MEDICO LEGAL EVALUATION OF FIREARMS INJURY CASES IN THE HOSPITAL EMERGENCY UNIT IN HYDERABAD, PAKISTAN: A RETROSPECTIVE SURVEY.

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ABSTRACT

Objective: To evaluate the demographic, origin and seasonal pattern of firearm injury cases brought or admitted between 2014 and 2018 in the emergency units of Liaquat University Hospital, Hyderabad. **Material & Methods:** Cross sectional study was carried out from November 2019 to January 2020at the emergency units of Liaquat University Hospital (LUH).Retrospective forensic analysis of firearm injury cases was collected from therecords of cases reported between2014 and 2018.All the firearm injury casesregardless of age and gender were included in the study. While cases of other injuries like accident emergency, explosive injuries, stab wound etc. were excluded from the study. The data was entered and analyzed in SPSS version 22. **Results:** The total prevalence of firearm injury cases was 14.30% with most (30.1%) of the cases belongs to the age group 30-39 years. Majority (86.57%) of them were male. While the mean age of cases was 34.33±13.5 years. More than half of fire arm injury or gunshot cases were homicidal in origin followed by accidental and suicidal. Homicide and accident cases predominantly belongs to age range of 20-29 years while suicidal origin injury cases were prominently from 30-39 years. Extremities (50.35%) are the most common injury locationand a single bullet hole was the most common as majority (62.62%) cases had single hole entry wounds. The mortality rate in the study was 13.67%. **Conclusion:** The high incidence of young age adults between age (20 to 39 years) with male predominance is common in firearm injury cases. Homicidal origin of firearm injuries is very common. Extremities are the most commonly injuries regions of the body. While cases of these injuries are common in summer season especially between the months of May to August.

Keywords: Firearm, Forensic medicine, Injuries, Emergency.

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INTRODUCTION

Firearm or Gunshot injuries are violent, complex and physical traumatic injuries that are commonly encountered in the forensic practice.[1] These injuries are caused by projectiles, pallets or bullets that are ejected from a barrel of firearm cause penetration in the body of victim.[2] The study of these injuries is also called wound ballistics. Such penetration of ejected projectiles may damage the tissues along the path followed (the permanent cavity) as well as the tissue surrounding the permanent cavity that is subject to the radial acceleration, stretch, and compressions.[3,4] This tissue damage due to such projectiles of firearms may lead to bleeding, wrecked bones, damage to different organs, wound site infection, or due to damage of nerves resulting in paralysis or loss of the ability to move that part of the body.[(2)] Severity of damage due to firearms or gunshots depends on the site of injury, body part hit by the projectiles, distance i.e. from which distance the projectile ejected from the firearm, speed and path of bullet or projectile, type of firearm used, type bullet or projectile used etc.[5] Post-traumatic stress as well as lead poisoning are the long-term complications of firearm injuries.[6]

Number of cases of firearm injuries vary from country to country.[7] Several factors are reported to be responsible for such violent injuries includes; deficiencies in legal regulations, easy availability of weapons, honor crime and terrorism increase the rate of deaths due to firearm injuries.[4,8,9] Furthermore, variety of gunshot injuries especially during the peace time may occur in different conditions. These conditions may include criminal incidences like during robbery or snatchings when shots fired by the police or other law enforcement agencies.[2,4] Moreover, attempted suicides, murders,

unintended accidents resulting from firearms by armed forces or even by civilians.[10]

Forensic experts specially forensics pathologist are the persons that plays an important role in examining a gunshot wounds by investigating and documenting the site, size, type, shape, and location like in any other injury.[11]

According to the World Health Organization (WHO), around 2.3 million people have died resulting from the worldwide violence while, about 26% of these deaths were warrelateddeaths.[12] Nearly about a million case of gunshot wounds have been reported worldwide in the year 2015 befell from relational violence.[5] While in 2016, total 251,000 became victim died due to firearm globally.[13] Out of these deaths, majority (64%) i.e.161,000 resulted from the assaults alone followed by suicides (67,500) or 27% of total while, (9%) accidents i.e. 23,000.[5, 14] In the United States alone, about 40,000 deaths occurred due to firearms in the year 2017.[9] Moreover, these firearms related deaths are found to be more prominent among males of 20 to 24 years of age. It has been estimated that a cost of 140 billion US $ economic costs are due to these gunshot or firearm injuries in a year in the United States.[9]

