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Medicolegal Evaluation of Firearm Injuries Pattern (Fatal and Nonfatal) in Qena Governorate, Egypt during the Years 2010 and 2011 (a Retrospective Study)

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Egypt.

Abstract This retrospective study was carried out to evaluate and compare the pattern of firearm injuries in Qena Governorate during the years 2010 and 2011 (before and after the 25th January Egyptian revolution) based on examination of medicolegal reports belong to cases of firearm injuries which referred to the Medicolegal Department of Ministry of Justice, in Qena Governorate. Firearm injuries were 356 and 448 cases which represented 38.56% and 40.7% of total cases in years 2010 and 2011 respectively. Most of injuries occurred in males which represented 95.5% and 96 % of total cases and the highest percentage of victims was in the age group 21-30 years which represented 42.41% and 42.18% of total cases in years 2010 and 2011 respectively. The highest percentage of cases among regions of the Governorate was in Deshna center which represented 20.2% and 20.3% of total cases in years 2010 and 2011 respectively. Most of cases occurred in summer months which represented 30.34% and 33% of total cases in years 2010 and 2011 respectively. Long rifled weapons constituted the highest percentage of used weapons which represented 87.4% and 96.4 % of total cases in years 2010 and 2011 respectively. The most common site for entrance wounds was the extremities which represented 85.67% and 81.2% of total cases in years 2010 and 2011 respectively. Most cases were due to perpendicular firing which represented 84.5% and 88% of total cases in years 2010 and 2011 respectively. The head and chest injuries constituted the highest percentage of causes of death which represented 42.1% and 37% of total cases in year 2010 while they represented 40.7% and 31.6% of total cases in year 2011 respectively. Fatal cases represented 5.3% and 18.1% of total cases in years 2010 and 2011 respectively while the nonfatal cases represented 94.7% and 81.9% of total cases in years 2010 and 2011 respectively. Permanent infirmities occurred in 7.1% and 8.7% of nonfatal cases in years 2010 and 2011 respectively. As regard the manner of injuries, homicidal injuries represented 89.6 % and 87.5%, accidental injury represented 8.9% and 11.8%, suicidal injury represented 1.5% and 0.7% of total cases in years 2010 and 2011 respectively. As regard motives of injuries revenge was the commonest motive for injuries which represented 54.7% and 44.6% of total cases then dispute in 32.95% and 41.47% of total cases in years 2010 and 2011 respectively. This study concluded that the percentage of firearm injuries was increased in year 2011 than year 2010 due to absence of security role and presence of unlicensed weapons. Minimization of firearm injuries necessitates activation of police role, enforcement of law in prevention of possession and trafficking of unlicensed weapons as well as strengthen the active role of conciliation and dispute resolution committees in the community.

Keywords Medicolegal, Firearm injuries, Qena Governorate, Egypt

Introduction

Firearm injuries continue as a major public health problem, contributing significant morbidity, mortality and expense to different communities (Rana et al., 2012).

The invention of firearm has come as a curse to this world; it has become the most dreaded killing tool used by human being to kill themselves (Patowary, 2005).

The percentage of firearm injuries and deaths varies greatly in different parts of the world and in different regions of the same country according to availability of weapons (Kapusta et al., 2007, Humayun et al., 2009 and Davies et al., 2012).

The United States has far higher rates of firearm deaths-firearm homicides, suicides, and unintentional deaths compared with other high-income countries (Richardson and Hemenway, 2011).

Firearm injuries can result in deaths, disabilities, emotional turmoil, economic coasts, greater utilization of health care system and burden on legal/police services (Narang et al., 2010).

Many factors increase the incidence of firearm injuries such as gun trafficking, illegal supply of guns to criminals, robberies and assaults (Braga et al., 2012).

Physicians necessitate special training for diagnosis, management and prevention of firearm injuries (Dingeldein, 2012). Forensic pathologist also require special training to diagnose type of wound, direction and distance of firing, type of weapon and manner of death (Naik et al ., 2011).

On examining firearm fatalities, the main goal of forensic analysis is to distinguish firearm suicides from homicides and accidents. The location of wound entrance, wound path trajectory and gunshot residues, blood stain pattern analysis of gunshot-related back-spatter on hands of the victim can be essential tools not only to determine which hand was holding the firearm, but also to reconstruct the position from which a weapon was fired (Kunz et al., 2013).

Although a lot of articles about firearm injuries and deaths have been published abroad, there is little studies about the magnitude of this problem in different Egyptian Governorates. Therefore, the objective of this work is to evaluate the pattern of fatal and nonfatal firearm injuries in Qena Governorate during the years 2010 and 2011 (before and after the 25th January Egyptian revolution) that examined by Medicolegal Department of Ministry of Justice in Qena. Also to compare the pattern in Qena with that reported in other Egyptian Governorates and other countries.

Subjects and methods

All cases of firearm injuries (fatal and nonfatal) from 1 January 2010 to 31 December 2011 were retrospectively studied through manual review of all medicolegal reports belong to cases of firearm injuries from the archives of the Medicolegal Department, Ministry of Justice in Qena Governorate. The cases were analyzed for evaluation of various parameters including age, sex, residence of the victims, as well as seasonal variation, sites of the wound, distance, direction, fate and cause of death of injuries. Manner and motives of injuries was determined using information from case histories, first information reports and scene circumstances. Also the type of weapon used in each case was obtained from records of firearm examiners.

Ethical consideration

This work was done after approval from the ethical committee of Faculty of Medicine, Assiut University. Agreement for perusal of records was obtained from the head office of Medicolegal Department of Ministry of Justice in Qena Governorate. Confidentiality of the medicolegal reports was maintained by keeping the reports anonymous.

Statistical analysis

The data collected were organized, tabulated, entered into a computer database program using SPSS (Statistical Package for Social Sciences) software version 16. Data was statistically analyzed using Chi-square test was used. Identification of the significance of differences between the years 2010 and 2011 by p value while demonstration of the significance of differences between groups of the same year by X^2 and Z values.

Results

Figure (1) shows percentage of firearm injuries to total cases examined by the medicolegal department in Qena Governorate in the years 2010 and 2011. The cases were 356 and 448 which represented 38.56% and 40.72% of total cases during years 2010 and 2011 respectively.

Table (1) and figure (2) show age distribution of victims of firearm injuries (fatal and nonfatal) in Qena Governorate in years 2010 and 2011. There was a highly significant difference between all age groups in each of years 2010 and 2011 (P value <=0.01). The highest percentage of cases was in age group 21-30 which represented 42.41% and 42.17% of total cases in years 2010 and 2011 respectively followed by the age group 31-40 years which represented 41.85% and 40.17 % of total cases respectively. There was no significant difference between the years 2010 and 2011 as regard the percentage of each age groups (p value >0.05).

Figure (3) shows sex distribution of victims of firearm injuries (fatal and nonfatal) in Qena Governorate during the years 2010 and 2011. Most of the victims where males who represented 95.5% and 96 % during the years 2010 and 2011 respectively

Table (2) shows residence distribution of victims of firearm injuries fatal and nonfatal) in Qena Governorate in years 2010 and 2011. There was highly significant difference between all regions of Qena Governorate in each of the years 2010 and 2011 (P value <0.01) as regard number of cases but there was no significant difference in number of cases of the same region in years 2010 and 2011 (P value >0.05). The highest percentage of firearm injuries was in Deshna rural area which represented 20.2% and 20.3% of total cases in years 2010 and 2011 respectively. Then Qena city which represented 14.9% and 14.5% of total cases in years 2010 and 2011 respectively followed by and Luxor city which represented 13% and 11.8% of total cases in years 2010 and 2011

respectively.

