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Analyses of suicidal deaths with shotguns in Istanbul, 1998-2007

İstanbul'daki av tüfeği intiharlarının analizi, 1998-2007

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BACKGROUND

In previous studies, some features of suicidal firearm deaths have been described, but series of suicidal deaths using shotgun are limited in the literature. The aim of the present study was to define several characteristics of suicidal shotgun deaths.

METHODS

In this study, we reviewed retrospectively 36,971 autopsy reports recorded by the Mortuary Section of the Forensic Medicine Council of Istanbul between January 1, 1998 and December 31, 2007.

RESULTS

Seventy-three shotgun-related suicide cases were evaluated. Of the 73 cases, 46 (63%) were male and 27 (37%) were female. Most of the cases (n=36, 53.4%) were aged 16-20 years ($p<0.001$). Sixty-two of the suicides (84.9%) occurred in victims' homes ($p<0.001$). A suicide note was recovered in 7 cases (9.6%). While entry wounds were on the head in the majority of the cases (n=29, 39.8%) ($p<0.001$), in nearly half of the female victims (n=12; 44.4%), entry wound was in the abdominal region. Fifty-six shots (76.7%) were determined to be from loose-contact range ($p<0.001$). Ethyl alcohol was detected in 17.8% (n=13) of blood samples of the cases.

CONCLUSION

Handling and usage of shotguns should be under strict control, educational efforts should be directed to early and late adolescents and their parents and psychological support centers should also be founded in an effort to prevent suicidal deaths with shotguns.

Key Words: Autopsy; deaths; firearm; shotgun; suicide.

AMAÇ

İntihar amaçlı ateşli silah ölümlerinin bazı özellikleri önceki çalışmalarda tanımlanmış ise de, av tüfekleri kullanılarak gerçekleştirilmiş intihar ölümlerine ait seriler, literatürde sınırlı sayıdadır. Bu çalışmanın amacı, intihar amaçlı av tüfeği ölümlerinin çeşitli özelliklerini tanımlamaktır.

GEREÇ VE YÖNTEM

01 Ocak 1998 ile 31 Aralık 2007 tarihleri arasında Adli Tıp Kurumu, Morg İhtisas Dairesi tarafından düzenlenmiş, 36971 otopsi raporu geriye dönük olarak gözden geçirildi.

BULGULAR

Yetmiş üç intihar amaçlı av tüfeği ölüm olgusu değerlendirildi. Olguların 46'sı (%63) erkek, 27'si (%37) kadındı. Olguların çoğu (n=39, %53,4) 16-20 yaş grubunda yer almaktaydı ($p<0,001$). İntiharların 62'si (%84,9) kurbanın evinde meydana gelmişti ($p<0,001$). Yedi olguda intihar notu (%9,6) bulunmuştu. Giriş yaraları olguların büyük çoğunluğunda (n=29, %39,8) kafa bölgesinde iken ($p<0,001$), kadın kurbanlarda intihar için genellikle (n=12, %44,4) karın bölgesinde idi. Atış, olguların 56'sında (%76,7) tam temas halinde, bitişik atış (gevşek temas) mesafesinden gerçekleştirilmişti ($p<0,001$). Olguların %17,8'inde (n=13) kanda etil alkol saptanmıştı.

SONUÇ

Av tüfekleri ile intiharların önlenebilmesi için, av tüfeklerinin elde edilmesi ve kullanımı sıkı olarak kontrol edilmeli, eğitim çabaları erken ve geç adölesan dönemindeki gençlere ebeveynlerine yönelmeli, psikolojik destek merkezleri kurulmalıdır.

Anahtar Sözcükler: Otopsi; ölümler; ateşli silah; av tüfeği; intihar.