Despite the fact that the incidence of firearm related crimes has been decline in most of the developed countries but the situation in the countries like Pakistan, India, Bangladesh etc. is still worse.[4,15] Pakistan is amongst the country that has faced serious wave of terrorist's attacks after the Afghan war. Furthermore, the increasing poverty, societal intolerance, media culture, ethnic, sectarian and religious intolerance caused increase in violence in the country. While on the other hand, easyavailability of all kind of weapons and ammunitions in the local market raising the number of firearm or gunshot injury cases in the country.[8] A study reported the death rate of 4.22 deaths per 100,000 population per year due to firearm injuries.[2] Another study from Faisalabad reported the homicidal rate as 8.3/100,000 population per year while the use of firearm was in 50% these cases.[8]

The main objective of the present study was to evaluate the demographic, origin and seasonal pattern of firearm injury cases brought or admitted between 2014 and 2018 in the emergency units of Liaquat University Hospital, Hyderabad.

MATERIAL AND METHODS

Cross sectional study was carried out from November 2019 to January 2020 at the emergency units of Liaquat University Hospital (LUH). Retrospective forensic analysis of firearm injury cases was collected from the records of cases reported between 2014 and 2018.All the firearm injury cases regardless of age and gender that had forensicexamination report attached in the record were included in the study. While casesof other injuries like accident emergency, explosive injuries, stab wound etc. orany other cases without any forensic evaluation report were excluded from thestudy. Information was collected from record files of all firearm or gunshot injury cases that were admitted or brought in the emergency unit of LUH during the study duration.

The firearm injury cases dead or alive were examined and recorded after thorough examination of victim record file. All demographic information including; gender, age, occupation, residential address etc. were collected. Moreover, date, season and month of incident, origin (homicidal, suicide, accidental or undetermined), injury location, number of bullet holes, type of weapon used, shooting distance, clinical status and outcome etc. A structured questionnaire and checklist was used to document the findings of all the cases. The data was entered and analyzed in SPSS version 22. The tables and graphs were developed for descriptive findings.

RESULTS

Total2916different forensic caseswere admitted or brought to the emergency unit during the study duration. Out of these, 417cases had injuries due to gunshots or firearms that make the prevalence of 14.30% of firearm injury cases. While remaining cases include; home violence, stab wounds, road traffic accidents etc. Among these firearm cases, majority 361 (86.57%) were male while 56 (13.43%) were female. The mean age of these firearm injury cases was 34.33 ± 13.5 years. The youngestofthecaseswas11yearsoldandthe oldest was 71 years. The most (30.1%) of the cases belongs to the age group 30-39 years. (Figure-I).