Table (3) and figure (4) show seasonal variation of firearm (fatal and nonfatal) in Qena Governorate in years 2010 and 2011. There was significant difference between all seasons as regard number of cases in the years 2010 (P value <=0.05 =significant). There was highly significant difference between all seasons as regard number of cases in year 2011 (P value <0.01). There was no significant difference in number of cases of the same season between the two years 2010 and 2011 (p value >0.05). The highest percentage of firearm injuries was in summer months which represented 30.34% and 33 % of total cases in years 2010 and 2011 respectively followed by spring months which represented 26.13% and 27.46% of total cases in years 2010 and 2011 respectively.

Table (4) show number of inlet and exit wounds of firearm injuries in Qena Governorate in years 2010 and 2011. There was a highly significant increase in number of cases of multiple inlets than single inlet wound in each of years 2010 and 2011 (P value <=0.01). Multiple inlets represented 57.6% and 66 % of total cases in years 2010 and 2011 respectively. There was a highly significant increase in number of cases of presence of exit wound than absence of exits in each of years 2010 and 2011 (P value <=0.01). Exit wounds were found in 86.70% and 88.2% of total cases in years 2010 and 2011 respectively.

Table (5) and figure (5) show types of firearm weapons which used in induction of injuries in Qena Governorate in years 2010 and 2011. There was a highly significant increase in number of long rifled weapons than other types of weapons each of years 2010 and 2011 (P value <=0.01). There was a highly significant increase in use of long rifled weapons in year 2011 than year 2010 (P value <0.01) and a highly significant decrease in number of short rifled weapons in year 2011 than year 2010 (P value <=0.01). Long rifled weapons were the commonest used weapons which represented 87.4% and 96.4% of total cases in years 2010 and 2011 respectively. Then short rifled weapons which represented 11% and 2.7% of total cases during the years 2010 and 2011 respectively. Lastly the non-rifled weapons which represented smallest percentage 1.6% and 0.9% of total cases in years 2010 and 2011 respectively.

Table (6) shows distance of firing of firearm injuries in Qena Governorate in years 2010 and 2011. There was a highly significant increase in number of cases of far firing than near firing in each of years 2010 and 2011 (P value <=0.01). Distant firing represented the highest percentage 84.5% and 97.5% of total cases in years 2010 and 2011 respectively. There was a highly significant increase in number of cases of far firing than near firing in year 2011 than year 2010 (P value <=0.01) while there was a highly significant decrease in number of cases of near firing than far firing in year 2011 than year 2010 (P value <=0.01)

Table (7) shows the different directions of firing. There were a highly significant increase in cases of perpendicular firing compared to other directions in years 2010 and 2011 (P value <=0.01). Perpendicular firing represented the highest percentage 84.5% and 88% of total cases in years 2010 and 2011 respectively. Oblique firing represented 13.7% and 9% of total cases in years 2010 and 2011 respectively.

Table (8) and figure (6) show sites of entrance wounds of firearm projectiles in the victims in Qena Governorate in years 2010 and 2011. The highest percentage occurred in the extremities (upper and lower) which represented 85.67% and 81.2% of total cases in years 2010 and 2011 respectively. There were a highly significant increase in number of cases in extremities compared to other sites (P value <=0.01).

Table (9) and figure (7) show motives and manner of firearm injuries in Qena Governorate in years 2010 and 2011. There was a highly significant increase in number of cases of homicidal manner than accidental and suicidal manners in each of years 2010 and 2011 (P value <=0.01). Homicidal manner represented 89.6 % and 87.5%, accidental injury represented 8.9% and 11.8%, suicidal injury represented 1.5% and 0.7% of total cases in years 2010 and 2011 respectively. There was a highly significant increase in number of injuries due to revenge than other motives in each of years 2010 and 2011 (P value <=0.01). Revenge was the commonest motive for injuries which represented 54.7% and 44.6% of total cases then dispute which represented 29.2% and 47.1% of total cases in years 2010 and 2011 respectively.

Table (10) and figure (8) show fate of firearm injuries (fatal and nonfatal) in Qena Governorate in years 2010 and 2011.The nonfatal cases represented 94.7% and 81.9% of total cases in years 2010 and 2011 respectively. There was a highly significant increase in number of fatal cases in year 2011 than year 2010 (P value <=0.01).Fatal cases represented 5.3% and 18.1% of total cases in years 2010 and 2011 respectively. Nonfatal cases represented 94.7% and 81.9% of total cases in years 2010 and 2011 respectively. There was a highly significant decrease in number of nonfatal cases in year 2011 than year 2010 (P value <=0.01). Complete cure occurred in 28.8% and 17.7% of nonfatal cases in years 2010 and 2011. There was a highly significant decrease in number of complete cure cases in year 2011 than year 2010 (P value <=0.01). Permanent infirmity was occurred in 7.1% and 8.7% of nonfatal cases in years 2010 and 2011 respectively. There no significant difference in number of permanent infirmity cases in years 2010 than year 2011(P value >0.05). Cure with complications (as fractures) represented 59.2% and 62.5% of nonfatal cases in years 2010 and 2011 respectively. There was a highly significant increase in number of cases of complete cure with complications in year 2011 than year 2010 (P value <=0.01).

Table (11) shows causes of death in fatal firearm injuries in Qena Governorate in years 2010 and 2011. There was a highly significant increase in number of deaths due to injuries of the brain and chest organs compared to other causes of death in years 2010 and 2011 (P value <=0.01). Laceration of brain and meninges represented 42.1% and 37% of total cases in years 2010 and 2011 respectively. There were a

significant increase in cases of lacerations of the brain and meninges in year 2010 than year 2011 (P value <=0.05). Laceration of heart and lungs represented 31.6% and 40.7% of total cases in years 2010 and 2011 respectively. There were a highly significant increase in cases of lacerations of the heart and lungs in year 2011 than year 2010 (P value <=0.01).

Table (1): Chi-square statistical analysis of age distribution of victims of firearm injuries in Qena Governorate in years 2010 and 2011.

Age groups	2010		2011		Z	P value
	No.	Percent	No.	Percent		
< 10 Y.	5	1.4	11	2.46	0.81	0.210
10 – 20 Y.	14	3.93	19	4.24	0.04	0.484
21-30 Y.	151	42.41	190	42.41	-0.07	0.472
31-40 Y.	149	41.85	179	39.95	0.47	0.318
41-50 Y.	27	7.6	38	8.48	0.33	0.369
> 51 Y.	10	2.81	11	2.46	0.09	0.464
Total	356		448			
X^2	504.03		590.03			
P value	0.0003**		0.00003**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (2): Chi-square statistical analysis of residence distribution of victims of firearm injuries in Qena Governorate in years 2010 and 2011.

Region	2010		2011		Z	P value
	No.	Percent	No.	Percent		
Deshna	72	20.2	91	20.3	-0.06	0.477
Nag Hamady	35	9.8	41	9.2	0.21	0.418
Qena city	53	14.9	65	14.5	0.05	0.479
Luxor	46	13	53	11.8	0.36	0.359
Armant	39	11	44	9.8	0.41	0.341
Abo Tesht	28	7.9	34	7.6	0.01	0.494
Ques	21	6	28	6.3	0.06	0.476
Farshot	29	8.1	41	9.1	0.38	0.353
Isna	14	3.9	19	4.2	0.04	0.484
Qeft	7	1.9	11	2.5	0.23	0.411
Naqada	8	2.2	13	2.9	0.36	0.361
Al Waqf	4	1.1	8	1.8	0.48	0.316
Total	356	100	448	100		
X^2	173.2		190.44			
P value	0.00001**		0.000002**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (3): Chi-square statistical analysis of seasonal variation of firearm injuries in Qena Governorate in years 2010 and 2011.