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Deaths and non-fatal injuries due to firearms remain a major public health problem in many countries.[1] Firearm injuries are the second leading cause of injury-related deaths, with a substantial national impact of 29,573 United States fatalities in 2001.[2] Suicidal deaths with firearms account for a high rate of all suicidal deaths and of all firearm deaths and they are one of the most lethal types of suicides.[3] Miller et al. and Desjeux et al. determined that the rates of suicides committed with firearms were 38% and 51% of all suicides, respectively.[4,5] Rosengart et al.[6] reported that 59% of the suicides were committed with firearms in the United States between 1991 and 2000. Moug et al. and Goren et al.[7,8] reported rates of suicidal deaths committed with firearms to be 24% and 27% of all firearm fatalities, respectively.

The most common type of firearm used in suicidal attempts is handgun, while suicides with long-barreled firearms are uncommon.[9,10]

In prior studies, some features of suicidal firearm deaths have been described, but there have been a very limited number of series of suicidal deaths using shotguns in the literature. The aims of the present study were to define several characteristics of suicidal shotgun deaths, to determine the relation between entry wounds and gender and age, and to emphasize the significance of cultural differences in preference of shotguns in suicides.

MATERIALS AND METHODS

This is a retrospective review of suicidal shotgun fatalities in Istanbul, Turkey, which were autopsied in the Mortuary Section of the Forensic Medicine Council. Approval was obtained from the Scientific Board of the Forensic Medicine Council.

In the Mortuary Section of the Council of Forensic Medicine, 36,971 medico-legal autopsies were performed between January 1, 1998 and December 31, 2007. Of the 36,971 medico-legal deaths, 73 (0.2%) were suicidal shotgun fatalities.

Data regarding age, sex, manner of death, site of entrance wound, hospitalization before death, range of fire, other traumatic lesions, and results of toxicological analyses were obtained from autopsy records. Suicide scene investigation records were reviewed to obtain additional detailed information about the suicides.

Statistical analyses were made with chi-square, Kolmogorov-Smirnov and Fisher's exact tests.

RESULTS

Age and Sex

Of 73 suicidal deaths due to shotgun injuries, 46 (63%) cases were male and 27 (37%) were female. The mean age of all the victims was 25.1±13.1 years (11-73 years). The mean ages of the male and female victims were 27.1±14.6 years (12-73 years) and 21.6±9.5 years (11-54 years), respectively. Most of the cases (n=39, 53.4%) were aged 16-20 years ($p<0.001$). Seventy point four percent of the female victims (n=19) were 16-20 years ($p<0.001$) (Fig. 1).

Lifespan

Fifty-eight shotgun suicide deaths (79.5%) occurred at the site of the suicide attempt and 15 (20.5%) occurred in hospitals. Of the 15 victims who died in hospital, 9 (60%) died on the day of suicide and 3 (20%) lived for two days. The longest survivals after injury were defined as 7 days in 1 case, 8 days in 1 case and 12 days in 1 case.

Suicide Scene

Most of the suicides (n= 62, 84.9%) occurred in the victims' homes ($p<0.001$). Six suicides (8.2%) occurred in offices; one in someone else's house; one in a garden; and one in a stable (4.1% totally). Information regarding the suicide scene could not be obtained in two cases (2.7%).

Suicide Note

According to suicide scene records, a suicide note was recovered in 7 cases (9.6%), but there was no suicide note in 36 suicides (49.3%). In 30 cases (41.1%), there was no mention of a suicide note in the suicide investigation records. In the case of one victim, the suicide note was written on his body.

Entry Wounds

There was a single entry wound in all cases. In most of the cases (n=29, 39.8%), entry wounds were on the head ($p<0.001$). There were abdominal or thoracic wounds in all cases who died in the hospital.

Entry wounds were located in the abdominal region of 44% of the female victims (n=12) ($p<0.001$) and 21.7% of the male victims (n=10).

