forensic Medicine

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Abstract: Introduction: All type of external impacts which cause disease or deaths are called trauma. Mechanical trauma is an injury to any portion of the body from the impact of kinetic force which damage the normal anatomy and physiology of an organ or tissue.¹⁻³ Trauma has always been a part of human existence and has significant importance in developing and third world countries. According to the World Health Organization (WHO), approximately one-third of the world's 5.8 million deaths are due to mechanical injuries such as suicide, homicide, war, and road traffic accidents.³ Objectives of the study: To find the mechanical causes of death and the factors that causes those deaths due to mechanical injuries. Research Method: Cross-sectional descriptive study has been planned and designed. Findings: Based on 1257 fatalities, 638 cases (51%) are due to mechanical injuries from which are 538 cases (84%) males, 100 female cases (16%), 312 cases (48.8%) in terms of age of people between 20-40 years old, in terms of marital status, married 422 cases (66.14%), low level of education or illiterate both total 324 cases (50.74%), in terms of low-income or unemployed employment 156 cases (24.45%) and 151 cases (23.66%) respectively they were. Firearms injuries account for 472 cases (67%), 115 cases (18%) for blunt trauma and 96 cases (15%) for sharp injuries. In terms of causes of death, destruction of vital organs (head, heart, lungs, liver ...) 321 cases (50.3%), bleeding 138 cases (21.6%) and the lowest causes of death are amputation of the head. Final findings: The most common fatalities in forensic medicine are mechanical injuries that occur in young married, illiterate, low-income or unemployed men. The main causes of injuries are firearms injuries. Most causes of death are due to the destruction of vital organs.

Keywords: mechanical causes, death and forensic

1. Introduction

All type of external impacts which cause disease or deaths are called trauma. Mechanical trauma is an injury to any portion of the body from the impact of kinetic force which damage the normal anatomy and physiology of an organ or tissue.¹⁻⁴ Trauma has always been a part of human existence and has significant importance in developing and third world countries. According to the World Health Organization (WHO), approximately one-third of the world's 5.8 million deaths are due to mechanical injuries such as suicide, homicide, war, and road traffic accidents.⁶

Despite of safety laws and efforts to raise public awareness of the problems, the rate of accidents remains high. Although modern medicine is able to deal with many dangers, the effects of trauma still pose a more serious risk to health and reduce efficiency and money consumption.

2. Discussion and Objectives

The increasing incidence of death due to various external factors is the reason for choosing this research. The results of this study provide information for the law enforcement officer (police, intelligence), courts and public health in relation to the incidence of deaths due to mechanical factors and to reduce its favorable areas in security, justice and public health programs. The result of the research provides public awareness of which people in the community (in terms of age, sex, occupation and level of education) are more prone to fatal injuries.

Research questions

- 1) What will be the rate of deaths due to mechanical factors such as (blunt, sharp, firearms) injuries?
- 2) What are the causes of death due to mechanical injuries?
- 3) What is the rate of deaths due to mechanical factors based on demographic specification such as age, gender, occupation and level of education?
- 4) What is the Proportion of fatal incidents due to mechanical injuries according to the seasons?

3. Background

In today's world of trauma, the leading cause of death is hospitalization and disability in all age groups, so today trauma victims are being worked on more than any other cause of disability or disease. According to the World Health Organization (WHO) Approximately one-third of the world's 5.8 million deaths due to mechanical injuries are the result of suicide, homicide and war, and almost a quarter is the result of road traffic accidents. Other major causes of death due to injuries are falls from heights, Asphyxia, burns, poisoning, etc.⁴

According to WPRO and SEARO, 2.3 million people in 2016 have lost their lives in Asia and the Pacific, which accounts for 8.6 percent of all deaths. Countries vary in terms of causal factors, type of injury, age, sex, and financial income. Mechanical injuries are the ninth leading cause of rapid death worldwide and the third most common cause of disability each year. One third of injuries worldwide (32.8%) are intentionally caused by violence and interpersonal and unintentional warfare. Annual violence

kills more than 1.6 million people worldwide. Many others are injured and experience a wide range of physical and mental health problems.⁴