Season	2010		2011		Z	P value
	No.	Percent	No.	Percent		
Winter	72	20.22	85	18.97	0.36	0.361
Autumn	83	23.31	92	20.54	0.86	0.194
Summer	108	30.34	148	33.03	0.74	0.229
Spring	93	26.12	123	27.46	0.34	0.365
Total	356		448			
X^2	10.53		30.29			
P. value	0.014*		0.000001**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (4): Chi-square statistical analysis of number of inlets and exits wounds of firearm injuries in Qena Governorate in years 2010 and 2011.

Type of wound	2010		2011		Z	P value
	No.	Percent	No.	Percent		
Inlet wound						
1. Single	151	42.4	153	34	2.33	0.009**
2. Multiple	205	57.6	270	66	0.70	0.243
X^2	16.45		91.75			
P. value	0.000005**		0.000001**			
Exit wound						
1. Present	309	86.7	395	88.2	0.48	0.316
2. Absent	47	11.30	53	11.8	0.48	0.316
X^2	404.91		522.99			
P. value	0.000005**		0.000003**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (5): Chi-square statistical analysis of types of weapons used in infliction of firearm injuries in Qena Governorate in years 2010 and 2011.

Type of weapon	2010		2011		Z	P value
	No.	Percent	No.	Percent		
Long rifled	311	87.36	432	96.4	4.69	0.000001**
Short rifled	39	10.96	12	2.7	4.64	0.000002**
Non rifled	6	1.68	4	0.9	0.69	0.246
Total	356		448			
X^2	708.31		1203.09			
P. value	0.00004**		0.000005**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (6): Chi-square statistical analysis of distance of firing of firearm injuries in Qena Governorate in years 2010 and 2011.

Distance of firing	2010		2011		Z	P value
	No.	Percent	No.	Percent		
Near	55	15.5	11	2.5	6.54	0.000001**
Far	301	84.5	437	97.5	6.54	0.000001**
Total	356	100	448	100		
X^2	338.98		808.64			
P. value	0.00002**		0.000003**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (7): Chi-square statistical analysis of direction of firing of firearm injuries in Qena Governorate in years 2010 and 2011.

Direction of firing	2010		2011		Z	P value
	No.	Percent	No.	Percent		
Perpendicular	301	84.5	395	88	1.39	0.088
Oblique	49	13.7	41	9	1.95	0.025*
From above downward	6	1.8	12	3	0.71	0.240
Total	356	100	448	100		
X^2	640.46		907.33			
P. value	0.000003**		0.000004**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (8): Chi-square statistical analysis of sites of entrance wounds of firearm injuries in the victims in Qena Governorate in years 2010 and 2011.

Sites	2010		2011		Z	P value
	No.	Percent	No.	Percent		
Head	11	3	31	6.9	2.26	0.011*
Chest	14	3.9	37	8.3	2.35	0.009**
Abdomen	26	7.3	16	3.6	2.20	0.013*
Limbs	305	85.8	364	81.2	1.57	0.057
Total	356	100	448	100		
X^2	937.78		1008.99			
P. value	0.000004**		0.000004**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (9): Chi-square statistical analysis of motives and manner of firearm injuries in Qena Governorate in years 2010 and 2011.

Manner	Motives	2010		2011		Z	P value
		No.	Percent	No.	Percent		
Homicidal	Revenge	195	54.7	200	44.6	2.78	0.002**
	Dispute	104	29.2	181	40.4	3.22	0.0006**
	Brawl	14	3.93	6	1.33	2.12	0.017*
	Robbery	4	1.1	2	0.45	0.70	0.243
	Cashing criminals	2	0.56	3	0.67	-0.26	0.398
	X^2	547.52		650.14			
	P. value	0.000003**		0.000003**			
Accidental	Random shooting in streets/festivals	7	1.97	12	2.68	0.43	0.334
	Playing with firearms	50	14	25	5.58	3.98	0.00003**
	X^2	35.06		4.76			
	P. value	0.000001**		0.029*			
Suicide	Depression	4	1.1	2	0.46	0.70	0.243
	Abuse of drugs	1	0.3	1	0.23	-0.55	0.291
	X^2	1.64		0.34			
	P. value	0.2004		0.557			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (10): Chi-square statistical analysis of fate of injuries in Qena Governorate in years 2010 and 2011.

Fate	2010		2011		Z	P value
	No.	Percent	No.	Percent		
Death	19	5.3	81	18.1	5.33	0.0001**
Total survived (nonfatal) cases	337	94.7%	367	81.9%	5.33	0.0001**
1. Complete cure	97	28.8	65	17.7	3.40	0.0003**
2. Cur with permanent infirmity	24	7.1	32	8.7	0.64	0.260
3. Cure with complications	216	64.1	270	73.6	2.63	0.004**
Total cases	356	100	448	100		
X^2	380.26		364.71			
P. value	0.000003**		0.000003**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

Table (11): Chi-square statistical analysis of causes of death of fatal firearm injuries in Qena Governorate in years 2010 and 2011.

Causes of death	2010		2011		Z	P value
	No.	%	No.	%		
Lacerations of brain and meanings	152	42.7%	164	36.6%	1.68	0.046*
Lacerations of heart and lungs	112	31.6%	182	40.7%	2.61	0.004**
Lacerations of abdominal organs (liver, kidneys, spleen, stomach, viscera)	54	15.2%	74	16.5%	0.42	0.336
Lacerations of blood vessels and hemorrhage	19	5.3%	22	5%	0.11	0.455
Fracture of vertebral column and spinal cord injury	19	5.3%	6	1.3%	3.04	0.001**
Total	356		488			
X^2	238.52		367.62			
P. value	0.000002**		0.000002**			

P value: >0.05 non-significant, ≤0.05=significant, ≤0.01 highly significant.

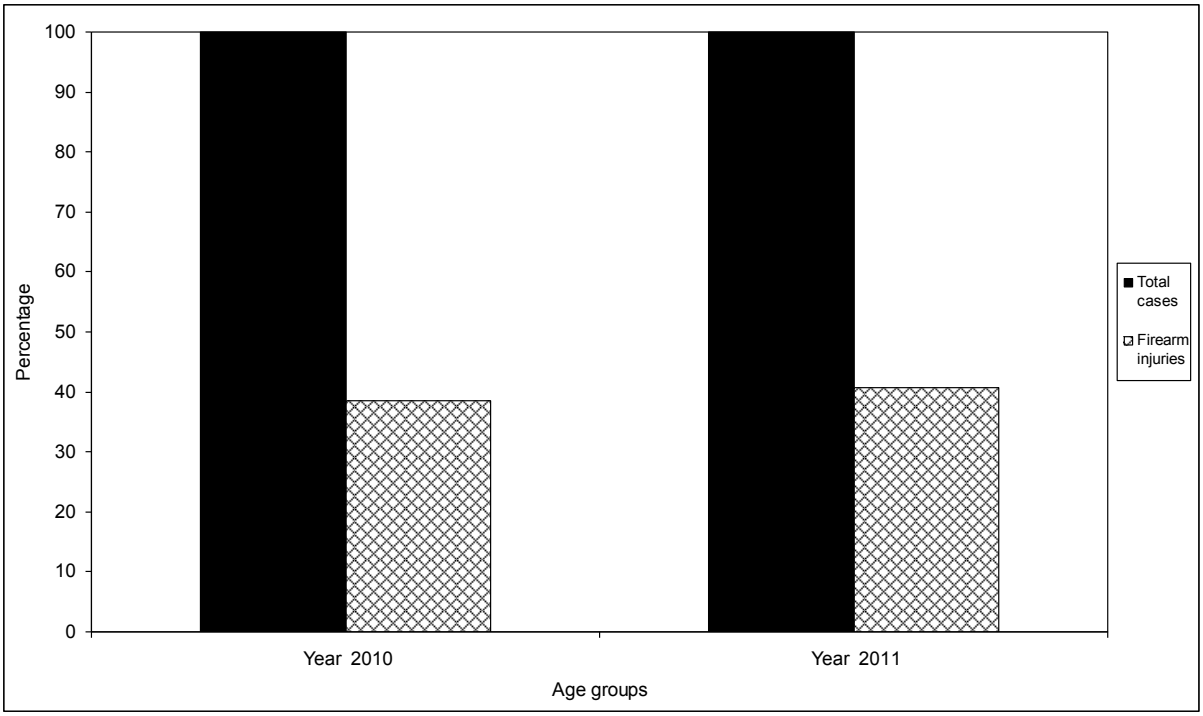

Figure (1): Percentage of firearm injuries to total cases in Qena Governorate in years 2010 and 2011.

