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Research Article

Childhood Deaths Due to Firearm Injuries in Izmir and Nearby Cities

İzmir ve Çevre İllerde Meydana Gelen Ateşli Silah Yaralanmasına Bağlı Çocukluk Çağı Ölümleri

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Abstract: **Objective:** Childhood deaths due to the firearm injuries are rising in our country and worldwide. In this study, our aim was to examine the childhood deaths related to firearm injuries in İzmir and neighboring provinces between 01.01.2006 and 31.12.2015 and the information such as sociodemographic aspects, the types of the firearms, origin, region of injury, place of death, shooting distance, and the owner of the firearm. **Materials and Methods:** In our study, autopsy report and forensic investigation files of childhood deaths related to firearm injuries in and around İzmir were retrospectively reviewed. The data were evaluated using SPSS version 22 program. **Results:** 79 (69,3%) of the cases were male, mean age is 14,04±4,23, and male / female ratio was 2,25. Guns and shotguns were used in 39 cases (34,2%) and in 75 cases (65,8%) respectively. When the cases were evaluated corresponding to their origins; homicide was the first with 37 cases (32,5%). It was found that deaths occurred most frequently in winter (n: 32,28.1%). Most of the cases occurred in rural areas such as villages and towns (n=48,42.1%) and the incidence mostly took place within houses (n=54,47.4%). In 35 cases (30,7%) the owner of the weapon was the father of the victim. **Discussion and Conclusion:** We think that if children reach the firearms easily, the injuries and the deaths are likely to occur therefore firearms shouldn't be kept in the residences with children if possible and children are not encouraged to use weapons even if they are toys.

Keywords: Child, Firearm, Death, Forensic Autopsy

Öz: **Amaç:** Ateşli silah yaralanmalarına bağlı çocukluk çağında meydana gelen ölümler ülkemizde ve yurt dışında giderek artmaktadır. Bu çalışmada 01.01.2006-31.12.2015 tarihleri arasında İzmir ili ve çevre illerde çocukluk çağında meydana gelen ateşli silah yaralanmasına bağlı ölüm olgularında sosyodemografik özelikler, kullanılan silah türü, orijin, yaralanan bölge, olay yeri, ölüm yeri, atış mesafesi, silahın ait olduğu kişi gibi verilerin değerlendirilmesi amaçlanmıştır. **Gereç ve Yöntem:** Çalışmamızda İzmir ve çevresinde meydana gelen ateşli silah yaralanmasına bağlı çocuk ölüm olgularının otopsi raporları ve adli tahkikat dosyaları retrospektif olarak taranmıştır. Veriler SPSS versiyon 22 programı kullanılarak değerlendirilmiştir. **Bulgular:** 79 (%69,3) olgu erkek, yaş ortalaması 14,04 ± 4,23, erkek/kadın oranı 2,25 bulundu. 39 olguda (%34,2) kısa namlulu, 75 olguda (%65,8) uzun namlulu silah kullanıldığı tespit edildi. Orijinlere bakıldığında; 37 olgu (%32,5) ile cinayetin ilk sırada yer aldığı görüldü. Ölümlerin en sık kış mevsiminde (n:32, %28,1) oluştuğu tespit edildi. Olguların en fazla (n:48, %42,1) köy/kasaba gibi kırsal bölgelerde ve olayın gerçekleştiği yer olarak en fazla (n:54, %47,4) evde meydana geldiği bulundu. Otuz beş olguda (%30,7) olayda kullanılan silahın küçüğün babasına ait olduğu görüldü. **Tartışma ve Sonuç:** Çocukların ateşli silahlara kolayca ulaşmaları halinde yaralanma ve ölüm olaylarının kolayca meydana gelebileceği, bu nedenle çocuklu evlerde mümkün olduğunca ateşli silah bulundurulmaması gerektiği, çocukların oyuncak dahi olsa silahlara özendirilmemesinin bu konuda faydalı olacağı sonucuna varıldı.

