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A RETROSPECTIVE STUDY OF FATAL FIREARM INJURIES ON AUTOPSY CASES AT RAMATHIBODI HOSPITAL, BANGKOK

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Abstract

Hundreds of thousands of people die from injuries caused by firearms in every year around the world. Nowadays, mass production of advanced firearms and their availability in worldwide result in increased rate of death and injuries by these weapons. Autopsy reports of fatal firearm injuries from January 2002 to December 2011 were reviewed from the Division of Forensic Medicine, Department of Pathology, Faculty of Medicine, Ramathibodi Hospital, Mahidol University. During these period, total 7,126 autopsies were performed and fatal firearm injuries comprised of 2.1% (n=149) of total autopsies cases. Among those victims, 136 were male (91.3%) and only 13 (8.7%) were female victims. The youngest and oldest ages of victim were 10 years and 79 years, respectively. Mean age of the victims is 33.79 years. Rainy season, weekends and night time were found to be the most common circumstances for fatal gunshot cases. Homicide (77.2%) was the most frequent manner of death. Head/face and chest were the most common sites of entrance wound. Number of entrance wound, range and types of projectiles also were studied as autopsy findings. We also find the association between manner of death and other factors by Chi-square test and Fisher's exact tests. Age group, time of incidence, place of incidence, number of entrance wound and range showed statistically significant association with manner of death at *p*-value less than 0.05.

Keywords: gun-shot wound, fatal firearm injury, suicide, homicide, forensic medicine

Introduction

Many people from all over the world dies every day due to firearm related injuries. Nowadays, mass production of advanced firearms and their availability in worldwide result in increased rate of death and injuries by these weapons. In developing countries, illegal firearms and locally made or country guns are available without licensing. These guns are commonly used in criminal cases [1].

A study regarding various methods of homicide in Ramathibodi Hospital showed that homicide by firearm was the most commonly used method for both male and female victims [2]. According to "Gunpolicy.org" website, Thailand is the highest rate of civilian gun possession among regional countries and is the number 11 ranking in private gun ownership in comparing 178 countries around the world [3]. Though there are previously published reports of firearm injuries of many countries, the incidence and pattern of death from firearm injuries in central Bangkok has not previously been studied. This study was carried out with the objectives of finding incidence, pattern, autopsy findings and associated risk factors of fatal firearm injuries in central Bangkok, Thailand. We also compared the results with other studies around the world.

Methodology

Retrospective study design was used in the present study. Data were reviewed from the autopsy reports of fatal firearm cases from January 2002 to December 2011. Those data could be

obtained from the Division of Forensic Medicine, Department of Pathology, Faculty of Medicine, Ramathibodi Hospital, Mahidol University. All cases were investigated by police and performed complete forensic autopsy. All firearm death cases confirmed by police investigation and complete forensic autopsy were included in this study. Explosive related deaths and deaths by riot control in 2006-2010 were excluded from this study.

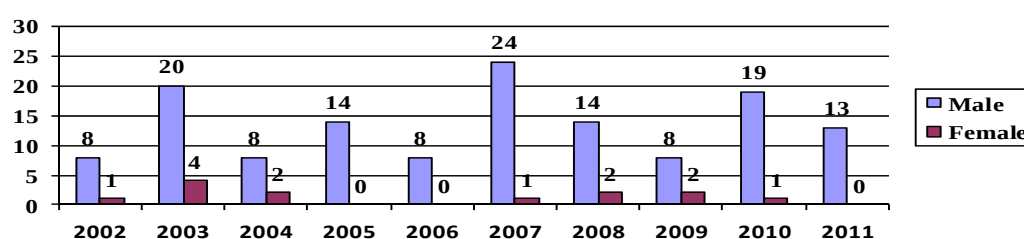
The data were analyzed by descriptive statistics and chi-square test using SPSS for Windows Version 18.0. A statistical significance was considered at p -value < 0.05.

Results

The results were divided into four parts: the demographic factors, circumstances of incidence, autopsy findings and association between manner of death and other factors.

Demographic Factors

Figure 1. Annual number of fatal firearm injury cases according to gender



During 10-year period, total of 7,126 autopsy cases were performed at the Autopsy unit in Ramathibodi Hospital. Total number of 149 cases of fatal firearm injury could be identified from these autopsy cases. Gunshot fatality comprised of 2.1% of total autopsy cases. Out of 149 cases, 136 (91.3%) and 13 (8.7%) were male and female victims, respectively (Fig.1).