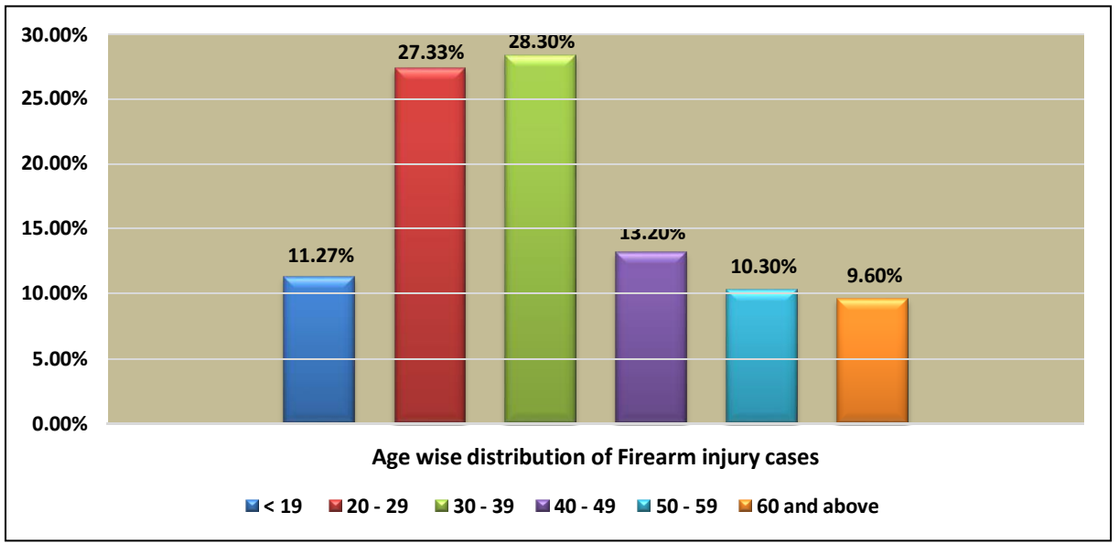

Figure I. Age wise distribution of firearm injury cases

Table 1 is demonstrating the origin of the firearm or gunshot injury among the forensic cases. More than half of fire arm injury or gunshot cases were homicidal in origin followed by accidental, suicidal, while remaining were unspecified. It was determined from the data that homicide and accident cases predominantly belongs to age range of 20-29 years. Moreover, higher number of suicidal origin cases were from age range of 30-39 years. (Table 1).

Table 1. Distribution of age groups according to the origin of firearm injury (n=417)

	Homicide 228 (54.67)	**Accidental 74 (17.74)**	**Suicide 63 (15.10)**	**Unspecified 52 (12.47)**	**Total 417**
< 19 years	24 (10.53)	16 (21.62)	4 (6.34)	3 (5.77)	**47**
20-29 years	52 (22.80)	32 (43.24)	24 (38.09)	6(11.53)	**114**
30-39 years	49 (21.50)	14 (19.00)	31 (49.20)	24 (46.15)	**118**
40-49 years	42 (18.42)	4 (5.40)	2 (3.17)	7 (13.46)	**55**
50-59 years	32 (14.03)	5 (6.75)	1 (1.60)	5(9.62)	**43**
≥60 years	29 (12.72)	3 (4.05)	1 (1.60)	7(13.47)	**40**

In the present study, the month wise frequency of firearm / gunshot injury was also evaluated. It has been demonstrated that 93(22.30%) cases of firearm /gunshot injuries occurred in the month of August followed by July, October and September (15.63%, 13.80%,10.87%) respectively. While least number of cases reported in February, March and November (6.33%, 5.18% and 4.21%) respectively.

Table 2 below is representing the injury location wise distribution of firearm/ gunshot wound injuries observed on the cases. When the cases were evaluated, the most common location of injury on cases was on extremities with the rate of 50.35%. (Table 2)

Table 2. Location wise distribution of firearm injuries on cases (n=417)

AREA OF INJURY	**NUMBER**	**%**
Head-Neck	56	13.43
Chest	19	4.55
Abdomen	33	7.91
Extremity only	210	50.35
Chest + Abdomen	13	3.11
Head-Neck + Chest	10	2.39
Head-Neck + Extremity	16	3.83
Abdomen + Extremity	9	2.15
Chest + Extremity	12	2.87
Head-Neck + Abdomen	8	1.91
Chest + Abdomen + Extremity	9	2.15
Genitourinary System + Extremity	8	1.91
Multiple Injury	14	3.35

Figure-II is presenting the information regarding the organs of victims involved in firearm or gunshot injuries. According to the findings, the most commonly involved organs were soft tissues while heart was least injured organ among the victims. (Figure-II)