Anahtar Kelimeler: Çocuk, Ateşli Silah, Ölüm, Adli Otopsi

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1. Introduction

Deaths from firearm injuries show different demographics that vary according to many factors. The number of deaths depending on a firearm injury shows a rapid increase in many countries that their legal mechanisms are slow or not sufficiently functioning, it is easy to access to the weapon and an important place of it in sociocultural structure, without strict legal practices restricting the possession and use of weapons (1).

It is stated that our country ranks fourteenth in the world in terms of armament, on average 3,000 people per year die by firearms in our country, and the most common cause of homicidal deaths is deaths that develop as a result of firearm injury (2). According to the 2003 reports of the National Trauma Data Bank of the United States (), It is stated that approximately 20% of all deaths occurred as a result of firearm injuries in cases under the age of 19 (3). In an autopsy study in Konya, which evaluated 985 cases in the 18 and under age group during the period between 1999 and 2007, it is reported that 5,1% of cases that were found to have died as a result of firearm injuries were in the 18 and under age group (4). In another autopsy study conducted in Erzurum, it is stated that 18,9% of deaths related to firearm injuries during the two-year period were deaths under the age of 18 (5).

A study in the USA reported that most cases of children with firearms and resulting in death were male, and that the incident usually occurred either as a result of the accidental firing of the weapon by the deceased child himself or a family member or close friend of the deceased (6). Similarly, a study in our country shows that the majority of childhood deaths with firearms are from suicide and accident (4). It is stated that children's easy access to firearms and the use of guns as a result which can cause accidents are the basis of the main problem in these deaths (7).

Both in our country and in the world, autopsy cases related to firearm injury deaths are in the first place. In addition to the cause of death, the autopsy also attempts to obtain information about the origin of the incident (murder-suicide-accident) in light of the evidence obtained. Examination of firearm entry and exit wound characteristics and clothing can also provide important information about the origin (8). The post-mortem examination will contribute to the full details of the incident.

Our aim in the study was to examine the sociodemographic characteristics of the deaths related to firearm injury in the 18 and under age group occurring in Izmir province and nearby cities, to compare the data obtained with similar studies conducted in our country and around the world, to draw attention to death events due to injuries caused by firearms in childhood and to increase the sensitivity of the society on this issue.

2. Materials and Methods

Autopsy reports and forensic investigation files of 114 deaths related to firearm injuries in the adolescent, child and infant age group of 18 years and younger, which occurred in Izmir and the surrounding provinces, were carried out by the Specialized Mortuary Department of Izmir Forensic Medicine Group Presidency in a total period of 10 years between 2006-2015; it has been evaluated in terms of characteristics such as location and time of death, gender, age, origin, type of gun, shooting distance, the structure of the bullet core, the entry point of the bullet, who owned the gun used in the incident, toxicological results of samples taken, cause of death and who the perpetrator is.

The data was evaluated using IBM SPSS version 22, using percentage, ratio and chi-square statistics in the data analysis, $p<0,05$ accepted as an indicator of significant difference and the data are presented in tables and graphs.

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3. Results

It has been observed that a total of 1,876 cases of firearm injury-related deaths that were autopsied between 2006 and 2015, 114 (6,07%) were in the age group aged 18 and below. Looking at the distribution of cases by gender; of the 114 cases, 79 (69,3%) were male and 35 (30,7%) were female, and the M/F rate was 2,25. The average age of cases was detected as 14,04 ± 4,23 (1-18) years. Looking at the distribution of cases according to age groups, 74 cases (64,9%) were found to be in the 15-18 age group in the first place (Table 1). There was no significant difference when comparing gender and age distribution ($p>0,05$).