In a 2017 study in the United States by Melonie Heron Dr. 16.9% of all fatalities are caused by three factors (consequences of injuries, stroke, chronic lower respiratory tract diseases).⁵

According to the forensic medical study in India by Katageri, Suresh et al, Of the 159 fatalities performed for Sanjiv Gandhi's forensic autopsy in Delhi over a three-year period (2011-2014) and for various sociological factors involved in the murder. The results showed that men were more likely to die from mechanical trauma than women. Most of the victims in the 21 to 30 age group were married, had lower social and economic status, and were from rural areas which is 47.16 percent of cases.⁷ In another study conducted in Brazil, the average age of corpses were between 38 and 35 years. The majority of corpses were male (87.5%). The most common cause of death was mechanical injury (64%), generally due to gunshot wounds (48.7%). And most were 35 years old.¹¹ In a cross-sectional study over a period of 10 years from 01-01-2006 to 31-12-2015, 63 cases were performed in the forensic medicine department of MKCG University, Brahmapur, Odosha, India. Mortality due to mechanical injuries was reported at 8.65%. Most of the victims (82%) were men. People in the age group of more than 60 years and less than 10 years together accounted for 38% of fatal injuries. In most cases, sharp tools (46.03%) and secondarily, blunt tools (20.6%) have been used. The main cause of death was coma (38.09%) followed by shock due to bleeding in 34.92%.⁷

In another study, the purpose of this study was to analyse autopsy findings after death from mechanical trauma in the US state of Los Angeles from 881 deaths from mechanical trauma by the Los Angeles Department of Forensic Medicine, 304 (35%) underwent a complete autopsy with internal examination and analysis. The mean age was 21 ± 43 years, most were male (71%). The most common vehicle collision mechanism (50%) followed by a vehicle collision with a sidewalk (37%).¹⁰

A one-year cross-sectional study was conducted from January 2010 to December 2010 at the Department of Forensic Medicine, Victoria Hospital, and Bangalore, India, to examine weapons for mechanical injuries in fatal cases. Firearms were typically used for attack in 20 cases (46.51%). (67.44%) is the most common cause of gunshot wounds.⁷ Anatomical trauma recording systems is essential for trauma research. In a prospective study, the mean age at death was 37.1 ± 18.7 years. 86% of the victims were men.⁹

In a study in forensic medicine at the University of Copenhagen in Denmark by Alberkitsen and colleagues on 218 fatalities due to mechanical injuries. In 11(5%) cases, independent injuries alone resulted in death, while in 51 (23%) in the form of monetary trauma. 27% of moderate injuries were serious in 28%, 40% severe and 5% critical. It has been concluded that autopsies are important in determining the cause of death from mechanical injury not only for legal certainty but also for the social need to analyse trauma mechanisms and possibly preventive measures.¹³

In postmortem studies of mechanical deaths clinical records of victims performed retrospectively on 7008 autopsy cases during 2001-2005 in the Department of Forensic Medicine and Toxicology of the Indian Institute of Forensic Medicine and Toxicology in New Delhi. During the study period, 2472 patients (35.27%) were affected by driving accidents whose male to female ratio was 7.49: 1. The most common age group was in the age group of 21 to 40 years, which included 1341 cases (44.24%). Pre-hospital mortality was 985 cases (39.84%). In 1699 cases (76.86%) of firearm injuries, which caused a large fraction of conjunctivitis, in 1183 cases (69.63%) cases of head injuries were observed. The most common fraction was related to temporal bone (559 people = 47.25%). The most common variant of hepatic haemorrhage was subcutaneous hemorrhage (1514 patients = 11.11%). The highest damage was in the epigastric area (532 patients = 21.52%). There was no significant difference in the seasons of the year in the occurrence of fatal traffic accidents on weekends and days of the week. But in November, the maximum casualties (273 people = 11.04%) of the total casualties of vehicle accidents occurred over a period of 5 years.¹⁴

Materials and methods of research

In the form of a cross-sectional observational study on the fatalities caused by mechanical injuries, the Department of Forensic Medicine Services has been designed. The obtained information includes demographic characteristics of events (age, sex, marital status, occupation and degree of education) based on the information in the register book of the Department of Forensic Medicine and characteristics (cause of injuries, type of injuries, causes of death) based on papers and opinions of the Department of Forensic Medical Services has collected and inserted the previously prepared forms according to the questions presented in the tables and diagrams.