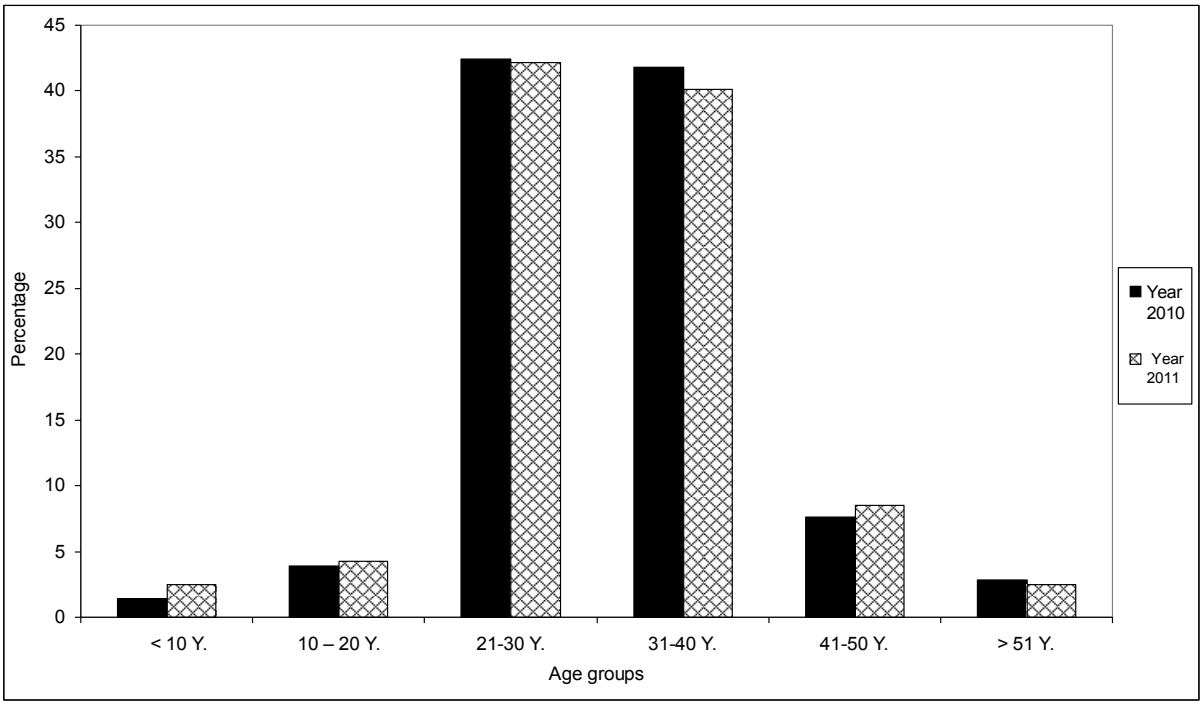

Figure (2): Age distribution of victims of firearm injuries (fatal and nonfatal) in Qena Governorate in years 2010 and 2011.

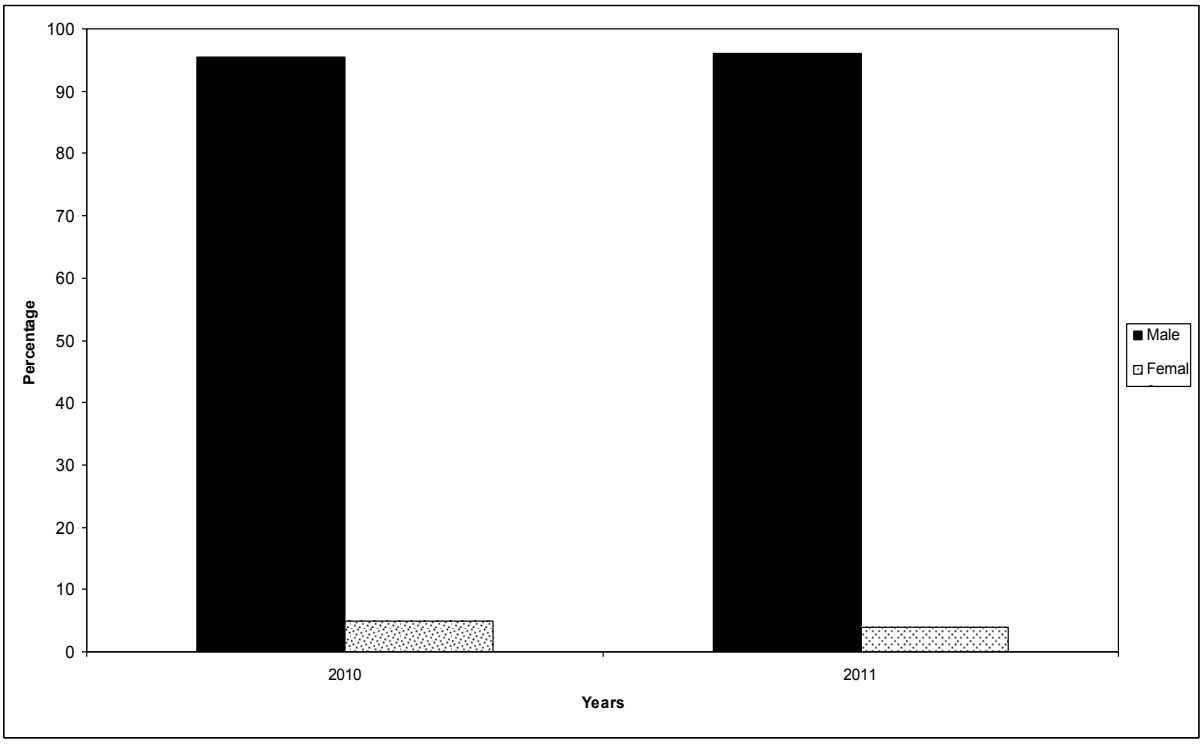

Figure (3): Sex distribution of firearm injuries in Qena Governorate in years 2010 and 2011.