Mean age of the gunshot wound victims was found to be 33.79 years (SD=14.08) and median age was 30 years. The youngest and the oldest ages were 10 years and 79 years, respectively. The most frequent age groups were 21-30 years (38.3%) and 31-40 years (19.5%).

Circumstances of incidence and Autopsy findings

For circumstance of incidence, we studied about distribution of cases according to seasons, day and time of incidence, place of incidence and responsible police area are shown in Table 1.

Majority of the fatal gunshot wound (GSW) cases were homicidal victims, 106 males and 9 females. Homicide was found to be 77.2% of the total fatal GSW cases occurred during 10 years period. The second common manner of death was suicide (21.5%), consisting of 29 males and 3 females. There was only one accidental fatal GSW case that occurred when two children playing together with a gun.

Single GSW cases were found in 28 suicidal cases and 43 non-suicidal cases, totally 71 cases. Majority of the multiple GSW cases were non-suicidal cases (n=74). Only 4 suicide cases of multiple GSW were found. There is significant association between manner of death and number of entrance wound ($\chi^2 = 25.942$, p -value = 0.000). Range showed significant association with manner of death ($\chi^2 = 112.306$, p -value = 0.000). Projectiles could be recovered from 91 cases (61.1%). Bullets could be recovered and identified in 79 cases and pellets from 12 cases. There was no suicide case died of pellet injury in our study (Table 2).

Table 1. Distribution of fatal firearm injury cases according to circumstances of incidence

Circumstances		Total number of cases	Percent
<i>Season</i>	Summer	30	20.1
	Rainy	73	49.0
	Winter	46	30.9
<i>Day of incidence</i>	Monday	16	10.7
	Tuesday	19	12.8
	Wednesday	24	16.1
	Thursday	21	14.1
	Friday	17	11.4
	Saturday	26	17.4
	Sunday	26	17.4
<i>Time of Incidence (hour)</i>	0:00 – 5:59	47	31.5
	6:00 – 11:5	31	20.8
	12:00 – 17:59	26	17.4
	18:00 – 23:59	40	26.8
	Unknown	5	3.4
<i>Responsible police area</i>	Phaya Thai	55	36.9
	Din Daeng	23	15.4
	Makkasan	22	14.8
	Huai Khuang	24	16.1
	Chana Songkram	4	2.7
	Dusit	8	5.4
	Samsen	6	4.0
	Others*	7	4.7
<i>Place of incidence</i>	Private home /apartment	34	22.8
	Social activity places	47	31.5
	Outdoor	50	33.6
	In automobile	6	4.0
	Unknown	12	8.1

Others*= Bang Pho (3), Nang Lerng (3), Don Muaung (1)

Table 2. Distribution of autopsy findings according to the manner of death

Autopsy findings		Manner of death			Chi-square	p-value
		Suicide	Non-suicide	Total number of cases		
Number of entrance wounds	Single	28	43	71	25.9421	0.000
	Multiple	4	74	78		
Range	Contact/near-contact	29	5	34	112.3065	0.000
	close/distant	0	104	104		
Type of projectile	Bullet	7	72	79	1.1519	0.283
	Pallet	0	12	12		

Head/face region was the most frequent site of entrance wound found in 78 cases followed by chest and back region (n=77). The least frequent site of entrance wound was found to be the neck region. Only 11 cases of non-suicide were shot in the neck region. No suicide case was shot to the neck, abdomen and pelvic or lower extremities at all as shown in Table 3.

Table 3. Distribution of site of entrance wound and manner of death

Site of entrance wound	Suicide	Non-suicide	Total number of cases	Percent
Head/face	29	49	78	52.3
Neck	0	11	11	7.4
Chest/back	3	74	77	51.7
Abdomen/pelvic	0	27	27	18.1
Upper extremities	1	33	34	22.8
Lower extremities	0	14	14	9.4

The association between manner of death in fatal GSW and other factors

In forensic practice, the manner of death can be usually categorized as accident, suicide, homicide or undetermined. However in our study, there was only one case of accident and one case of undetermined. Therefore, we combined homicide, accident and undetermined in one category as non-suicide. The association between manner of death and other factors was studied (Table 4).