4. Results

During the year 1396 solar (2017) 1257 fatalities were referred from the law enforcement officer (Police, Intelligence, Attorney General) and courts to the Department of Forensic Medicine (the only center for the supply of medical justice services in Kabul and its neighboring provinces) of which 638 fatalities (51%) caused Mechanical trauma and 619 fatalities (49%) caused other causes of death.

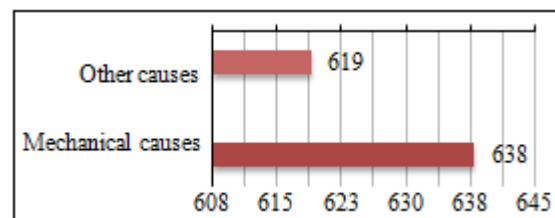


Figure 1: Indicates the occurrence of fatalities due to mechanical injuries and other causes of death

The above Figure shows that the increase in deaths due to mechanical trauma is significant compared to other causes of death.

Table 1: Incidents of death due to mechanical injuries by age

Age	Number	Percentage
0-10 years	15	2.35%
11-20 years	60	9.40%
20-30 years	141	22%
31-40 years	171	26.80%
41-50 years	116	18%
51-60 years	96	15%
Over 60 years	39	6%

The table above shows that in terms of age of young people between the ages of 21 to 40 years (with an average age of 30 years) a total of 312 cases (48.8%) are the most deaths due to mechanical injuries and ages 0-10 years 15 cases (2.35 %) And over 60 years, 39 cases (6%) constitute fewer events.

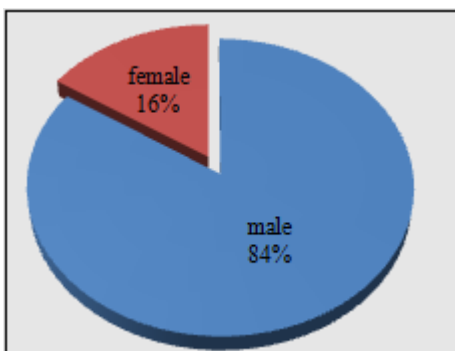


Figure 2: Deaths due to mechanical trauma in terms of gender

The above Figure shows that in terms of male gender, the highest number of fatalities due to mechanical injuries is 538 cases (84%) and females 100 cases (16%)

Table 2: Deaths due to mechanical injuries in terms of civil status

Civil status	Number	Percentage
Single	177	22.70%
Married	422	66.14%
Unknown	39	6.10%

In terms of civil status, according to the information in the table above, 422 cases (66.14%) of people were married. Their civil status could not be stabilized.

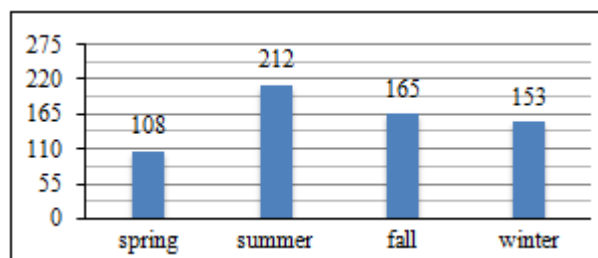


Figure 3: Occurrences due to mechanical injuries according to the seasons

In terms of seasons, the most events in the summer are 212 events (33.22%) and the autumn season is 165 events (25.86%). According to the above Figure, it can be seen that in the spring, the lowest number of deaths due to mechanical injuries occurred and an upward trend is seen in the summer, which shows a significant difference.