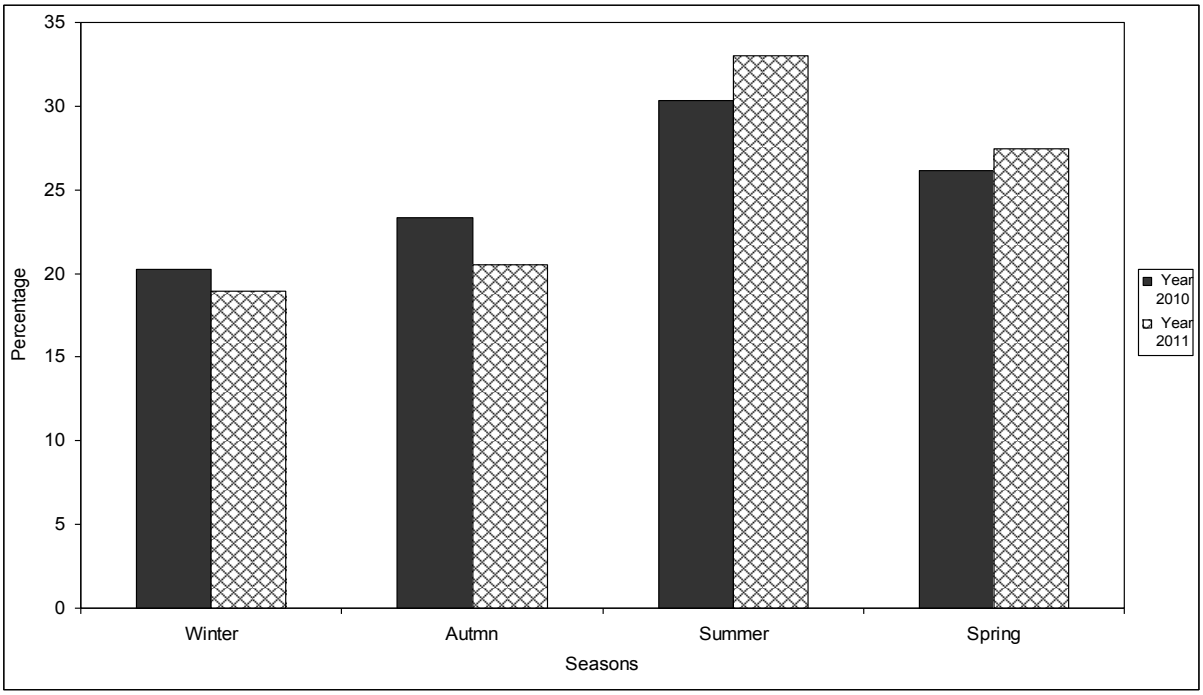

Figure (4): Seasonal variation of firearm injuries in Qena Governorate in years 2010 and 2011.

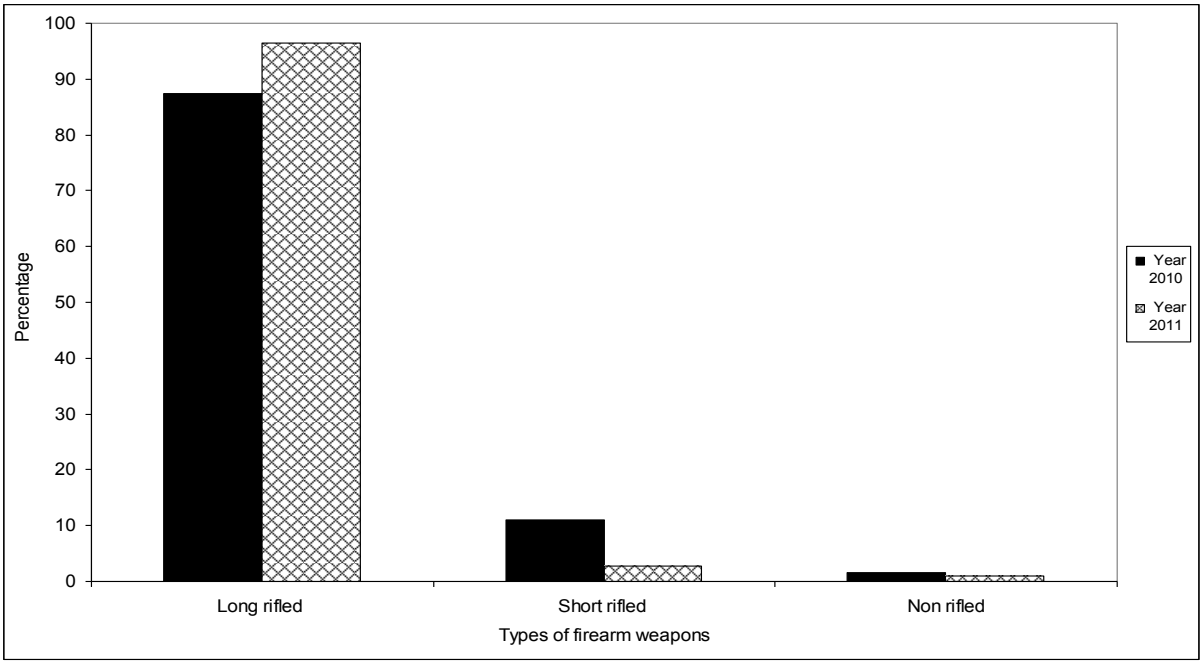

Figure (5): Types of weapons used in firearm injuries in Qena Governorate in years 2010 and 2011.

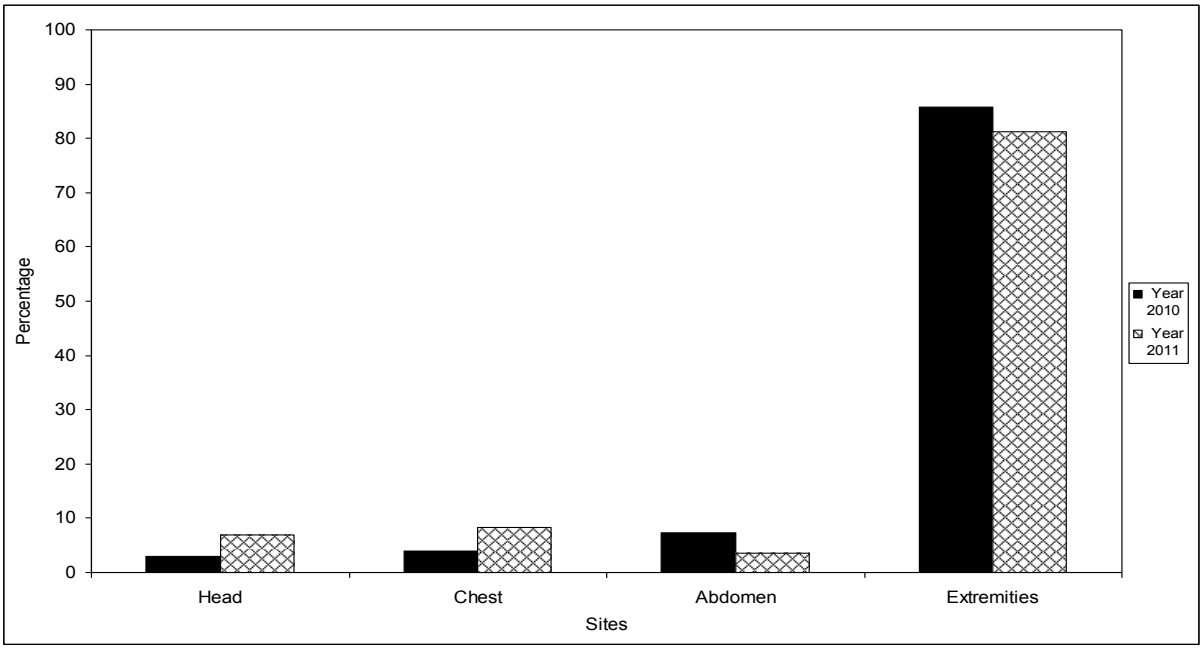

Figure (6): Sites of entrance wounds of firearm projectiles in the victims in Qena Governorate in years 2010 and 2011.