Table 1. Distribution of cases by age groups and gender

Age (Year)	Male		Female		Total	
	n	%	n	%	n	%
1-4	5	6,3	1	2,9	6	5,3
5-9	7	8,9	5	14,3	12	10,5
10-14	15	19	7	20	22	19,2
15-18	52	65,8	22	62,8	74	64,9
Total	79	100	35	100	114	100

When it was looked at the distribution of cases according to the years in which the event occurred, it was found that deaths occurred most frequently in 2007 with 22 cases (19,3%). When the distribution of the cases according to months is evaluated, the highest number of deaths was found to have occurred in August with 18 deaths (15,8%) and the fewest deaths occurred in October with 3 cases (2,6%) (Figure 1). In the distribution of deaths by seasons; 32 the most common cases (28,1%) occurred in the winter season, then in the summer season with 28 cases (24,6%) and in the spring and autumn seasons with 27 cases (23,7%) respectively.

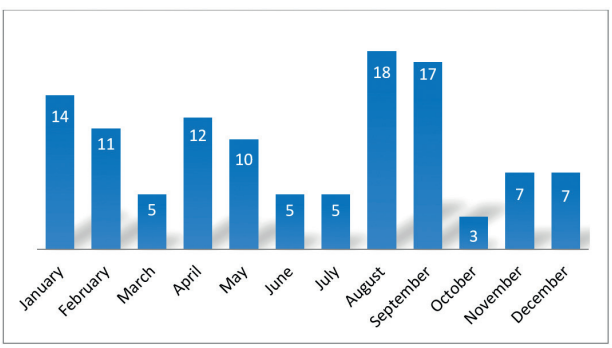

Figure 1. Distribution of cases by months of occurrence

Cases are evaluated by the type of firearm used; it was found that 39 cases (34,2%) had short-barreled guns and 75 cases (65,8%) had long-barreled guns (shotguns). In 58 (77,3%) of the cases where the shotgun was used, small (bird) pellets were used, and in 17 (22,7%) large pellets were used. (Figure 2).

Looking at origin distribution; while homicide ranks first with 37 cases (32,5%), in 34 cases (29,8%) suicide, in 22 cases (19,3%) accidental death was observed; on the other hand, in 21 cases (18,4%), no information about the origin was found in the forensic investigation file. The origin was most common in males (n: 29, 36,7%) and

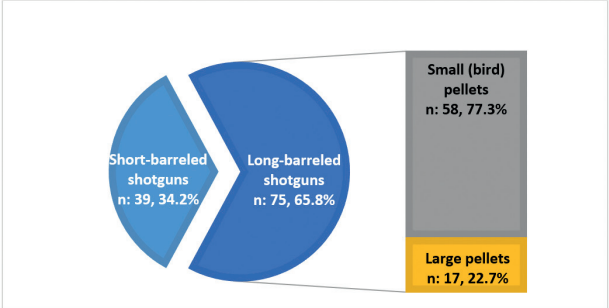

Figure 2. Distribution of the cases according to the type of firearms used in the event

most common in females (n:14, 40%) was suicide (Figure 3). In 39 cases (34,2%) the injury was carried out by the minor themselves, in 11 cases (9,6%) the perpetrator was the father of the deceased, in 11 cases (9,6%) their sibling, in 12 cases (10,5%) their friend. The origin of the incident was stated as an accident when 22 cases were examined; five of them (22,7%) who pulling the trigger of a firearm causing their own death, in 15 cases (68,2%), people who pulling the trigger, was found to be less than 18 years old (Figure 4). Six of the suicide cases (17,6%) caused because of separating from their boyfriend/girlfriend, two (5,9%) committed suicide as a result of an argument with their family, two (5,9%) had a known severe psychiatric illness in their story, and one (2,9%) committed suicide due to bad report cards. In all cases where the