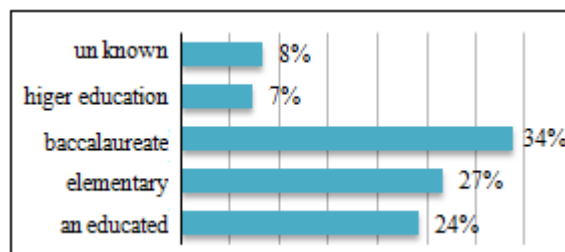


Figure 4: Deaths due to mechanical injuries in terms of educational level during life time

According to the table above, when we look at the educational level of the deceased during their lifetime, although we can see that in the table the most victims are people with a bachelor's degree, but if I calculate the total number of illiterate people with primary education (324 in total) Incidents (50.74%) (more than half of the figures) and the fewest victims during their lifetime have higher education. That is a huge difference.

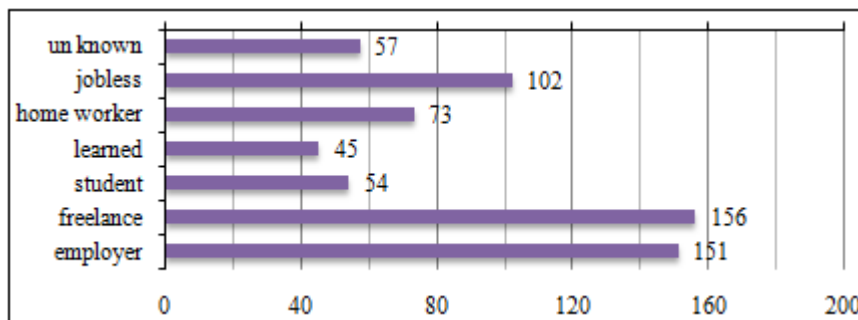


Figure 5: Occupational status of deceased persons due to mechanical injuries during life

In terms of occupations, most of the people during their lifetime were employed and freelance (strangers, shopkeepers, craftsmen ...) and employees, which were 156

cases (24.45%) and 151 cases (23.66%), respectively, and a significant figure. Another significant number of 102 cases (15.98%) were unemployed.

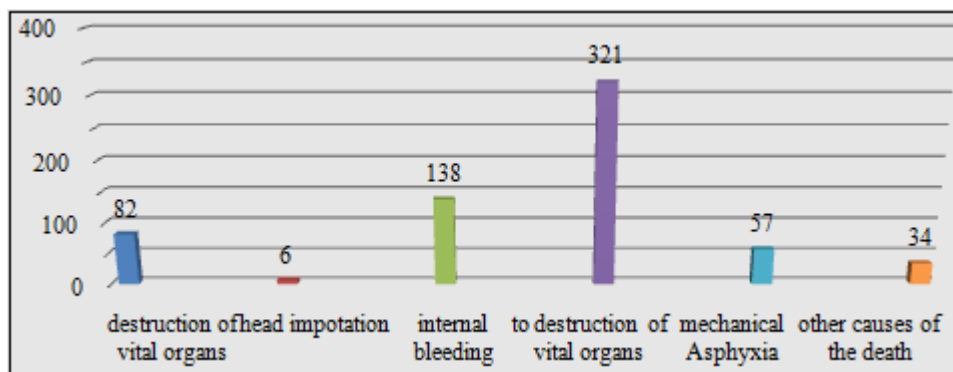


Figure 6: Causes of death in fatalities due to mechanical injuries

In terms of causes of death, the highest number of deaths due to destruction of vital organs (head, heart, lungs, liver) 321 cases (50.3%) and secondary bleeding 138 cases (21.6%) and the lowest causes of death were amputation of the head, See Figure (6). which is established in forensic examinations, which in external, internal and complementary examinations, the most injuries in the positions of the skull, chest, abdomen and upper and lower limbs, respectively

