ORIGINAL ARTICLE

DISTRIBUTION OF FIREARM INJURIES PRESENTED TO SURGICAL DEPARTMENT OF DHQ TEACHING HOSPITAL BANNU, PAKISTAN

Ajmal Shah Bukhari[1], Akhtar Munir[2], Shabir Hussain[3]

[1]Department of Surgery, Bannu Medical College, Bannu, Pakistan, [2]Department of Surgery, Gomal Medical College, D.I.Khan, Pakistan, [3]Department of Pharmacology, Bannu Medical College, Bannu, Pakistan

ABSTRACT

Background: The incidences of violent crimes with gunshot injuries have become increasingly more common. The objective of the study was to determine the frequency and distribution of firearms injuries, etiological factors and the management of the patients.

Material & Methods: This hospital based, cross-sectional study was conducted in the department of Surgery, DHQ Teaching Hospital, Bannu from January 2015 to December 2015. Sample size was 292 cases with consecutive technique. All the firearm injury cases presented to the Surgical Department of DHQ Teaching Hospital were included and all other cases were excluded. Demographic variables were; sex, age in years, age groups and time distribution. Research variables were; length of hospital stay, etiology, site of firearm injuries and the procedure performed in surgical operation theater. Categorical variables were calculated as frequency and percentages whereas numeric variable that is age in years was calculated as minimum and maximum. SPSS version 20 was used for data analysis.

Results: Out of the 292 cases, 250 (85.6%) were male and 42(14.4%) were females. The male to female ratio was 6:1. The age ranged from 4-70 years. The majority of cases were between 11-30 years. In terms of injury site 126(43%) had injury of abdomen, 74(25%) limbs, 69(24%) thorax, Head (3%), Neck 3(1%) and 11(4%) patients got multiple injuries on their bodies. On laparotomy, 65 had perforations in jejunum and ileum, while liver was involved in 18 cases, Colon was injured in 16, cecum in 7. While in 63 cases Chest cavity was breached where Chest Intubation was done.

Conclusion: Firearm injuries were common among young males, Civilian clash was the most common cause of firearm injuries. Abdomen and pelvis were the most affected body regions.

KEY WORDS: Firearm; Gunshots; Civilian.

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INTRODUCTION

Violent injuries are the eighth leading cause of death, worldwide.[1] Beside high death toll firearm injuries cause significant morbidity, long-term physical and psychological disability for individuals, families communities and societies.[2] The incidences of violent crimes with gunshot injuries have become increasingly more common, reflecting the deterioration of law and order in our society. These are common in the low and middle income countries. In 2000, the rate of violence related death in low to middle income countries as a whole was more than twice that in high income countries.[3]

According to study in USA, guns took the lives of 31,076 Americans in homicides, suicides and unintentional shootings in 2010. This is the equivalent of more than 85 deaths each day and more than three deaths each hour.[4]

In Egypt in 2000, there were about 117 fatal cases (83 accidental, 18 suicides, and 16 homicides).[5] Firearm injuries are invariably associated with a high degree of mortality and morbidity; rarely they remain asymptomatic or give delayed manifestation. Such a case of firearm injury without any remarkable expression is an extremely rare event.[6]

Corresponding Author:

Dr. Ajmal Shah Bukhari
Assistant Professor
Bannu Medical College
Bannu, Pakistan
E-mail: dr.ajmalbukhari11@gmail.com

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Despite of these dreadful facts, relevant studies, data and information are lacking, particularly in the Bannu District in Pakistan where incidence and pattern of firearm injuries have not previously been studied.

The objective of the study was to determine the frequency and distribution of firearms injuries, etiological factors in this area and the management of the patients.

MATERIAL AND METHODS

This hospital based, cross-sectional study was conducted in the Department of Surgery, DHQ Teaching Hospital, Bannu from January 2015 to December 2015.

Sample size was 292 cases. Sampling technique was consecutive. Inclusion criteria was all the firearm injury cases with intentional and non-intentional injuries presented to the Surgical Department of DHQ Teaching Hospital, Bannu. Exclusion criteria was all cases presented to departments other than Surgical Department, and those who expired before admission.

A specific data collection performa was developed. Demographic variables were; sex, age in years, age groups and time distribution. Research variables were; length of hospital stay, etiology of firearm injuries and the site of injuries, and the procedure performed in surgical operation theater. The attributes of etiology were; civilian clashes, accidents and stray bullets. Injured body regions were defined: head and neck, thorax, abdomen, upper and lower limbs. Categorical variables were calculated as frequency and percentages whereas numeric variable that is age in years was calculated as minimum and maximum. SPSS version 20 was used for data analysis.