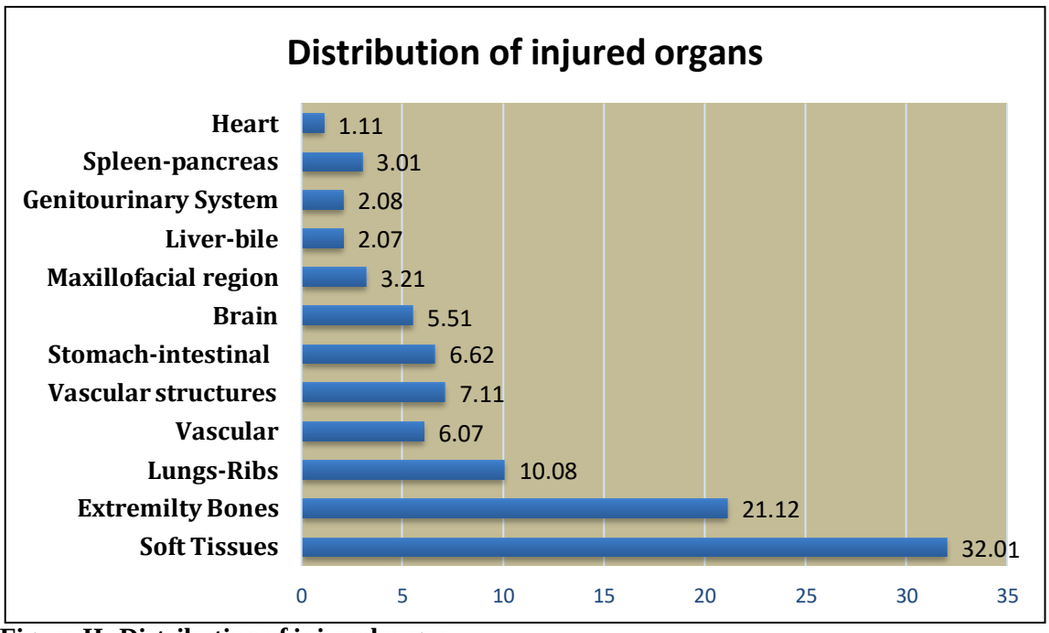

Figure II: Distribution of injured organ

In total 300 cases with a specified number of bullet holes, a single bullet hole (62.62%) was the most common, followed by five and more bullet holes (16.64%). It was also evaluated that out of total cases, 283 (67.80%) were hospitalized while 79 (18.94%) were discharged from the emergency department. The mortality rate in the study was 13.67%.

DISCUSSION

Firearm or gunshot injuries are acknowledged for their peculiar findings and appearances in the routine medico legal examinations of alive persons as well as during the autopsies.[9, 16]These injury results from the discharge of bullets from different types of firearms. The severity of these type of injuries or wounds depends on the distance, caliber, site or region got injured etc.[17]The present study was designed to evaluate and analyze the pattern of such type of injury cases reported during the five-year duration from 2015 to 2019. In this study, 361 (86.57%) were male while 56 (13.43%) were female. Consistent findings have also been reported by Hapeep et al. and Hussain et al.[4, 18] While this male-to-female ratio was found to be higher than other study by Flower et al. [9]This may be due to the fact that men have easier access to firearms and take part in social life more actively, and that terrorist, snatching and robbery incidents are more frequent in this region.The mean age in the study was determined to be 34.33 ± 13.5 years. Consistent findings were also reported by different studies, Meral et al., Hapeep et al. and Kir MZ et al. reported the similar mean age of their study cases (i.e. 32.13±11.52, 32.96±10.45, and 31.28±8.39) respectively.[4, 17, 19] Moreover, the age range of the cases in the present study was between 11 and 71 years with the most (28.30%) of the cases belongs to the age group 30-39 yearsfollowed by age range of 20-29 years (27.33%). Collectively, more than half (> 55%) of all cases were from age range 20-39 years.Similar findings were reported by study in Peshawar (61.1%) cases belong to 21 to 40 years, Thailand that reported 57.8% cases belongs to age group of 21-30 years while another study from brazil reported 61.5% cases were from age group of 20-39 years. [5, 14, 15]The current study demonstrated that the origin of most of the firearm injury was Homicidal or Homicide (54.6%) followed by accidental (17.74%) and suicidal (15.10%) origin cases.Husain et al also reported that majority (77.7%) of their firearm injury cases had homicidal origin followed by accidental and suicidal origin.[18] Most of these homicide and accidental origin firearm injury cases belongs to age group of 20-29 years (22.80% and 43.24%) respectively. While suicide cases were most common in the 30-39 age group (49.20%).Consistent findings were also reported by Flower et. al, Ribeiroet al and Amiri et al.[5,9, 20]The low suicide rates were due to difficulty of obtaining firearms in suicide attempts. When firearm injuries were evaluated in terms of seasons, they were more common in summer (40.3%) while their rate significantly decreased in winter (15.72%). These results were consistent with similar studies.[12, 14, 15, 17] The fact that people spend more time in social life in the summer months due to long days mayexplain the frequency of forensic cases in these months.In this study,extremities (50.35%) are the most common injury location.These results are consistent with the another Pakistani study where majority (31.6%) of their firearm injury cases had extremities involvement. Moreover, study by Flower et al. from United States of America reported extremityinjuriesseen in 77% of unintentional and 49% of intentional firearm injuries. While in Nigeria, extremity injuries