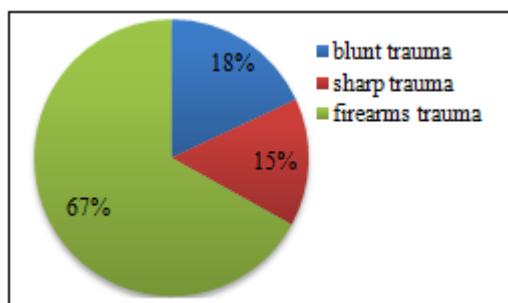


Figure 7: Indicates mechanical injuries based on the surface characteristics of the impact

As can be seen in the above diagram, out of the total number of fatalities due to mechanical injuries, 427 cases (67%) were injured by 115 (18%) and 96 cases (15%) were caused by sharp or injuries. This is the most common injury in terms of the factors that cause it. Of course, with the review of the relevant case, more firearms injuries occurred as a result of organized crime, armed robbery and terrorist explosions, while blunt and sharp trauma more occurred as a result of interpersonal violence leading to crime, traffic accidents, theft by vagrants and Random events have occurred. It is noteworthy that in connection with the job and educational level, a number of unknown incidents whose identities have not been established, their relatives did not refer to the transfer of the body and were buried by the cultural department of Kabul Municipality. On the other hand, most of the information provided in the return documents is not provided by the authorities, so there is no information in the field. Thus, in relation to those people who are transferred to hospitals for treatment after injury due to mechanical factors, it is excluded from the study, which requires a separate investigation.

5. Discussion

As the findings in this study show, mechanical injuries are one of the most serious and catastrophic causes, as a threat to human life and health. During the year (1396), out of

1257 fatal cases referred to the Department of Forensic Medicine, 638 cases (51%) were due to mechanical trauma. (Figure (1) In terms of the factors causing it, 472 cases of firearms injuries (67% of blunt and sharp injuries (115 cases (18%) and 96 cases (15%), respectively, represent a high number of deaths due to mechanical injuries in terms of other causes of death and a significant difference between fire injuries Figure (3). These figures show a significant difference compared to other studies, so that the causes of death due to mechanical injuries and two other causes of death (cancer and lower respiratory tract diseases) (16.9%) in the United States and (8.6%) in India reported 5 high numbers of deaths due to mechanical trauma in this study, although it included all deaths due to mechanical injuries and other causes of death in Kabul and neighboring provinces to the only center providing Forensic Medicine services. It is not sent because, on one hand, the lack of medical forensic service centers and standard handling of all fatalities due to the busyness of reconnaissance forces in defense affairs to public order and also a significant number of fatalities due to mechanical injuries before death in the event of an injury are referred to hospitals for treatment, and most are not re-transferred to forensic medicine for forensic medical examinations. According to other studies in the literatures, it has been shown that a large number of deaths due to mechanical injuries compared to other causes of death, and on the other hand, firearms as a cause of injury is another significant difference that indicates the heavy use of firearms against the lives of people in Kabul and neighboring provinces may have been due to irresponsible access to firearms weapons and incidents of terror and war.

Factors causing mechanical injuries in the United States due to the use of firearms (46.51%), Brazil (48.7%) and India less than firearms and more in traffic accidents than the use of sharp tools (46.03%) and secondary use of the blunt tools, 20.6 percent do not agree with the results of this study.^{4,5,7,11} Based on the cases of deaths sent to Kabul Forensic Medicine are because of war in the country, illegal handling and use of weapons and no control over them in Kabul city. The disruption of public order on the other hand the loss of human resources, the length of time in hospital, the disability and inability of participation of survivors in society, and the serious financial and social impact leave a huge impact on society. The analysis of the data this study shows that the highest number of deaths due to mechanical injuries in people are between 20 and 40 years old is 312 cases (48.8%), males 538 cases (84%) and females 100 cases (16%), most of which males 422 cases (66.14%) married, low-income or unemployed employed 156 cases

