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Epidemiologic Investigation of Gunshot death in Tehran Legal Medicine Organization during 2010-2014

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ABSTRACT

Given the higher prevalence of firearm murder and firearm access nationwide in general compared to the past, the epidemiologic investigation of gunshot death provides important and valuable information on change of firearm use patterns, involved gender and age groups, and motivations of using weapon. Accordingly, the present study aims at conducting epidemiologic investigation of gunshot death in Tehran Legal Medicine Organization within 2010-2014. This is a descriptive and analytical research which is applied in terms of purpose and a census study in terms of data collection. 220 gunshot death cases were examined in a dissection hall of Legal Medicine Organization for a five-year period. The statistical analysis of the collected data was conducted via SPSS software (Ed. 18) and Chi-Square Test. The research samples of this study included 95.9% male and 4.1% female corpses. The average age of the deceased persons was 31.5. In 41.4% of cases of gunshot injury, brain has been the main hurt organ, while in 47.3% of cases the injured area of body has been head. 23.3% of gunshot death cases were suicides and 31.1% have been homicides. 60.5% of cases under study were handgun shootings. 47.1% of suicide cases were occurred at home, 41.3% of cases were street homicides, 48.8% of the cases under study were accidental gunshots in military camps, and 90.6% were gunshot deaths following the street clashes with police.   Many gunshot death cases could be prevented via precautionary studies and interventions. The present study can be considered a basis for a trauma systematic development in Iran.
Keywords: Epidemiology, gunshot, legal medicine.

INTRODUCTION

Gunshot is an important matter related to trauma and has become prevalent over the recent years. Since the World Wars until the present, gunshot trauma has caused many fatalities and considerable costs in human communities given the development of military weapons. A high number of medical staff has always been involved in treatment and recovery of gunshot trauma-related incapacities [1]. The prevalence of gunshot death associates directly with availability of firearms. Unfortunately, using the firearms in criminal acts is increasing even in the countries with severe weapons control acts [2]. Firearms carriage, storage, and keeping in Iran have many legal restrictions and impediments; therefore, people do not possess firearm and it is forbidden to buy and sell [3]. The studies have shown that the prevalence of gunshot death associates directly with availability of firearms [4].

The firearm death toll is less announced officially in Iran, and most of the relevant reports are limited to using firearm to commit suicide. A report of Ettelaat daily newspaper in May 18, 2014, No. 25875 reads "Mostafaei, deputy to counter crime department of Criminal Investigation Police, elaborates on the type of murder weapon that 3.32% of the murders across the country has been committed by firearms, 3.35% by cold weapons (white arms), 4.13% by assault and battery, and 1.12% by strangulation. Also, using cold weapons is scaled down from 40% to 5.35%, while employing firearms has been increasing [5] which may be caused by ease of access to firearms and increase of tendency of people to this type of weapon.

In shooting cases, certain issues such as examination of bullet entrance hole to determine the shooting distance, type of gun, type of gunpowder, shot angle, etc. [6]. A close-range shot to temporal area is more

probably an indication of a suicide, while long-range shot illustrates most possibly a homicide [6]. The identification of features of the fired gun such as the gun type, size and form of the bullet cartridge shell is of high importance in criminal investigations. As evidences show that firearm murders and general access to firearms are increasing throughout the country, the epidemiologic investigation of gunshot death provides important and valuable information on change of firearm use patterns, involved gender and age groups, and motivations of using weapon. It is possible as well to estimate the prevalence of gunshot death and compare it with other fatal methods. Accordingly, the present study aims at conducting epidemiologic investigation of gunshot death in Tehran Legal Medicine Organization within 2010-2014.

MATERIAL AND METHOD
The current study is a descriptive and cross-sectional retrospective research. All 220 corpses which had died by gunshot and brought to Kahrizak Dissection Hall of Tehran Legal Medicine Organization in a five-year period (April of 2010 to April of 2014) were included in the study as samples. The inclusion standards were a) death must be caused by gunshot; b) death must be occurred in the aforementioned time period; c) information of the case of the deceased must be complete and available to the researcher. Those samples without these standards were excluded from the study. The minimum sample size based on Cochran Sampling Technique was 140. However, given the limited statistical population, this research benefited from counting all instead of sampling. The data of the corpses under study was collected based on the provided checklist consisting demographic details, toxicology reports, type of death, type of weapon, bullet's hit point, shooting distance, etc. The results were analyzed by SPSS (Ed. 18) statistical software in a frequency table (including number and percent), and Chi-Square Test.