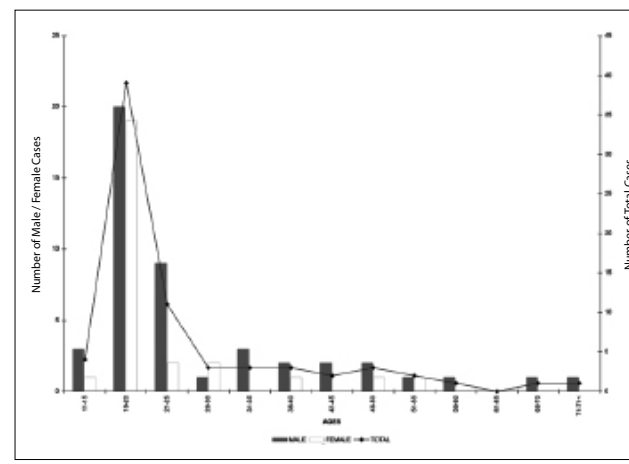

Fig. 1. Age groups and gender of 73 cases of suicide committed with shotguns.

Table 1. The relation between entry wound sites and gender

Entry wound sites	Male		Female		Total	
	n=46	%	n=27	%	n=73	%
Head	19	41.3	10	37.1	29	39.8
Right temple region	1	2.2	4	14.8	5	6.9
Left temple region	1	2.2	2	7.5	3	4.1
Right orbital region	3	6.5	0	0	3	4.1
Left orbital region	5	10.9	1	3.7	6	8.2
Mid frontal region	4	8.7	3	11.1	7	9.6
Intra oral	5	10.9	0	0	5	6.9
Neck	9	19.6	1	3.7	10	13.7
Thorax	8	17.4	4	14.8	12	16.4
Right side of the thorax	7	15.2	4	14.8	11	15.0
Left side of the thorax	1	2.2	0	0	1	1.4
Abdomen	10	21.7	12	44.4	22	30.1

The entry wounds on the head were detected on the right or left temple regions in the female victims (60% of the head injuries) and on the face in male victims (89.5% of the head injuries). The males were nine times more likely to have entry wound on the neck and twice as likely to have entry wound on the thorax, respectively ($p<0.001$) (Table 1).

The most common entry wound site was the head in all age groups (Table 2), followed by the abdomen in the 12-20 (n=15, 34.9%) and 21-30 (n=5, 35.7%) years of age groups, and the thorax in the those aged 31 years and over (n=5, 31.3%) ($p<0.001$).

The range of fire of entrance wounds is shown in Table 3. There were hard-contact wounds in 7 cases (9.6%), loose-contact wounds in 56 cases (76.7%) and near-contact wounds in 10 cases (13.7%) ($p<0.001$). There were no cases of close or distant range of fire.

Characteristics of entry wounds are shown in Table 4. All the hard-contact shots were on the head and neck and muzzle imprints were around the entry wounds. Entry wounds in the neck extended towards the head except for one suicide with a loose-contact wound. Thus, neck entry wounds in 6 cases accompanied head traumas. Of 33 suicides with thoracic or abdominal loose-contact wounds, 19 were undressed during the suicide attempt. They had marked exposed skin findings.

Other Traumatic Findings

One case had fresh incisions, which occurred during the suicide attempt, on the left wrist. There were no other traumatic lesions except shotgun-related injuries in the other cases and there was no sign of sexual assault. There were tattoos on several parts of the body in 11 cases (15.1%) and common incision sequelae on the bodies of 7 victims (9.6%). Additionally, there were both tattoo and common incision sequelae in 2 cases (2.7%). All cases with tattoo and/or common incision sequelae were males.