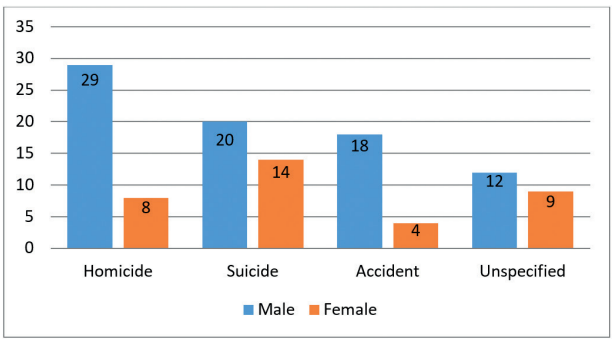

Figure 3. Distribution of cases by origin and gender

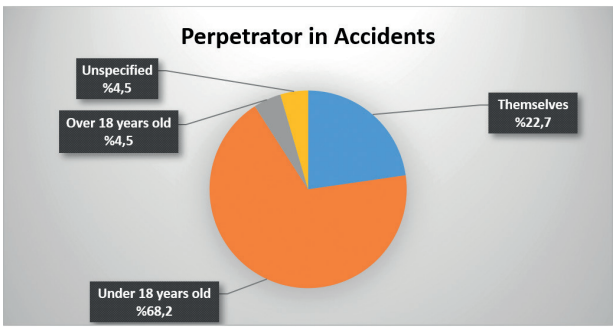

Figure 4. Distribution of persons performing injury in cases with origin accident

origin was suicide, the shooting was done at adjacent or at closest distance, the most cases with accident origin (five cases) were from an adjacent and far distance, while the most cases with murder origin (14 cases) were from far distance.

In fifty-three cases (46,5%), injuries in the head region, 20 cases (17,5%) in the abdomen region, 17 cases (14,9%) in the chest region, and 7 cases (6,1%) in the neck region were detected (Table 2). Other body injuries of the head region in cases whose origin is a suicide, there was a significant difference in the advanced level compared to the area injuries ($p<0,001$). Besides, there were observed that there was skull fracture and brain tissue destruction in 56 cases (49,1%), internal organ injury and large vessel destruction in 27 cases (23,7%), and in 22 cases (19,3%) death occurred as a result of internal organ injury. The single gunshot entry wound was found in all cases of suicide (n: 34) and accident (n: 22), and in 21 (56,8%) cases of homicide (n: 37).

Evaluating by the residential areas where the incident took place; 48 cases (42,1%) were found to have occurred in rural areas such as villages/towns, 37 cases (32,5%) were in the county center and 29 cases (25,4%) were in the provincial center. It was found that 17 (58,6%) of the fatalities reported to occur in the provincial center were short-barreled, 12 (41,4%) used long-barreled weapons (shotguns), while 39 (81,3%) of the fatalities in rural areas such as villages/towns were shotguns and 9 (18,8%) were short-barreled guns (Table 3). Short-barreled weapons were used in the provincial center and long-barreled weapons were used more in rural areas such as villages/towns. This difference was found to be statistically significant. ($p<0,05$). The majority of accidental deaths (72,7%) occurred in rural areas such as villages/towns, while there were almost none in provincial centers (4,5%) and there was a statistically significant difference ($p<0,05$).

Table 3. Distribution of the cases according to the location of the incident and the firearm used in the incident and the origin

	Provincial Center	Villages/ towns	County Center
Firearm Type			
-Short-barreled shotguns	17	9	13
-Long-barreled shotguns	12	39	24
Origin			
-Suicide	9	14	11
-Accident	1	16	5
-Homicide	12	16	9
-Unspecified	7	2	12
Total	29 (%25,4)	48 (%42,1)	37 (%32,5)

Fifty-four deaths (47,4%) occurred at home, 33 deaths (28,9%) occurred on the street, 11 deaths (9,6%) occurred in the field, and 4 deaths (3,5%) occurred at work. (Figure 5). Suicide (n:25, 73,5%) and accident (n:10, 45,5%) cases occurred in the home and homicide cases occurred in the street (n:16%, 43,2%) were the most.