RESULTS
The demographic analysis of corpses indicated 211 men (95.9%) and 9 women (4.1%). The average age of the above bodies was 31.5, the median was 28, and the exponent was 24. The gunshot death frequency in 2010-2014 demonstrated that 27.3% of the death cases were happened in 2010, 18.6% in 2011, 19.1% in 2012, 23.6% in 2013, and 11.4% in 2014.
23.3% of the death cases were suicides, 31.1% were homicides, 20.1% were accidental gunshots, and 25.6% were occurred during clashes with police. In 60.5% of the cases, the shot has been made via handgun, 10.2% by fowling piece, and 29.3% were by firearms. In 41.4% of the death cases, the main injured area of body was head, while in 36.4% the injured area were internal organs, and in 29.5%, skull has been reported as the injured area.
No toxin was observed in 91.2% of the studied bodies. The highest used toxic material was drug which was seen in the bullet-riddled bodies following the clash with police. 40.8% of the cases were occurred on streets, 24.6% at home, 20.4% in military camps, 4.7% in office, and 4.3% of the cases were happened in the car. Also, in 47.3% of cases head was the main hit point, in 27.3% chest, in 25.9% belly, and in 10.5% lower extremities were the hit spot. The bullet's hit point in most of suicide cases was head, unlike the homicide ones that was belly (P Value=0.00).
On shooting distance, the study showed that 32.9% of shooting cases were zero-range shots, 14.6% were fired from less than one meter, and 46.6% were long-range shots i.e. more than one meter. There is a significant relationship between shooting and the type of death in a way that in suicide cases, shots have been made in close ranges, while in homicides shooting have been done in long ranges.
The maximum suicide cases per 100 individuals have been 57.1 and 42.8 persons for 46-50 and 19-20 age groups, respectively. Also, the suicide cases per 100 individuals were 23.2 and 22.2 persons for men and women, respectively.

Table 1 Suicide changes in Tehran Legal Medicine Organization within 2010-2014

Year	Total gunshot death	Suicide frequency	Suicide frequency per 100 individuals
2010	60	11	18.3
2011	41	13	31.7
2012	42	10	23.8
2013	52	14	26.9
2014	25	3	12

The maximum homicide cases per 100 individuals have been 54.5 and 44.7 persons for 51 and 26-30 age groups, respectively. Also, the homicide cases per 100 individuals were 29.8 and 55.5 persons for men and women, respectively.

Table 2 Homicide changes in Tehran Legal Medicine Organization within 2010-2014

Year	Homicide frequency	Homicide frequency per 100 individuals
2010	22	36.6
2011	10	24.3
2012	11	26.1
2013	16	30.7
2014	9	36

Also, the results of Chi-Square Test demonstrated a significant relationship between type of death and the deceased age group. The type of death has been accidental for -18, suicide for 19-20, homicide for 26-35, and homicide for +51 age groups, mostly.

Table 3 Comparison of death type changes in Tehran Legal Medicine Organization within 2010-2014 based on the type of weapon

Weapon \ Death type	handgun	fowling piece	firearm	Total
Suicide	25	5	21	51
	19.2%	22.7%	33.9%	23.8%
Homicide	49	9	8	66
	37.7%	40.9%	12.9%	30.8%
Accidental Shot	19	8	15	42
	14.6%	36.4%	24.2%	19.6%
Police clash	37	0	18	55
	28.5%	.0%	29.0%	25.7%
Total	130	22	62	214
	100.0%	100.0%	100.0%	100.0%

The results of examination of death type changes based on the location of occurrence revealed that 47.1% of suicide cases were happened at home, 41.3% of homicide cases took place on street, 48.8% of accidental gunshots happened in military camps, and 90.6% of gunshot deaths have been occurred on street during clashes with police (P Value= 0.000). The death type was mostly homicide in self-employed individuals (37.2%), employees (41.7%), and housewives (62.5%), and was mostly accidental in unemployed individuals (40%), and military staff (42%) (P Value = 0.000).