Toxicological Findings

Thirteen victims (17.8%) had blood alcohol levels between 35 mg/dl and 600 mg/dl. High-dose Clorazepate (Tranxene) was detected in the blood, urine and

Table 2. The relation between entry wound sites and age groups

Entry wound sites	11-20 years		21-30 years		≥31 years		Total	
	n=43	%	n=14	%	n=16	%	n=73	%
Head	18	41.9	5	35.7	6	37.5	29	39.8
Right temple region	3	7.0	1	7.1	1	6.3	5	6.9
Left temple region	2	4.7	0	0	1	6.3	3	4.1
Right orbital region	1	2.3	2	14.3	0	0	3	4.1
Left orbital region	3	7.0	2	14.3	1	6.2	6	8.2
Mid frontal region	5	11.6	0	0	2	12.5	7	9.6
Intra oral	4	9.3	0	0	1	6.2	5	6.9
Neck	5	11.6	2	14.3	3	18.7	10	13.7
Thorax	5	11.6	2	14.3	5	31.3	12	16.4
Right side of the thorax	4	9.3	2	14.3	5	31.3	11	15.0
Left side of the thorax	1	2.3	0	0	0	0	1	1.4
Abdomen	15	34.9	5	35.7	2	12.5	22	30.1

Table 3. The relation between entry wound sites and range of fire

Entry wound sites	Hard-Contact Wounds		Loose-Contact Wounds		Near-Contact Wounds		Total	
	n=7	%	n=56	%	n=10	%	n=73	%
Head	4	57.1	17	30.4	8	80.0	29	39.8
Right temple region	2	28.5	1	1.8	2	20.0	5	6.9
Left temple region	1	14.3	2	3.6	0	0	3	4.1
Right orbital region	0	0	3	5.4	0	0	3	4.1
Left orbital region	1	14.3	4	7.1	1	10.0	6	8.2
Mid frontal region	0	0	7	12.5	0	0	7	9.6
Intra oral	0	0	0	0	5	50.0	5	6.9
Neck	3	42.9	6	10.7	1	10.0	10	13.7
Thorax	0	0	12	21.4	0	0	12	16.4
Right side of the thorax	0	0	11	19.6	0	0	11	15.0
Left side of the thorax	0	0	1	1.8	0	0	1	1.4
Abdomen	0	0	21	37.5	1	10.0	22	30.1

vomit samples of one case (1.4%). In the remaining 59 cases (80.8%), results of the toxicological analyses were normal.

DISCUSSION

Suicide with firearm, most commonly with handguns, is by far the most popular form of suicide, while suicides with long-barreled firearms are rare worldwide. However, use of long-barreled guns in suicide attempts is more popular in rural areas.[9,10] In present study, the suicidal deaths with shotgun accounted for 0.2% among all deaths, which is consistent with the literature.

Tamosiunas et al.[11] reported a ratio of male to female suicides as 11 (44/4). Kennedy[12] revealed that the ratio of male to female firearm suicides in Wisconsin was 12. In contrast to the studies mentioned above, suicides with firearms were reported to be the most common method of suicide among women in Texas.[13,14] In the present study, the ratio of male/female cases was 1.7 (46/27), which is lower than the rates reported in the literature. The high rate of female victims in this study can be explained by the severe oppression for honor and moral values imposed on women living in Turkey.[15] Although the methods of suicides vary according to age groups, gender, and cultural and social factors, peoples generally select easily accessible suicide methods.[16] Shotguns are easily obtainable firearms and are traditionally hung on nails on the walls of homes in Turkey. Thus, they are attractive objects for those who aim to commit suicide, especially for women who spend extended periods at home. The male/female ratio of suicides with firearms was reported as 1.4 (70/50) in another study from Turkey.[8]

Miller et al.[4] reported that most of the suicides were performed by adults older than 24 years, although most of the attempts occurred among people aged 15-24 years old in seven Northeast states of the United States. In two studies of firearm suicides in England and Sweden, the mean ages of the victims were 50.1 years and 50±19 years, respectively.[17,18] In this study, the mean age of the cases (25.1±13.1) was lower than those reported in the literature, with most of the victims in the group aged 16-20 years (Fig. 1). In two