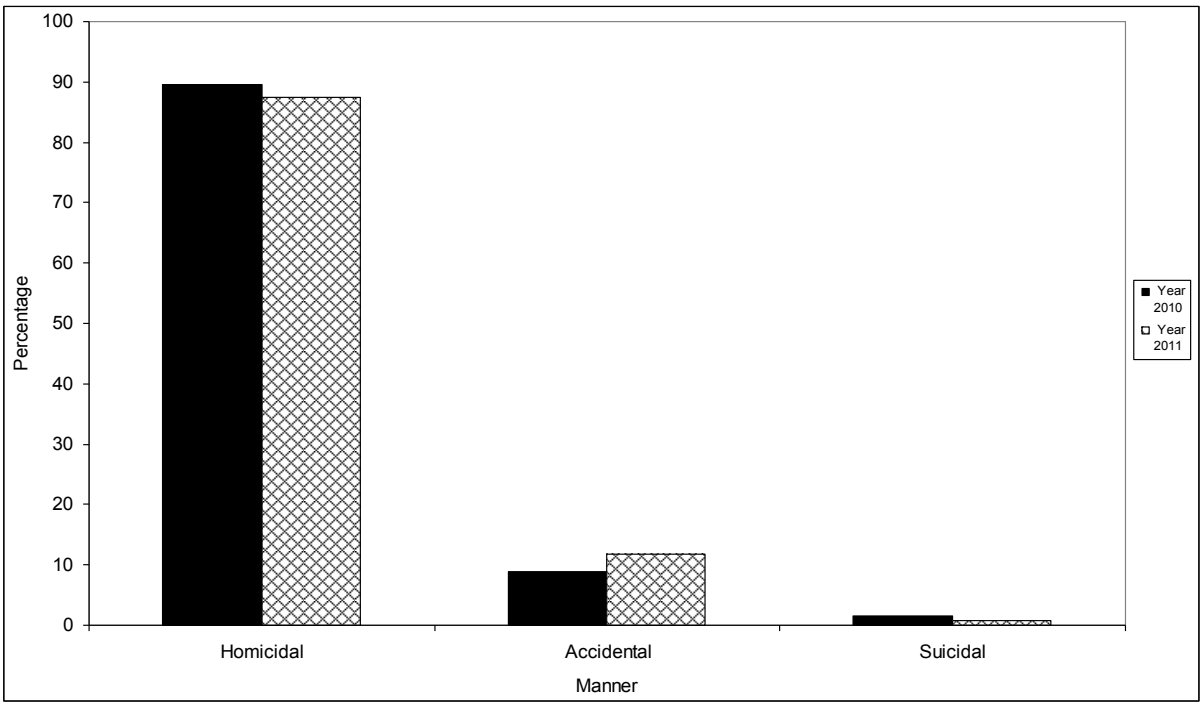

Figure (7): Manner of firearm injuries in Qena Governorate in years 2010 and 2011.

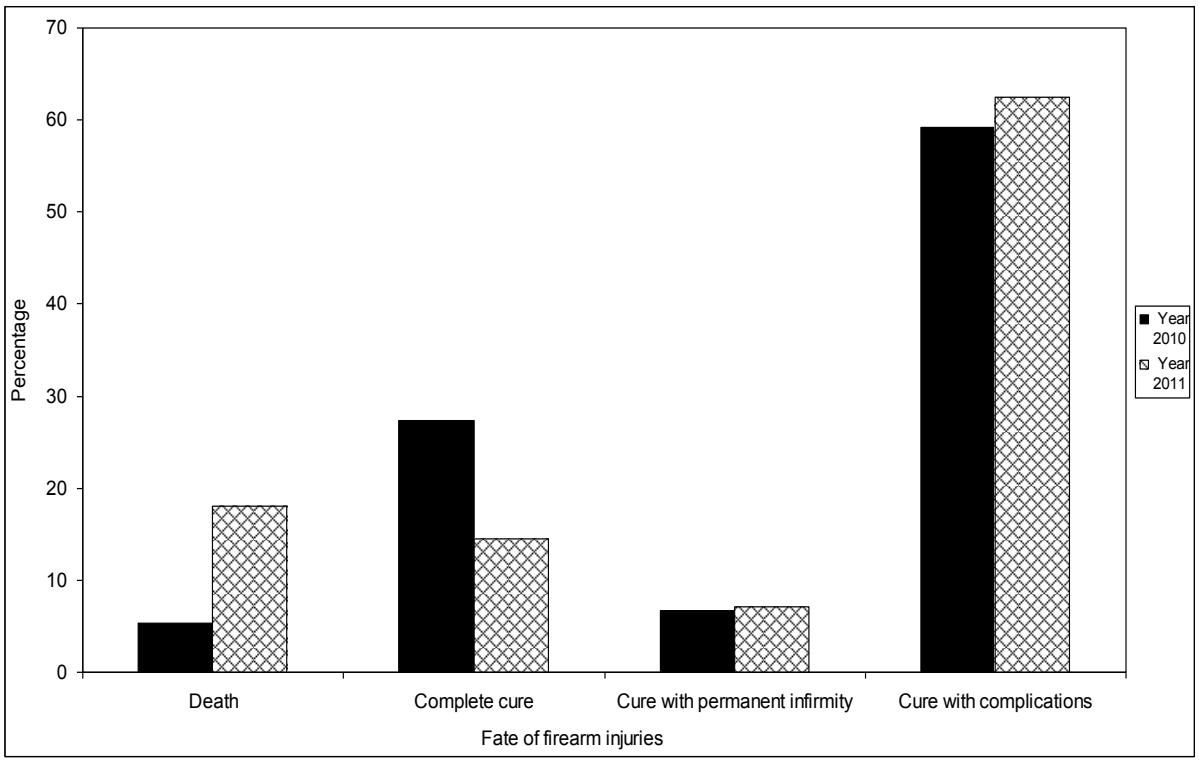

Figure (8): Fate of firearm injuries in Qena Governorate in years 2010 and 2011.

Discussion

Firearm injuries represent a major public health problem throughout the world resulting in substantial morbidity, mortality and permanent disability, particularly in young individuals (Yacoub et al., 2006).

Firearm injuries and deaths severely affect the health care system and criminal justice (Hargarten, 2002).

The frequency of firearm related deaths appear to be higher in nations where firearm are more readily available, either legally or illegally (Verzeletti et al., 2009).

The present work is a retrospective analysis of firearm injuries and deaths in Qena Governorate which examined by medicolegal Department of Ministry of Justice in Qena during the years between January 2010 and December 2011.

This study demonstrate that the number of firearm injuries (fatal and nonfatal) was increased

Qena during the year 2011 following the Egyptian revolution were firearm weapons were freely used due to absence of security role.

The present study illustrated that the highest percentage of age groups of was between 21-30 years represented (31.25%) followed by the age group 31-40 years (20.54%). The majority of victims were males (86.31%).

Studies in other parts of the world revealed similar results as most victims were males in age group of 21-30 years like Sweden (Karlsson et al., 1993), Germany (Karger et al., 2002), Nigeria (Seleye-Fubara et al., 2009), Saudia Arabia (Al Madni et al., 2008), Iran (Amiri et al., 2003), India (Pradipkumar et al., 2005), Pakistan (Nasrullah and Razzak, 2009) and El Salvador (Paniagua et al., 2005).

In agreement with the present work was the study in Edirne, Turkey also reported that 54% of firearm victims were aged between 20 and 40 years (Azmak et al., 1998). Also in Bari (Italy) most of victims in firearm fatalities were males which represented 93% (Solarino et al., 2007). Similar results obtained in Faisalabad (India) where 28.19% of victims were in age groups 20-29 and 77.66% victims were males (Bashir et al., 2007). Firearm related injuries in a Finland study during the years 1990-2003; revealed that men's injury incidence was 10 times that of women's and young men's aged 15-34 years displayed the highest incidence figures (Mattila et al., 2006). Firearm injuries are the highest of all categories of injuries between 15-34 years after which they equalize with stabbing injuries and the age group 20-24 years has the highest rate of nonfatal injuries from firearms in the capital of Honduras (Yacoub et al., 2006).