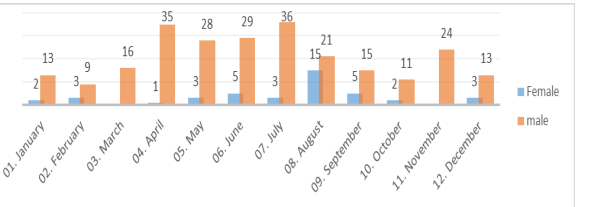
RESULTS

Out of the 292 cases, 250 (85.6%) were male and 42 (14.4%) were females. The male to female ratio was 6:1. The age ranged from 4 to 70 years. The majority of cases were between 11-30 years as shown in table no 1.

Table No1. Age wise distribution of firearm injuries

Age group	No. of Patients	Percentage
1-10	13	4.45%
11-20	92	31.51%
21-30	84	28.77%
31-40	50	17.12%
41-50	33	11.30%
>50	20	6.85%
Total	292	100%

Time distribution of firearm injuries is given in graph-1 with April to July being the modal semester.



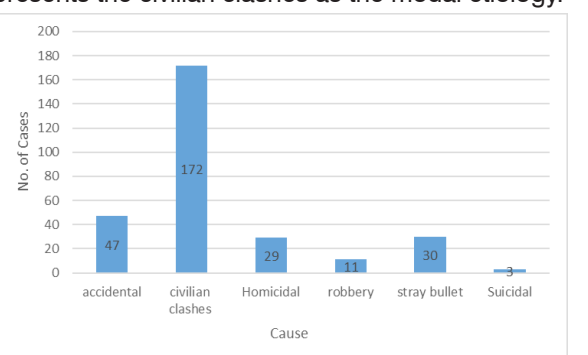
Graph.1 showing the monthly distribution of cases.

Hospital stay of the injured patients is given in table 2 with 1-5 days being the modal stay.

Table no. 2: Hospital stay of patients with fire arm injuries.

No. of days	No. of Patients stayed	%age
1-5	123	42.12%
6-10	95	32.53%
11-15	59	20.21%
16-20	14	4.79%
21-25	1	0.34%
Total	292	100.00%

Regarding causes of injuries, the graph no 2 presents the civilian clashes as the modal etiology.



Graph No 2. Showing the etiologies of firearm injuries.

In terms of injury site 126 (43%) had injury of abdomen, 74 (25.34%) limbs, 69 (23.63%) thorax, Head 9 (3%), Neck 3 (1%) and 11 (3.77%) patients got multiple injuries on their bodies. (Table no 3)

On laparotomy 2 patients had perforations in duodenum, 65 had perforations in jejunum and ileum, while liver was involved in 18 cases, spleen was injured in 6 cases, pancreas was injured in 3 cases and Kidney 7, ureter and bladder were injured in 4 cases. Colon was injured in 16, cecum in 7 and 4 patients had rectal injuries. (Table no: 4)

In thorax, 10 cases had chest wall (anterior and lateral) injuries and 6 had injuries on the back only. While in 63 cases Chest cavity was breached where Chest Intubation was done. (Table no.5)

Table No. 3 Distribution of site of injuries

Injured Part	Abdomen	Limbs	Thorax	Head and Neck	Multiple
No. of Patients	126	74	69	12	11
Percentage	43.15%	25.34%	23.63%	4.11%	3.77%

Table No.4: Showing frequency of injuries in different parts of Abdomen and Management offered.

Part Involved	No	Management Offered					
Stomach	13	Stomach repair	13				
Jejunum & Ileum	65	Primary closure	19	Resection and E/E Anastomosis	44	Stoma Formation	7
Duodenum	2	Controlled fistula	2				
Large Intestine							
Colon	16	Primary repair	2	Hemi colectomy	4	Exteriorization	10
Caecum	7	Ileotransverse anastomosis	2	Hemi colectomy	2	Stoma formation	3
Rectum	4	Proximal Decompression	4				
Liver	18	buttress suture	10	Peri-hepatic packing	8		
Gall bladder	2	Cholecystectomy	2				
Spleen	6	Spleenorraphy	1	Total spleenectomy	5		
Pancreas	3	Pancreatic packing	2	Distal Pancreatectomy	1		
Kidney	7	Buttress Suture	2	Partial Nephrectomy	1	Total Nephrectomy	4
Scrotum	2	Wound Exploration	2				
Urinary Bladder/ Ureter	4	Bladder repair	3	Rail Road Catheterization	1		

Table No.5: Showing frequency of Injuries in different parts of the Thorax and Management offered.

Organ involved	No	Management Offered			
Chest cavity	63	Chest Intubation	63		
Back of the chest	6	Wound exploration/ FB Removal	4	Only Debridement & Dressing	2
Chest wall (anterior and lateral wall)	10	Wound exploration/ FB Removal	7	Only Debridement & Dressing	3

DISCUSSION

Civilian firearm injuries are the major contributors to the number of trauma patients worldwide. Gunshot injuries have become extremely prevalent among the United States civilian population because of increasing urban violence and the availability of handguns. In contrast, gunshot violence showed different trends in European countries. In 2002 it was markedly increasing in the UK, but was declining in Germany.[7,8]

Our study shows that young males were at higher risk for firearm related injuries than females. Abdomen and limbs were the major body regions affected. Patient stayed on average seven days in hospital. Civilian clashes, was found to be the main cause of firearm injury.