Discussion
Most examined corpses in this study were men, consistent with the researches of Keykhavani [7], Cosco [8], Khetran [9], Amani [1], and Astaraki [11]. This may be associated with more violent temper of men who are more interested in using firearms. The sole exception in this connection was a study by Garen et al. (12) which showed a higher number of women compared with men.
The average age of the studied deceased was 31.5 which was lower than a research by Ghorbani (2014) in Tehran. This indicates a downward trend on the average age of gunshot death.
Most of the studied individuals were -30 years of age (57.7%) which was similar to a research carried out by Tofighi (2003), and different from the studies of Choi et al. (1994) and Gill et al. (2003) in the United States in terms of age range that may be caused by cultural difference and the availability of weapons in Western communities.
Head has been the main injured organ in 41.4% of gunshot injuries, and has been the bullets hit point in 47.3% of the cases. Gunshot suicide happens more in soldiers and military staff in a way that they put the gun under the chin and trigger by their toes. This causes the bullet's entrance point tissues to crack up, and the outlet hole is made in the upper part of the head or the skull area. Temple and right side of the body are areas of bullet's entrance in handgun suicides, mostly. This is consistent with the findings of the studies by Arora *et al.* (15), Mahmoudlou *et al.* [1], and Ghodsi *et al.* [16], and different from that of Khetran [9] which introduces belly as the main area of bullet's hit. It is worth noting that the bullets hit entrance in gunshot death cases in police clashes has been mostly in head and belly areas.

In the present study, 23.3% of gunshot death cases were suicides, while 31.1% of the death cases were homicide events. This finding is similar to those of Shkrum [17] and Ghorbani [18], however, it is inconsistent with the findings of other studies by which reported suicide as a cause to most of firearm injuries. the important note of the results of the current study is the 20% frequency of accidental shots which has been left unnoticed in other researches and accounts for a great deal of gunshot death cases in the present attempt.

Based on the findings of this research, 47.1% of the suicide cases took place at home, 41.3% of homicide cases occurred on street, 48.8% of accidental shots happened in military camps, and 90.6% of gunshot death cases came about during clashes with police. This is consistent with the findings of Ghorbani [18] and indicates that keeping firearm at home increases the suicide frequency in houses.

The death types within the age groups of -18, 19-20, and 26-35 were mostly accidental, suicide, and homicide, respectively. This is consistent with the findings of studies by Astaraki [11] and Khademi [22], however, it is different from those of a research by Amani [10] because the current study revealed that 20-31 age group has experienced the highest suicide cases, unveiling a downward trend in suicide age group among people.

The findings demonstrated also that 60.5% of the cases included handgun shots. It was indicated as well that handgun and fowling piece have been used more in homicides while most of suicide cases took place by firearms. This was inconsistent with the findings of Ghorbani [18] which believed most of the suicides have been conducted by handgun, however, it was consistent with the results of the study of Tofighi (2003). In the present research, the most frequent weapon used in suicides could be handgun if this study excludes the suicide cases of soldiers. However, given the ease of access to firearms (esp. Kalashnikov) in military camps and the high number of suicide events among soldiers within the years under study, the aforementioned weapons are found more frequent in suicides examined in this study. This is in consistency with the findings of Khademi [22] which suggests the high frequency of suicide among soldiers in military camps. This demonstrates again the relationship between weapon availability and suicide rate.

The suicide and homicide frequencies are higher in men and women, respectively. In other words, women have been victim of firearm violence more than men which is similar to the results of a study by Romer [23]. A rise in homicide among women indicates an increased violence against female individuals.

Also, homicide has been prevalent more in self-employed people, employees, and housewives. The gunshot death cases in unemployed people, soldiers and military staff have been mostly as accidental shots and suicides.

CONCLUSION

Many scholars believe that more weapon availability causes gunshot fatalities to increase. Based on the findings of this study, weapon control and safe use acts are effective to some extent on firearm death reduction. For instance, weapon access acts reformation for soldiers during the military service could leave undeniably positive effects on the suicide frequency and accidental deaths of this group. Therefore, the armed forces of the country are expected to control the weapon availability to soldiers in peacetime. This may be not applicable to ordinary citizens and the above rules may restrict only the defensive use of weapon for laypeople and may not reduce much the firearm fatalities.

The above discussion suggests that a majority of gunshot deaths can be prevented via precautionary studies and interventions. The present study could also be considered a basis for a trauma systematic development in Iran.

ACKNOWLEDGMENT

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ATTENTION
- The data of homicide and police clash, due to significant differences in patterns of these death types, were not integrated to be preserved.
- The data percentage difference between skull and brain is due to the fact that some samples of the study had more than one injured organ in a way that even up to three were recorded by the researchers in the study.
- In the event of data integration associated with workplaces and military camps, the data related to suicide cases of soldiers would be lost.
- The rest of the points were modified.

CITATION OF THIS ARTICLE