Comparable with results of the present work is the study of the pattern of firearm injuries and fatalities in Assiut Governorate, Egypt during the year 2006. The majority of victims were males which represented 86.31% of total cases and the peak age group was 20-30 years (31.25%) then 31-40 years (20.25%) of total cases (Abdel Hady et al, 2008).

Also, in harmony with the present study in El-Menofia Governorate, Egypt during the year 2000. The maximum number of firearm injuries was in the age group 20-30 years. The majority of victims were males 88.6% of total cases which were near the figure in the present study (86.31%). This might be due to the fact that males are more mobile, more violent and more liable to be engaged in quarrels and assault (Maklad et al., 2004).

The young age of most victims may be related to their unemployed status and might explain their willingness to engage in criminal activity. Also, young people are more aggressive by nature. Elderly people tend to act with restraint; their role is more to settle quarrels than provoking them. Youth pick up more fights and more involved as aggressors as well as victims. Males generally go for work outdoor and female tend to remain indoors. Males are also more exposed to daily stress activities. Males are also more affected than females as they are expected to have the moral prestige of the family and any threat to it can lead to violence (Kohli and Aggarwal, 2006; Solarino et al., 2007).

In the present work firearm injuries were common in summer and spring. The highest percentage of cases was in summer months which represented 30.3% and 33% of total cases respectively followed by spring months which represented 26.13% and 27.46% total cases in years 2010 and 2011 respectively. A similar results obtained in a study of firearm injuries in Suez canal area from year 2005 to year 2010 where the highest percentage of cases was in summer months which represented 53.7% of cases followed by spring months which represented 26.1% of total cases (Hagras et al., 2012). Disagreement with present work a study carried out to determine the prevalence of fatal and nonfatal firearm injuries in Alexandria, Egypt. The researchers reported that 31.5% of injuries occurred during autumn months, while the least occurred in summer months (20.4%) (Abdel Salam et al., 2006).

In the current study the percentage of firearm injuries was 27.9% and 26.3% in urban area of Qena and Luxor cities in years 2010 and 2011 respectively while the percentage was 72.1% and 74.9% in rural areas of Qena Governorate in years 2010 and 2011 respectively. Similar finding was detected in the study of firearm injuries in El Fayoum Governorate in the period between years 2000 to 2007. It was found that 73.2% of cases in rural area and 26.8% in urban area (Gamal Eldin et al., 2008).

In the present work most of inlet wounds were multiple which represented 57.6% and 66% of total in years 2010 and 2011 respectively. In agreement with the present work the study of fatal firearm injury in Bari (Italy) where multiple entrance wounds were more common than single entrance wounds (Solarino et al., 2007). Also the study of homicidal cases from firearm injury at autopsy in Adana, Turkey, it was found that multiple injury in 53. 65% while the victims suffered a single wound in 47.35% of firearm-related murders (Hilal et al., 2005).

The results of the current study revealed that the highest percentage of injuries occurred from distant firing 84.5% and 97.5% of total cases respectively in 2010 and 2011 respectively. The majority of cases had multiple entrance wounds in 57.6% and 66% of total cases respectively. Also the majority of cases occurred by perpendicular firing 84.5% and 88% of total cases respectively. This is explained by homicidal injuries constituted the highest percentage of injuries.

In agreement, was a study of firearm injuries in Dammam, Saudi Arabia during the period from year 2002 to 2006 where distant range firing was observed in 65.6% of cases (Al Madni et al., 2008).

In the present study long rifled firearm weapons were the commonest type used which represented 87.4% and 96.4 % of total in years 2010

and 2011 respectively followed by short rifled weapons 11% and 2.7% of total in years 2010 and 2011 respectively, lastly non rifled 1.6% and 0.9% of total in years 2010 and 2011 respectively.

These results were in agreement with the study of homicidal firearm injuries in Sri Lanka during the period from June 2005 to July 2006, where long rifled weapons represented 98% of totally used weapons (Edirisinghe and Kitulwatte, 2010).

In contradiction with the present work is study of pattern of firearm injury in Assiut in the year 2006 by Abdel Hady et al. (2008) who reported that the long rifled weapons represented 21.43%, short rifled constituted only 2.68%. On the other hand homemade guns represented 75.89% of totally used weapons of them 55.65% fire shots and 20.24% fire bullets.

Homicide is one of the oldest crimes in human history. Motives of homicide include revenge, rage, jealousy, honor, dispute and argument/conflict (Drawdy and Myers, 2004 & Hassan et al., 2005). Also drug abuse, drug trafficking and gang membership (Well et al., 2010). Cultural factors may contribute to such homicidal injuries such as poverty, unemployment, income inequality, defense of honor; alcohol consumption; methods of dispute resolution, weapon carrying and weaknesses in mechanisms of law enforcement (Seedat et al., 2009 and Shon, 2010).

In the current work the most common manner of injuries were homicidal injuries which represented 89.6 % and 87.5%, followed by accidental injury which represented 8.9% and 11.8% while fewer number were suicidal injury which represented 1.5% and 0.7% of total cases in 2010 and 2011 respectively.

Similar results obtained in a study of pattern of firearm injury in Assiut Governorate in year 2006 where homicidal manner represented 86.91%. Accidental manner represented 12.20% and suicidal manner represented 0.89% of total cases (Abdel Hady et al., 2008).

Similar results were reported in the study of manner of firearm injuries in Menofia Governorate Egypt. It was found that the manner in 71.43% of the studied cases were homicidal, 28.57% were accidental and no suicidal or fabricated cases. These results can be explained as firearm is not the vulnerable method of suicide in Egypt (Maklad et al., 2004).

In Egypt some accidental firearm injury and deaths were reported in rural areas due to use of guns in wedding, holidays and festivals. Out of total of 29 years cases of firearm injuries admitted to Menoufiya University Hospitals, seven victims had no work which easily engaged in quarrels (Badawy et al., 2009).

Homicides predominantly occurred in young males residing in a rural locality. The peak incidence was between 20-29 years in males and in females the age group most prone was 30-39 years. Male to female ratio was 6:1. The chest (33.8%) followed by the head and abdomen were the areas primarily targeted. High velocity automatic weapons are primarily being used to kill young people in rural areas. Prevention can be through strict gun control laws coupled with education and awareness (Marri and Bashir, 2010).

The fatal firearm cases due to rifled weapons examined at the Bexar County Medical Examiner's Office, USA between 1988 and 2004 were studied. A total of 509 cases were identified, with 233 suicides and 266 homicides, the head was the most common site of injury, homicides most often had multiple wound locations and sustained from a distant range (Molina and Di Maio, 2008).

Study of autopsies were conducted in DL Khan, Pakistan revealed that homicidal deaths constituted 259/341 (76%) of all autopsies. Out of these homicides 59.07% were caused by the firearm. The most common firearm weapons were high velocity rifled weapons (AK-47, rifles and pistols). A total of 304 injuries were found in various body regions giving an average of about two injuries per victim/person. The head, neck and face sustained the highest numbers of injuries 100, (32.90%) followed by chest 91 (29.93%) and abdomen 47 (15.4%); the extremities, buttock and genitalia together sustained 65 (21.38 %) injuries (Humayun et al., 2009). Also a study of fatal injuries in Campina Grande, PB, Brazil, between January 2003 and December 2007 reported that the head and face were found to be the commonest site of fatal firearm injuries

In agreement with the present work was the results of study of Berg et al., (2012) in the USA who mentioned that the extremities were the most commonly injured anatomic region in nonfatal firearm trauma and are associated with high rates of vascular, nerve and bony injury (Berg et al., 2012). Also a study of total of 286 patients with firearm injuries in Aga Khan University Hospital Karachi, Pakistan. Lower limb (30%), abdomen (27%) and pelvis were the most affected body regions. Most of injuries occurred during robbery (40%) (Nasrullah and Razzak, 2009).