Our study shows that the most affected gender in firearm injuries is male and ratio is 6:1. The male predominance is in keeping with fact that male are generally more adventurous, more aggressive and more exposed to external environment. In other studies, similar to our study, male is more affected gender.[9]

Our data revealed that majority of cases have age between 11-30 years, median 23 years. This range of civilians is because of easy availability of guns and firearms to them.

Our studies shows that, out of 292 cases, 172 (58.9%) were due to civilian clashes followed by 47 (16.1%) cases of accidental and 30 (10.3%) cases

of stray bullet. 29(10%) cases were due to homicidal and 3(1%) cases due to suicidal attempts. The firearm injuries due to civilian clashes are more because of intolerance in society and dispute over properties. The accidental cause is at 2nd most due to habit of gun cleaning at home and behavior to impress others. Accidental cases also include those who were not part of the civilian clash but were innocent go byers.

Studies have shown that firearms are frequently used as a mode of suicidal deaths[10,11] but in our study, only 3 cases are present because the method used for suicidal attempt in Bannu are ingestion of poisons like organophosphate and aluminum phosphate because they are available at low price.

According to our study, in 292 cases, injury site 126 (43%) had injury on their abdomen, 74 (25%) limbs, 69 (24%) thorax, Head 9 (3%), Neck 3 (1%). 11 (4%) patients got multiple injuries. The most common injury site in our study is abdomen followed by limbs. While in study from Peshawar[12] the Chest was the part most frequently involved and also in similar studies in Greece[13] and Finland.[14] In a study in Turkey, the most common site for entrance wound was also chest.[15] In Dammam, Saudi Arabia, the most common sites of firearm injury were the head (36.7%) and chest (28.7%).[16] Other studies reported the head, neck and face as the most frequently injured areas.[17,18] This difference is because these studies were done in central hospitals where Cardiothoracic departments are well established and most of the patients are referred from the peripheries.

In the abdominal injuries, mostly the laparotomy was done. Focused abdominal sonography for trauma (FAST) remains the main diagnostic tool, but not the sole reason for exploration.[19] We explore the abdomen in most of the cases which were haemodynamically unstable and on clinical judgment. And the negative exploration rate was less than 1% in this peripheral hospital. The most common injured viscera were small intestine and liver similar to the study in Bahawalpur.[9] In small intestine injuries, mostly resection and anastomoses, stoma formation and primary repair was done while in liver, buttress suture and peri-hepatic packing was done. In splenic injury spleenectomy or spleenrrhaphy, in Kidney injury repair of the kidney or nephrectomy was done according to the condition of the affected organ or patient. Similarly in Pancreatic injury hemostasis or distal pancreatectomy was done as needed. The stomach perforation was also managed by repair, while in gall bladder perforation, cholecystectomy was done. In large intestine injuries, primary repair, hemi colectomy, and stoma formation were done according to the need of the patient.

In the thorax injuries, when only chest wall was involved, debridement and dressing was done but when chest cavity was injured and there was haemothorax or pneumothorax then chest intubation was done.

Firearm injuries to the extremities are rarely life-threatening, but can be associated with severe morbidity.[20] In our study where arteries or veins are not involved then only wound exploration and foreign body's removal were done but when vascular injuries were present then vascular repair was done or the patient was referred to the Vascular Surgeon. Cranio-cerebral firearm injuries are lethal and are associated with poor outcome. Glasgow Coma Scale (GCS) remains the main prognostic parameter.[21] In our study when there were superficial head and neck injuries, only conservative treatment was done while in penetrating head and neck injuries, the patients were referred.

The epidemiology of firearm injuries requires a range of strategies for prevention. These strategies should use ecological model to help them to get to the root of violence.[22] They can be prevented by individual approach as well as Community based approach. Individual approaches include social development programs in particular to help young people to develop social skills, manage anger and resolve conflicts. Community based efforts comprise of modification of physical environment like social boycott from the families or persons who indulge in such activities. In addition, community policing and coordinated community interventions aiming toward improving services are some of the useful measures for firearm crime reduction. Societal approaches aiming for legislative and judicial remedies, proper licensing of firearm use. In addition public awareness about bad effects of firearm is necessary.

We studied different aspects of firearm injuries in civilians though it was a difficult task because complete record was not there as DHQTH Bannu bears a very big burden of firearm injuries along with heavy flow of other patients. Other type of violent injuries like bomb blasts and burns are not included in our study. Despite all the limitations, our study gives valuable information on firearm-related injuries and also provides some of the approaches to prevent these kinds of injuries.

CONCLUSION

Firearm injuries were common among young males. Civilian clashes were the most common cause of firearm injuries. Abdomen and pelvis were the most affected body regions.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

Conception and Design:	AM
Data collection, analysis & interpretation:	ASB
Manuscript writing:	SH