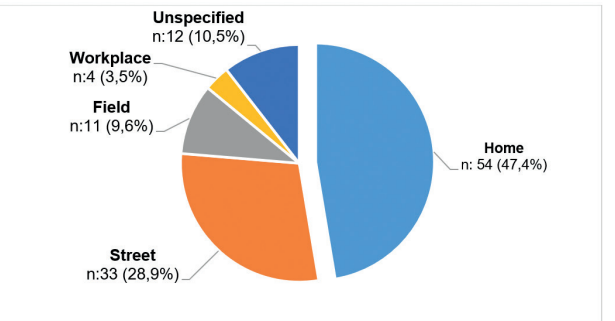

Figure 5. Distribution of cases according to the location of the event

Table 2. Distribution of cases by origin and injured body area

Body Area	Suicide		Accident		Homicide		Unspecified		Total**	
	n	%	n	%	n	%	n	%	n	%
Head	21	61,8	9	40,9	14	37,8	9	42,9	53	46,5
Abdomen	7	20,6	8	36,4	4	10,8	1	4,8	20	17,5
Chest	2	5,9	1	4,5	8	21,6	6	28,6	17	14,9
Multiple body areas	3	8,8	1	4,5	9	24,4	3	14,2	16	14,1
Neck	1	2,9	3	13,6	2	5,4	1	4,8	7	6,1
Extremity	0	0	0	0	0	0	1	4,8	1	0,9
Total*	34	100	22	100	37	100	21	100	114	100

*: Rates by origin **: Proportions within body regions

Looking at who owned the firearm used in the incident; it was observed that in 35 cases (30,7%) the gun belonged to the father of the deceased, in 11 cases (9,6%) to the family of the friend, in 7 cases (6,1%) to the relative and in 1 case (0,9%) to the mother, in 60 cases (52,6%) it was not stated who owned the gun (Figure 6).

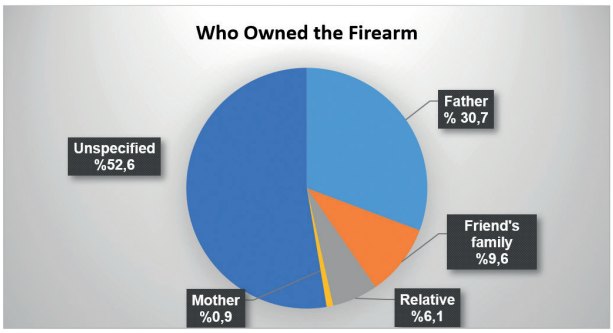

Figure 6. Distribution of the firearms used in the incident by whom they belong

Of the 101 cases analyzed by toxicological analysis, 81 (71,1%) were negative, 20 (17,5%) were positive, the toxicological results were positive and eight cases were the first among the 14 cases whose origin was determined.

4. Discussion

It has been observed that a total of 1,876 cases of firearm injury-related deaths that were autopsied between 2006 and 2015, 114 (%6,07) were at the age group 18 and below. When similar studies were examined; in the study conducted in Erzurum (5), 18,9% of all firearm injury related death cases between 2008 and 2009 were under the age of 19. While the study conducted in Diyarbakır (9), between 2009 and 2014, this ratio was 33% in the group under the age of 20, the study conducted in Eskisehir (2), this ratio was 16,3% in the group under the age of 20 between 1999 and 2008. In the study (10) conducted in the USA between 2000 and 2014, this ratio was reported as 7,3% in the group 17 years and under, and in the study (11) conducted in Canada between 1999-2003, it was reported as 15% in the group under 19 years. The proportion of children and adolescents in firearm injury related deaths in all age groups in our study, it appears to be lower compared to similar studies both national and foreign. We believe that this result is due to the fact that people living in Izmir and the surrounding provinces are more sensitive to hiding firearms from minors by taking security measures.

Our study showed that out of 114 cases, 79 (69,3%) were male and 35 (30,7%) were female. The proportion of men in the study, which included all age groups and examined deaths that developed as a result of a firearm injury; 91,8% of Cingöz's (12) study in Aydın, The studies of Şam and et al. (13) in Istanbul, it was determined as 87 %, Demirci et al. (4) in Konya, the proportion of men in the study who evaluated firearm deaths under the age of 18 was 68% while Dowd and et al (14) study in the USA, it was reported that this rate is 90,4% for firearm injuries aged 14 and under. Studies conducted both in our country and abroad showed that the proportion of men in all age groups and child and adolescent age groups was significantly higher than that of women. (Table 1).