Table 4. The characteristics of entry wounds

Characteristics of entry wounds	Hard-Contact Wounds		Loose-Contact Wounds		Near-Contact Wounds	
	n=7	%	n=56	%	n=10	%
Muzzle jammed	7	100.0	0	0	0	0
Seared edges of entry holes or wounds	7	100.0	56	100.0	10	100
Soot deposition under skin of entry wounds	7	100.0	42	75.0	9	90.0
Soot deposition in band around wounds	0	0	14*	25.0	10	100.0
Soot deposition inside circular defects in clothes	0	0	14*	25.0	1	10.0
Soot smudging around circular defects in clothes	0	0	0	0	1	10.0
Evisceration of the cerebral hemisphere and/or fragmented skulls	7	100.0	22	39.3	9	90.0
Skin defects or deep lacerations around entry wounds	7	100.0	22	39.3	9	90.0
Circular defects on skin matching with weapon bores	0	0	35	62.5	1	10.0

*Dressed regions.

studies including firearm-related suicides in Turkey, 46.7% and 47% of the suicides were in the groups aged 16-20 years and 15-24 years, respectively.[8,19] The rate of firearm-related suicide victims aged 10-19 years was found to be 47.4% in a study from Pakistan.[20] The higher rates of young suicides in Turkey and other developing countries can be explained by a high ratio of the young population and high rates of mental disorders, especially depression, in the youth due to socioeconomic problems, i.e., unemployment, emigration from villages to cities and failure to adapt to urban life.[21] Polat[16] reported that suicide rates in males diagnosed with mental diseases were 39 times higher than in males without mental diseases in a study in Sweden and that people with depression were 80 times more likely to commit suicide than non-depressed people.

In this study, the mean age of the females was lower than the males. The rate of female suicide victims aged 16-20 years was higher than in males. This result was contrary to the results obtained in a study from the United States,[22] while it was concordant with the results of two studies from Pakistan and Cyprus.[20,23] In other studies performed in Turkey, the rate of female suicides was higher than the rate of male suicides in the same age group.[24-27]

Firearm suicide rates may vary according to the occupation of the victims. Malmberg et al.[28] showed that firearm suicides accounted for 4% of all suicides among doctors and 19% of all suicides among farmers. In this study, occupations could not be determined since they had not been recorded in autopsy and scene investigation reports. This can be considered one of the limitations of this study.

Miller et al.[4] reported the fatality rate among firearm suicides to be 85-91%. In the present study, the high rate of deaths at the scene and the low rate of hospitalized suicides were concordant with the abovementioned fatality rate.

Most of the suicide types including firearm-related suicides occur at home or in the close vicinity of the home.[18,24,29] In this study, most of the suicides also occurred at home. This may be explained by the difficulty in carrying the shotguns outside the home and the privacy afforded in one's home, which permits use of the firearm without recognition.

Although the existence of a suicide note at the scene is not a proof of a suicide,[16] they may traditionally be considered as one of the markers of the severity of a suicide attempt, and it is suggested they provide a valuable insight into the thoughts of a suicide victim before the fatal act.[30,31] They may not be found in most of the suicides. It has been reported that suicide notes are present in 5%-43% of suicides.[31-36] In the present study, the rate of suicide notes was not high. It was interesting that the suicide note was written on the body of one victim in the current series.

In suicides with firearms, the head is generally the involved site. The rates of entry wounds have been reported to range between 58%-83.7% on the head, 1.9%-33% in the abdomen, and 10.5%-32% on the thorax.[20,35] Kohlmeier et al.[35] reported that 64.6% of the entrance wounds were on the head, 19.9% on the thorax and 5.6% on the abdomen in suicides with rifles. Azmak et al.[37] reported in a study in Edirne, Turkey that of 20 wounds, 13 (65%) were located on the head and 10 at the right temple. In the present study, the most common site of entry wound was also the head.