occurred in41% of firearm injuries.[9, 18, 21]Commonly observed number of bullet holes among the cases of this study,a single bullet hole was observed in (62.6%)consistent findings were reported by Türkoğlu et al. and Kohli et al.[22, 23] In this study, no information was found about the firearm entry wound in the medical documents of 68 cases. In these cases, emergency physicians had not made a sufficient wound description, which causes difficulties in writing a final report and determining the shooting distance. In order to prevent this, physicians should be educated and given in-service training on these topics.It was also evaluated that out of total cases, 283 (67.80%) were hospitalized while 79 (18.94%) were discharged from the emergency department. The mortality rate in the study was 13.67%. Another Pakistani study by Nasruallah et al. reported lower mortality rate in their study.[24]While studies from other countries reported consistent mortality rate.[3, 10]Moreover, the mortality rate of study was lower than Flower et al. and Ribeiro et al.[5, 9] This is a natural result of the fact that extremity injuries were more common in this study.

CONCLUSION:

The high incidence of young age adults between ages (20 to 39 years) with male predominance is common in firearm injury cases. Homicidal origin of firearm injuries is very common. Extremities are the most commonly injuries regions of the body. While cases of these injuries are common in summer season especially between the months of May to August.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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CONFLICT OF INTEREST: No competing interest declared.

REFERENCES:

1. Bäckman PB, Riddez L, Adamsson L, Wahlgren C-M. Epidemiology Of Firearm Injuries In A Scandinavian Trauma Center. European Journal Of Trauma And Emergency Surgery. 2020;46(3):641-7.
2. Khani GMK, Humail SM, Hafeez K, Ahmed N. Pattern Of Bony Injuries Among Civilian Gunshot Victims At Tertiary Care Hospital In Karachi, Pakistan. Chinese Journal Of Traumatology. 2015;18(3):161-3.
3. Colakoglu A, Simsek Y, Gulen M, Avci A, Satar S. Evaluation Of Firearm Injuries In Emergency Department. International Journal Of Health Sciences & Research. 2017;7(12).
4. Hapeep MA, Hameed IH, Jasim AA. Risk Factors, Cause And Site Of Firearm Injuries: A Prospective And Retrospective Study. Research Journal Of Pharmacy And Technology. 2017;10(10):3420-5.
5. Ribeiro AP, Souza Erd, Sousa Camd. Injuries Caused By Firearms Treated At Brazilian Urgent And Emergency Healthcare Services. Ciencia & Saude Coletiva. 2017;22:2851-60.
6. Vella MA, Warshauer A, Tortorello G, Fernandez-Moure J, Giacolone J, Chen B, Et Al. Long-Term Functional, Psychological, Emotional, And Social Outcomes In Survivors Of Firearm Injuries. JAMA Surgery. 2020;155(1):51-9.
7. Nadeem S, Naheed K, Ijaz R, Ambreen S, Aslam M. Small Arms, Major Transgressions: Exploring Homicidal Deaths By Firearms In City Of Faisalabad, Pakistan. The Professional Medical Journal. 2020;27(10):2170-5.
8. Aziz F, Qasim AP, Khaliq S, Naheed K, Qasim JA. Spectrum Of Firearm Related Deaths In Multan City: Autopsy Based Study. Annals Of Punjab Medical College (APMC). 2018;12(1):28-30.
9. Fowler KA, Dahlberg LL, Haileyesus T, Annest JL. Firearm Injuries In The United States. Preventive Medicine. 2015;79:5-14.
10. Davies M, Kerins M, Glucksman E. Inner-City Gunshot Wounds–10 Years On. Injury. 2011;42(5):488-91.
11. Maqungo S, Kauta N, Held M, Mazibuko T, Keel MJ, Laubscher M, Et Al. Gunshot Injuries To The Lower Extremities: Issues, Controversies And Algorithm Of Management. Injury. 2020.
12. Naveed S, Alam N, Ahmad MS, Shazia S, Khattak MA, Iqbal F. WEAPONRY PATTERN OF HOMICIDAL DEATHS IN DISTRICT PESHAWAR. Journal Of Medical Sciences. 2019;27(3):194-7.
13. Richmond TS, Foman M. Firearm Violence: A Global Priority For Nursing Science. Journal Of Nursing Scholarship. 2019;51(3):229-40.
14. Myint S, Rerkamnuaychoke B, Peonim V, Riengrojpitak S, Worasuwannarak W. Fatal Firearm Injuries In Autopsy Cases At Central Bangkok, Thailand: A 10-Year

Retrospective Study. Journal Of Forensic And Legal Medicine. 2014;28:5-10.
15. Malik B, Ahmed MS, Hussain MA, Anwar HN, Khan S, Yousaf M. A Review Of Firearm Deaths In Female Victims–An Experience Of Forensic Medicine Department In Pakistan. Journal Of Medical Sciences. 2020;28(2):121-4.
16. Khan MN, Ur Rehman R, Nouman MA, Anwar K, Ayub S, Tufail M. Fire Arm Injury To The Head: A Two Years Experience At Department Of Neurosurgery Lady Reading Hospital, Peshawar. KJMS. 2018;11(3):430.
17. Meral O, Ozturk T, Bulut S, Baykan O, Parlak I. The Socio-Demographic, Clinical And Forensic Medical Investigation Of Suicide Attempts Over 18 Years Old Presented To A Training And Research Hospital's Emergency Department: Izmir Example. Medicine. 2020;9(2):352-7.
18. Hussain Z, Shah MM, Afridi HK, Arif M. Homicidal Deaths By Firearms In Peshawar: An Autopsy Study. Journal Of Ayub Medical College Abbottabad. 2006;18(1).
19. Kır MZ, Ketenci HÇ, Başbulut AZ, Özsoy S. Firearm-Related Deaths In Erzurum. 2012.
20. Amiri A, Sanaei-Zadeh H, Zavarei HT, Ardestani FR, Savoji N. Firearm fatalities. A preliminary study report from Iran. Journal of clinical forensic medicine. 2003;10(3):159-63.
21. Mohammed A, Edino S, Ochicha O, Umar A. Epidemiology of gunshot injuries in Kano, Nigeria. Nigerian Journal of Surgical Research. 2005;7(3):296-9.
22. Kohli A, Aggarwal NK. Firearm fatalities in Delhi, India. Legal medicine. 2006;8(5):264-8.
23. Türkoğlu A, Tokdemir M, Tunçez FT, Börk T, Yaprak B, Şen M. Elazığ'da 2010-2012 Yılları Arasında Otopsisi Yapılan Ateşli Silahlara Bağlı Ölümlerin Değerlendirilmesi. The Bulletin of Legal Medicine. 2012;17(3):8-14.
24. Nasrullah M, Razzak JA. Firearm injuries presenting to a tertiary care hospital of Karachi, Pakistan. Journal of injury and violence research. 2009;1(1):27.