Table 4. Association between the manner of death and other factors

Factors		Manner of death				
		Suicide	Non-suicide	Total number of cases (%)	Chi-square	p-value
Gender	Male	29	107	136(91.3)	0.0216	0.883
	Female	3	10	13(8.7)		
Age group	<30	10	61	71(47.7)	4.3945	0.036
	≥30	22	56	78(52.3)		
Place of incidence	Private home	22	12	34(22.8)	48.4562	0.000
	Others	8	96	104(69.8)		
Time of incidence	06:00-17:59	21	36	57(38.3)	11.6671	0.001
	18:00-05:59	11	76	87(58.4)		
Day of incidence	Week days	23	74	97(65.1)	0.823	0.364
	Week ends	9	43	53(34.9)		
Season	Dry	12	64	76(51.0)	2.975	0.085
	Rainy	20	53	73(49.0)		

Discussion and Conclusion

Firearm fatality is the global health problem destroying many lives and properties every day around the world. Prevention of firearm fatality needs identifying of risk factors which are different from countries to countries. In our study, total of 149 cases of fatal firearm injury cases were recruited from autopsy reports of January 2002 to December 2011. This accounts for 2.1% of total autopsy cases. Male victims accounts for 91.3% of total firearm fatality cases and this pattern is similar to other studies from around the world [4-18].

In consistent with other studies that young age is one of the risk factors for fatal firearm injury, the age group 21-30 and 31-40 are the commonest age groups for fatal firearm injuries [4-9, 14-19].

Along with other reports, Saturday and Sunday are the common days for fatal firearm injuries [2, 20]. As reported by previous studies, most of the crimes occur during night time [2, 17, 20]. Evening and night time showed higher rate of firearm injury and this may be due to the fact that most violence crimes occur during these times as in our study.

For the police area, Phaya Thai showed distinctly higher rate of incidence of fatal firearm injury in this study. This agree with previous study about homicidal cases in Bangkok[2]. This is the commercial district of Bangkok and highly heterogenic by tourists and migrant workers.

Similar result with the study by Fedakar et al., outdoor is the most common place of incidence for gunshot fatality followed by social activity places [6]. But, this study showed different result regarding homicide from studies in Italy and England. Their results showed that both homicide and suicide cases occurred commonly in private home [8, 21].

Fatal firearm injury cases in homicide and suicide were 77.2% and 21.5%, respectively. Accident and undetermined categories account for 1.3%. Results of manner of death in this study are

similar to those from India [5], Turkey [4, 6], Iran [7], southern Italy [9] and Egypt [17]. However, reports from Brescia (Northern Italy)[8], Sweden[10, 22], Denmark[23] showed different pattern where suicide was the dominant manner of death followed by homicide and accident. Studies in Yorkshire and Humberside also showed homicide was the most common manner of death but the percentages of homicide and suicide were not so much different as in our study [21]. In all reports, accident accounts for minor ratio. Cheap and unlicensed guns from black market may be one of the reasons of high incidence of homicidal gunshot fatalities in developing countries. Reports from small arm survey indicated that gun smuggling is high in Thailand and it is the principle black market in the Southeast Asia region [3]. As reported by many studies, possession of gun is the major risk factor for firearm fatality [24]. Suicidal rate by firearm in the present study showed similar results to the studies in Turkey and Iran [4, 6, 7]. In contrast, reports from Bari, Delhi and Suez Canal area of Egypt revealed lesser percent of suicidal firearm fatality [5, 9, 17].

Multiple entrance wounds are common in homicidal gunshot wounds. This result differs from other studies in which single entrance wound was common in homicide. However, for the suicide, the results are similar [4, 5, 21]. All but 4 of suicide showed single entrance wound. There had been reported in literatures about suicides with multiple entrance wounds [8, 9, 25, 26]. Manner of death and number of entrance wound shows significant association in our study.

In consistent with other studies, there was no case of suicide shot by close/distant range. Only five cases of homicide were found to be discharged from contact/near contact range. Apart from these cases, others were shot from distant range [4]. In our study, the range was found to be associated with manner of death.

The results of recovered projectiles emerging out from the present study showed dominance of rifled firearm. Similar results could be found in Delhi [5]. In contrast with other studies, no case of suicide was found to be committed by shotgun in our study [22, 25, 27]. Pallet injury discharged by shotgun could be found only in homicidal victims.

From our study, middle aged men are found to be vulnerable victim of firearm injuries. Homicide was common and the most frequent sites of entrance wound were head and chest along with other studies. Shot guns were relatively rarely used in this region. Age groups, place of incidence, time of incidence were associated with manner of death. From autopsy findings, manner of death was associated with number of entrance wound, range and site of entrance wound. Our study is based on only one hospital and it is needed to do further study from other centers.

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