In our study, the cases were evaluated according to the seasons in which the incident occurred; the highest number of deaths occurred during the winter season with 32 cases (28,1%) (Figure 1). In studies conducted in our country and involving all age groups; These results were stated that; According to Bozkurt's study (9), fatalities occurred in Diyarbakir most during the summer season (32,7%) and least during the winter season (18,1%), according to Türkoğlu and et al, occurred (15) most in summer season in Elazığ (%30,8), according to Aydın and Çolak (16), it was most in summer season in Samsun (%28,3) and least during winter season(%20,9), and for Cingöz (12), the most occurred during the fall season (28,1%) and the least occurred during the winter season (21,2%). Although deaths from firearm injuries in all age groups are most likely to occur in the summer season, deaths in patients at the age of 18 and below in our study were most common in winter. It was suggested that children who were unable to get out of the house much in the cold weather and had to play their toys at home were more likely to spend time in the home environment where firearms were kept.

When the cases were evaluated according to the type of firearm in our study; 39 cases (34,2%) of short-barreled guns, 75 cases (65,8%) of long-barreled guns (shotguns) were recorded (Figure 2). Deaths from firearm injuries involving all age groups; it was stated that 71,4% of pistols were used in Bozkurt's study (9), in the study conducted by Türkoğlu et al. (15), 60% of pistols were used, 77% of pistols were used in the study of Aydın and Çolak (16).

Studies assessing firearm deaths under 18; Choi et al. (17) stated that shotguns were used in 51,6% of death cases while Demirci et al. (4) stated in their study that the use of shotguns was 66% and the use of handguns was 34%. Our study found that greater use of shotguns was in line with other studies that assessed firearm deaths under the age of 18. Although guns are easy to carry and can be kept on the person without attracting attention in daily life and it is seen that there are many deaths occurring with such weapons in all age groups, it was conducted

that the use of hunting rifle is higher in the group aged 18 and below because pistols are usually kept in houses and children are partially prevented from reaching these weapons while rifles are hung on the walls of the house especially in the countryside, it's bigger than pistols even if it's hidden and it is easily found by children.

When the cases are evaluated according to their origin (Figures 3 and 4), it was observed in the study that homicide was the first in 37 cases (32,5%), suicide was the first in 34 cases (29,8%), and accidental deaths were the first in 22 cases (19,3%). In other studies, all age groups in Turkey and abroad were examined for deaths with firearms; In the study of Gören and et al (18), 66,7% of cases were murder, 27% were suicide, 6,3% were accidents, In Toka's (2) study, 55,3% of cases were homicide, 37,6% were suicide, 5,7% were accidents; and also the study conducted by Solarino et al (19) found that 88,4% of cases were homicide, 11,5% were suicide, 0,1% were accidents. Compared all age groups and deaths as a result of firearm injuries in the 18-year-old and under age group in our study; the origin of murder ranks first in both groups, and as with all age groups, the tendency to commit murder with firearms is more likely in childhood age groups. When we look at all age groups From the studies we have analyzed in the literature, the highest rate of accident origin deaths was 6,3%, while firearm deaths under the age of 18 were assessed and also in the other studies; When Demirci and et al (4) stated accident origin rate as 34 %, Eber and et al (20) stated 20,7% in the group aged 14 and under. In our study, the rate of accidental deaths was 19,3%. These results show that accidental deaths from firearms increased noticeably in the group aged 18 and under. In our study, it was observed that the perpetrator was still at the age of 18 and below (68,2%) in the majority of accidental deaths, and 22,7% of the perpetrators pressed the trigger themselves as a result of playing with a firearm. Having a high rate of accidents in child and adolescent firearm deaths in the age group, it has been suggested that children in this age group are treated as toys by their parents because of toy guns, children's perception of firearms as toys and use them in their games cause fatal injuries to both themselves and other children.