Study of homicidal firearm injuries in Sirlanka showed that the majority of victims (N = 76) were young adult males (aged 18-40 years). Almost half of the firearm injuries were homicidal. Daylight hours (6.00 a.m. to 6.00 p.m.) were preferred by rebels, while there was no relation to the time of day in the other firearm deaths. The weapon of choice was a rifled firearm (98%) (Edirisinghe and Kitulwatte, 2010).

Variation from common findings in death due to firearm injury is not commonly encountered. When there is an atypical finding, the forensic pathologist may feel difficulty to differentiate firearm entry wound from exit wound, tracing the wound track, estimating approximate range of firing and differentiating suicidal injury from homicidal injury. Failure to differentiate entry wound from exit wound can cause error in calculating number of projectiles entered into the body, lodged inside the body or exited through the body, besides posing problem in ascertaining direction of

firing and direction of wound track. Failure to differentiate contact or close range firearm injury from distant range firearm injury can lead to wrong interpretation about the manner of death (Naik et al., 2011).

Study of fatal cases of firearm injury in Delhi, India, reported that 46.7% victims were aged between 20 and 30 years and 90.7% were males. 92.6% were victims of homicidal attacks, 6.5% suicidal and 0.9% accidental. Single firings were the norm. Chest (39%) and head (29.6%) were the two most common entry sites for the bullets (Kohli and Aggarwal, 2006). In the present work death occurred in 5.3% and 18.1% of total firearm injuries while nonfatal cases represented 94.7% and 81.9% of total in years 2010 and 2011 respectively. Permanent infirmities occurred in 6.7% and 7.1% of total cases (7.1% and 8.7% of nonfatal cases) in years 2010 and 2011 respectively. It was found that the percentage of permanent infirmities was 8.9% in firearm injuries in Assiut Governorate in 2006 (Abdel Hady et al., 2008) while the permanent infirmity represented 4.1% and cure with complications occurred in 2.1% of total cases in firearm injuries in Suez Canal area from year 2005 to year 2010 (Hagras et al., 2012).

Educational efforts and individual, community and societal approaches are needed to alleviate firearm-related injuries (Nasrullah and Razzak, 2009). Stringent laws on illegal firearms handling should be enforced by the government to reduce the frequency of firearm death (Seleye-Fubara et al., 2009).

Conclusions and recommendations

The fatal and nonfatal firearm injuries in Qena Governorate were increased in year 2011 than year 2010 due to defect in police supervision in the community. Firearm injuries are still increasing which may be attributed to gun trafficking, easy access to firearm weapons, absence of law enforcement strategies, economic difficulties, low level of education and wrong social believes about revenge.

So minimization of firearm injuries in Qena Governorate necessitates activation of the police role, enforcement of law, prevention of use, possession and trafficking of unlicensed weapons by effective legislation. In addition strengthen the active role of conciliation and dispute resolution committees to solve problems of revenge and disputes among population belonging to different tribes in Qena Governorate. Also educational and social programs and solving the problem of unemployment are mandatory.

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الملخص العربي

تقييم طبي شرعي لنمط إصابات الأعيرة النارية (المميتة وغير المميتة) بمحافظة قنا، مصر خلال عامي 2010 و2011 (دراسة مرجعية)

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تم إجراء هذه الدراسة المرجعية بهدف تقييم ومقارنة نمط إصابات الأعيرة النارية في محافظة قنا خلال عامي 2010 و2011 (قبل وبعد ثورة 25 يناير المصرية) من خلال فحص التقارير الطبية الشرعية الخاصة بحالات إصابات الأعيرة النارية التي وردت إلي مصلحة الطب الشرعي التابعة لوزارة العدل بمحافظة قنا. أظهرت الدراسة أن عدد حالات إصابات الأعيرة النارية هو 356 و 448 حالة بنسبة 38.56% و 40.7% من إجمالي الحالات الكلية خلال عامي 2010 و 2011 على التوالي. معظم الضحايا كانوا من الذكور بنسبة 95.5% و 96% من إجمالي الحالات خلال عامي 2010 و 2011 على التوالي. وكانت أعلى نسبة للمصابين في المرحلة السنية من 21 30 سنة بنسبة 42.41% و 42.18% من إجمالي الحالات خلال عامي 2010 و 2011 على التوالي. وكانت أعلى نسبة من الضحايا من منطقة مركز دشنا بنسبة 20.2٪ و 20.3٪ من إجمالي الحالات خلال عامي 2010 و 2011 على التوالي. حدثت معظم الحالات خلال شهور الصيف بنسبة 30.34% و 33% من إجمالي الحالات خلال عامي 2010 و 2011 على التوالي. واستخدمت البنادق المشخشخة طويلة الماسورة في إحداث الإصابات بنسبة عالية بلغت 87.4% و96.4 % من إجمالي الحالات خلال عامي 2010 و2011 على التوالي وكانت الأطراف هي الأكثر شيوعا لأماكن جروح الدخول بنسبة 85.67% و 81.2 % من إجمالي الحالات خلال عامي 2010 و 2011 على التوالي0 وكانت معظم الحالات نتيجة الإطلاق باتجاه عمودي بنسبة 84.5% و88 % من إجمالي الحالات خلال عامي 2010 و2011 على التوالي. مثلت إصابات الرأس و الصدر أعلى نسبة لأسباب الوفاة حيث بلغت 42.1 % و 37 % من إجمالي الحالات خلال عام 2010 في حين بلغت نسبتها 31.6 % و 40.7% من إجمالي الحالات خلال عام 2011. كانت نسبة الإصابات المميتة 5.3% و 18.1% من إجمالي الحالات خلال عامي 2010 و 2011 على التوالي. وقد كانت حالات الإصابات الغير مميتة بنسبة 94.7٪ و 81.9% من إجمالي الحالات خلال عامي 2010 و 2011 على التوالي. حدثت العاهة مستديمة بنسبة 7.1% و 8.7% من إجمالي حالات الإصابات الغير مميتة خلال عامي 2010 و 2011 على التوالي 0 وعن كيفية حدوث الإصابات فقد مثلت الإصابات الجنائية نسبة 89.6% و 87.5 % من الإجمالي، ومثلت الإصابات العرضية نسبة 8.9% و 5 11.8% من الإجمالي و مثلت الإصابات الانتحارية نسبة 1.4 % و 0.7% من الإجمالي في عام 2010 و 2011 على التوالي 0 كان الثأر هو الدافع الرئيسي لإحداث الإصابات بنسبة 54.7% و 44.6% من إجمالي الحالات ثم المنازعات بنسبة 32.95% و 41.47 % من إجمالي الحالات خلال عامي 2010 و 2011 على التوالي. وتخلص نتائج هذه الدراسة إلى زيادة نسبة الإصابات في عام 2011 عن عام 2010، و يرجع هذا إلى غياب الدور الأمني ووجود الأسلحة النارية الغير مرخصة. تقليل إصابات الأعيرة النارية يتطلب إنفاذ القانون في منع استخدام وتجارة الأسلحة النارية الغير مرخصة وتقوية الدور الفعال للجان الصلح وفض المنازعات في المجتمع.

1 قسم الطب الشرعي والسموم الإكلينيكية كلية الطب جامعة أسيوط
2 قسم الطب الشرعي والسموم الإكلينيكية كلية الطب جامعة الأزهر
3 مصلحة الطب الشرعي بقنا وزارة العدل