(24.45%) and 151 cases (23.66%) with primary education or illiterate, respectively, both a total of 324 cases (50.74%) and cases which is more than half of the figures. (Table (1,2) figures (2,4,5) that according to the findings of other studies (most victims in the age group of 21 to 30 years, married, belonging to social status and they were economically low income from rural areas, accounting for 47.16 percent of cases.⁵ Consistent with the results of this study, it appears that the vulnerable group due to mechanical injuries is mostly married young men with low levels of education and, which highlights the need to meet the needs of this category of people, i.e. education, employment and healthy occupations low income. In terms of seasons, the most cases in the summer 212 cases (33.22%) to the second degree of the autumn 165 cases (25.86 %) constitutes Figure (1). According to the mentioned figure, it can be seen that in the spring, the lowest number of deaths due to mechanical injuries occurred and an upward trend is seen in the summer, which shows a significant difference. In other studies, no significant differences were found.¹⁴ This difference is probably due to the country's climate and security variables in the country that require to be examined and analyzed separately. In this study, in terms of causes of death, the most common cause of death was destruction of vital organs (skull, heart, lungs, liver) 321 cases (50.3%) and second degree bleeding 138 cases (21.6%) and the lowest causes of death is amputation of the head. Figure (6) While in other literatures, the study on the causes of death in mechanical injuries was the most common cause of death in 1699 cases (68.73%) of head injuries, which caused a large fraction of skull bone, in 1183 cases (69.63%) cases of injuries. Ross observed. The most common fraction was related to temporal bone 559 cases (47.25%). The most common variation of bleeding was intra cranial and subcutaneous bleeding 1514 cases (11.11%). The most common injury was in the epigastrium 532 cases (21.52%), which are mostly caused by traffic accidents.^{13, 14} These differences indicate that the causative agent of injury plays a major role in the cause of death. Since most of the occurrences in this study are firearms injuries, exposure to this type of injury in the membership causes extensive damage, especially in vital organs within the body (skull, chest and abdomen). Since most of the occurrences in this study are firearms injuries, exposure to this type of injury in the membership causes extensive damage, especially in vital organs within the body (chest, abdomen and udder). Elimination of injury-causing factors with effective methods, depending on the type of injury-causing factors, will play a key role in reducing the occurrence of mechanical injuries.

6. Final result

The most common fatalities in forensic medicine are mechanical injuries that occur in young, illiterate, low-income or unemployed young men. The main causes of injuries are firearms injuries. Most causes of death are due to the destruction of vital organs. Continuation of war, violence, public access to illegal weapons and other weapons, injuries, poor security, economic, political and social situation, including the underlying factors for these casualties, disabilities that carry a heavy economic, security, social and cultural burden.

7. Recommendation

To reduce the incidence of mechanical injuries to prevent casualties and mixing of this social catastrophe, the following suggestions are respectfully presented.

- 1) Efforts to end war, violence and other disorders in society through effective solutions based on scientific and objective perceptions of society.
- 2) Improving the capacity of the security forces and public order as much as possible through the collection of illegal weapons.
- 3) Improving the capacity of investigative institutions (prosecution), judiciary, forensic medicine and public health in the country to fight effectively in order to prevent accidents caused by mechanical injuries.
- 4) Implementing educational programs to enlighten the minds of families to deal with violence, war and other disorders of life through social media.
- 5) Combating illiteracy by creating grounds and facilities for access to primary education and higher education for all members of society, especially young people who have been deprived of the blessings of literacy and higher education.
- 6) Creating jobs and employment for young people with regard to deprivations that lead to violence and drag them into war and crime.
- 7) Propaganda against violence and war as a sinister anti-human and Islamic phenomenon by responsible people, committed and influential political figures, clerics, university professors and schools
- 8) Establishment and development of trauma centres to rehabilitate disabled people to enable them and their healthy presence in society.
- 9) Psychotherapy of healing patients, especially from explosions and suicides, the families of the victims and giving them hope for survival.

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