When the cases in our study are evaluated according to origin and area of injured body (Table 2); of the 34 cases whose origin was determined to be suicide, the maximum number of injuries was found in the head region (n:21, 61,8%) and the second most frequent in the abdomen region (n:7, 20,6%). Most studies with cases of suicide by firearm, head and neck injuries ranging from 50,5% to 81% were reported (21-24). In our study, it was found that the highest proportion of suicide-related deaths carried out by firearm was in the head and neck region. In preference to the head-and-neck area of those who commit suicide with a firearm, we believe that it is easier to hold a firearm, especially in the neck area. In addition, we believe that the head region is the riskier region for fatal injuries and that it is known that deaths from brain damage among people are definite and rapid and that it is effective for suicides to choose this region.

When the cases in our study are evaluated according to the residential areas where the incident occurred (Table 3); it was determined that 48 cases (42,1%) occurred in rural areas such as villages/towns, 37 cases (32,5%) occurred in the district center, and 29 cases (25,4%) occurred in the provincial center. Our study showed that the highest proportion of all three deaths due to firearm injury occurred in rural areas such as villages/towns. We think that all three origin deaths occur mostly in rural areas, due to the fact that those living in rural areas are easier to reach for shotguns due to both traditional and lack of supervision than those living in urban centers. In our study, it was observed that only one of the accidental deaths occurred in the city center. We believe that the reason why accident origin deaths are rarer in the city center that handguns are the most common type of firearm in provincial centers, so they are more difficult to find by children than long-barreled guns from hiding, and they are more conscious about the storage of weapons by taking security measures because the population in the provincial centers has higher socioeconomic and educational levels than in rural areas.

When the cases in our study are evaluated according to where the incident took place (Figure 5); there were 54 deaths (47,4%) at home, 33 deaths (28,9%) on the street, 11 deaths (9,6%) in the farm, and four deaths (3,5%) at work. When the cases are evaluated according to the place and origin of the incident; suicide (n:25, 73,5%) and accident (n:10, 45,5%) cases occurred in the home and homicide cases occurred in the street (n:16, 43,2%). The data we obtained in our study have been found to be consistent with the literature. (4, 17, 20, 25). In particular, possession of firearms in the home reduces the use of drugs, gas and other methods that are less likely to result in death in childhood suicides, and increases the likelihood that suicide will result in death (26).

In our study, the distribution of 54 cases according to the origin of the firearm used in the case can be determined (Figure 6); the highest proportion of all origins was found to be deaths from a father's firearm. It is reported that cases of accidental origin occurring with firearms at early age are usually caused by the curious individual

playing with a weapon that is not properly maintained by one of the family members in their own home (6).

In the world, the number of deaths related to firearm injury in the age group of 18 years and below is increasing, both legally and illegally, and individual armament is increasing. It is thought that multiple factors, such as the easy reach of children, contribute as a result of not keeping the guns in the home well. We believe that storing firearms in empty lockers in separate places from bullets and firecrackers will reduce the access of children to these weapons and thus prevent the injuries and deaths caused by firearms.

In our country, families to choose toys for their children to buy guns and the use of firearms in family TV series is very frequent in children's interest in guns is increasing; therefore, it leads to the perception of the gun as a toy. This results in accidental death as a result of the child playing with a firearm found in the home. We believe that not choosing guns when buying toys for children, and more careful selection of series and films watched with children will reduce the deaths caused by firearm injuries in this age group. As a result, in our world where individual armament is increasing, it is observed that firearms kept in homes lead to childhood deaths.

We think our community needs to be educated about that incident of injury and death can easily occur if children have easy access to firearms; therefore, homes with children should not have firearms as much as possible, if it is necessary, firearms should be to keep in high places beyond the reach of children, it is necessary to store them in empty lockers in separate places from projectiles and flares by taking safety precautions.

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