In this study, there seemed to be a correlation between entrance holes and gender (Table 1) consistent with Kohlmeier's study.[35] While wound entries were located in the abdomen in most of the women (n=12, 44.4%), they were located in the head in most of the men (n=19, 41.3%). In Kohlmeier's study,[35] the rate of women shooting themselves in the chest and abdomen was found to be higher than the rate in men. This can be explained by the hypothesis that "women think to live at the same time they think of death during suicides" as quoted by Polat.[16] The site of bullet entry was usually the head (17/19) in firearm suicides among female victims in a study by Scmeling et al.[32]

In the present study, wound entries were located at the temple in most of the women (60% of the head injuries) and they avoided shooting their face and neck. There was no female case with intra-oral gunshot entry in the present study, which is in agreement with the results of the study entitled "Intra and peri-oral shooting fatalities" by Azmak et al.[38] This may be explained by the beautiful corpse phenomenon proposed by Scmeling et al.[32] According to this phenomenon, the female pride in their appearance rejects disfiguring methods of suicide because they never want to disturb their beauty even in the last moment of life. Contrary to this phenomenon, Albek et al.[39] stated that the rate of entry wounds to the face was 56% for female victims and 66% for male victims of suicide or suspicious suicides with firearms.

Location of wound entries was correlated with age. Wound entries were located on the head and the abdomen in most of the suicide cases under 30 years old and the thoracic region in most of those aged over 30 years (Table 2).

In prior studies on firearm-related suicides, the rates of contact wounds were reported to be between 89% and 99.1%.[18,29,35,40] In the present study, the rate of contact wounds was found to be 100%, including hard-contact wounds in 7 cases, loose-contact wounds in 56

cases and near-contact wound in 10 cases (Table 3).

Descriptions of characteristics of entry wounds by physicians who attend to the suicide cases, as shown in Table 4, will provide important clues for identification of shot range in the diagnosis of the manner of death. Though insufficient by itself, its evaluation in combination with data from the scene investigations and results of examination of clothes belonging to the victims will provide important evidence for the diagnosis of the manner of death.[10,41]

Rape and violence are considered as causes of suicides.[19] However, autopsy findings in this study revealed no sexual assault or violence. Only one male victim had fresh incisions on his left wrist, suggestive of a complicated suicide by using two methods together even though the incisions were not fatal. There were tattoos and/or common incision sequelae on several parts of the body in 27.4% of the suicide cases. Cetin et al.[42] reported that existence of tattoos and/or common incision sequelae, which is one of the signs of psychopathic personality disorders, is usually a sign of a person's aptness to violence.

Alcohol consumption has an important role in suicide mortality, and alcohol intake has been implicated as an acute risk factor for suicide or suicide attempts in previous studies.[43,44] In several studies, alcohol was detected in 31.9% and 69% of the suicides.[35,45] The rate of alcohol dependence among suicide victims is 15-47%.[44] In this study, ethyl alcohol was found in only 17.8% of the blood samples of victims. Additionally, a high dose of Clorazepate (Tranxene) was detected in one case, which was considered a complex suicide, in this study.

In conclusion, firearms are the commonly preferred tools for suicides because of their easy accessibility and the high fatality ratio. In Turkey, even if obtaining handguns requires a strictly controlled professional license, their illegal handling unfortunately cannot be prevented. In addition, shotguns may be obtained easily due to minimal control over hunting licenses. As the number of firearms has increased, the rates of suicides and other crimes committed with firearms have dramatically risen.

It may be possible to prevent deaths of many young people by taking some simple preventive measures, such as implementing stricter legal precautions for the handling of shotguns and more severe penalties for illegal handling and usage of all types of firearms; supporting disarmament efforts among the civil society; increasing educational efforts and psychological support targeted at early and late adolescents - in fact, the highest rate of shotgun-related suicides was found to occur among the individuals aged 16-20 years in this study; and increasing awareness of maintaining firearms safely at homes –the minimum age at suicide was 11 years and most of the suicides were females, who are unlikely to possess a gun themselves.

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