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RESEARCH

## EVALUATION OF FORENSIC AUTOPSIES OF THE ELDERLY PEOPLE IN SIVAS

### ABSTRACT

**Introduction:** Aging is a physiological phenomenon, and the elderly group constitutes individuals aged 65 years and over. In this study we aimed to discuss socio-demographic and forensic medicine investigations in the elderly, together with autopsy findings.

**Materials and Method:** Among a total of 540 cases autopsied for judicial reasons during a four-year period (2006-2009) in the morgue of Cumhuriyet University Hospital, 123 of them were evaluated as cases of elderly death. The cases were analyzed with respect to sociodemographic and forensic medicine parameters: gender, age, type of death according to crime scene investigation, date of death, crime scene and autopsy findings.

**Results:** The majority of elderly deaths, whose cause of death was frequently (41.5%) reported as associated with suspicious causes, were of male gender aged between 65-96 years (73.2%), with most (60.2%) belonging to the 65-74 age group. A greater number (32.5%) of fatal events occurred during the spring months.

**Conclusion:** The causes of deaths of the elderly forensic cases are very important, as they are in all criminal cases. Circumstances of death, crime scene investigations, necropsic examination, laboratory analysis, and assessment of medicolegal investigation documents should be performed in the determination of manner of death. Therefore, if detailed examination is not possible then manner of death can not be exactly determined. In this study, the most common cause was suspicious deaths, followed by traffic accidents, falls from a height, hanging, poisoning, fire arm injuries, and freezing to death.

**Key Words:** Aging; Autopsy; Aged; Cause of Death; Forensic Medicine.



ARAŞTIRMA

## SİVAS'TA ADLİ OTOPSİ UYGULANAN YAŞLI ÖLÜMLERİNİN DEĞERLENDİRİLMESİ

**Giriş:** Yaşlılık fizyolojik bir olay olup 65 yaş ve üzeri yaş grubunu oluşturmaktadır. Bu çalışmada adli nitelikli yaşlı ölüm olgularına ait sosyodemografik ve adli tıbbi veriler ile otopsi bulgularının tartışılması amaçlanmıştır.

**Gereç ve Yöntem:** Cumhuriyet Üniversitesi Hastanesi morgunda 2006-2009 yılları arasındaki dört yıllık süreçte adli otopsileri yapılan toplam 540 olgudan 123'ü yaşlı ölümü olarak değerlendirilmiştir. Olgular cinsiyet, yaş, olay yeri incelemesine göre olay türü, ölüm tarihi, olay yeri ve mekanı, otopsi bulguları gibi sosyodemografik ve adli tıbbi yönden incelenmiştir.

**Bulgular:** Olguların %73.2'si erkek olup 65-96 yaşlar arasındaki tüm olgulardan çoğunluğu (%60.2) 65-74 yaş grubunu oluşturduğu, olay türleri olarak en fazla (%41.5) şüpheli ölüm olgularının olduğu görülmüştür. Olay tarihine göre çoğunluğunun ilkbahar mevsiminde (%32.5) olduğu belirlenmiştir.

**Sonuç:** Yaşlı adli olguların ölüm nedenleri tüm adli olgularda olduğu gibi önem taşımaktadır. Ölümün meydana geldiği koşullar, olay yeri incelemesi, ölü muayene ve otopsi incelemesi, laboratuvar tetkiki ile adli tahkikat evrakı değerlendirilmeden orijin tespiti yapılmamalıdır. Bu çalışmada şüpheli ölümlerden sonra trafik kazalarının yer aldığı, bunu düşme, ası, zehirlenme, ateşli silah yaralanmaları ve donmanın izlediği görülmektedir.

**Anahtar Sözcükler:** Yaşlanma; Otopsi; Yaşlı; Ölüm Nedeni; Adli Tıp.



## INTRODUCTION

The increasing average life expectancy leads an aging population, and growing numbers in the vulnerable elder population. Therefore, a rise in elder medicolegal deaths is expected (1).

The aging of the population is one of the most important demographic events of the 21<sup>st</sup> century. Almost all over the world, people live longer, birth rates are diminishing and therefore the elderly population is increasing both in number and in ratio. By 2050, the world will have two billion people over the age of 60. The aging of a population influences all aspects of the society, from health to social security, environmental issues to education, job opportunities, socio-cultural activities and family life. A proper evaluation of the changes in Turkey's population, as well as reflections on these changes, will allow the aging of the population to be resolved without it turning into a problem for our country. Something else that the aging of the population affects is the relationship between crime and elderly people (2).

As the proportion of the elder population increases, some problems related to the elderly arise. In line with somatic and social life changes in the elderly, economical hardships experienced by elders in urban areas might suggest elder abuse and neglect, in cases where care of the elders is not adequately supported at home or in nursing homes. Besides, violence continues to be a public health problem that increases in severity every day (3). Death is the extreme end of abuse and violence. However, elder abuse has been overlooked for years (4).

Medico-legal deaths are a serious issue in Turkey, as in other countries. In this study, our aim was to analyze forensic deaths of elders aged over 65 years from the perspectives of socio-demographic and forensic medicine, and perform comparative evaluations with studies investigating similar causes of death, and indications of autopsy.

## MATERIALS AND METHOD

Among a total of 540 cases of death sent from Sivas city, its counties, nearby cities, and abroad and autopsied for judicial reasons during a four-year period (2006-2009) in the morgue of Cumhuriyet University Hospitals, 123 of them were identified as cases of elder death. These cases were analyzed retrospectively with respect to socio-demographic and death investigation as to gender, age, type of death according to crime scene investigation, date of death, crime scene and autopsy findings

**Table 1—** Distribution of Cases According to Their Age Groups.

Age Group	Female n (%)	Male n (%)	Total n (%)
65-74	15 (20.3)	59 (79.7)	74 (100.0)
75-84	15 (36.6)	26 (63.4)	41 (100.0)
≥85	3 (37.5)	5 (62.5)	8 (100.0)
<b>Total</b>	<b>33 (26.8)</b>	<b>90 (73.2)</b>	<b>123 (100.0)</b>

For statistical analysis, data were evaluated using version 14.0 of the Statistical Package for the Social Sciences (SPSS). This study was approved by the Cumhuriyet University Ethics Committee of Clinical Investigations with the decree dated 09.29.2010 and numbered 2010-06/68.

## RESULTS

A hundred and twenty three cases (20.2%) out of a total of 540 forensic autopsies performed during the 2006-2009 period in the morgue of Sivas Cumhuriyet University Hospital were in the 65-96 age group. The majority (73.2%) of the cases were of male gender (Table 1) and most (60.2%) belonging to the 65-74 age group, whose cause of death was frequently (41.5%) reported as associated with suspicious etiologies.

According to crime scene investigation, the majority (n=51; 41.5%) of types of death were secondary to suspicious causes, while traffic accidents took the second place (n=27; 22.0%) (Table 2).

**Table 2—** Distribution of Types of Death According to Crime Scene Investigation.

Types of death	n	%
Suspicious deaths	51	41.5
Traffic accidents	27	22.0
Falls	19	15.5
Hanging	8	6.5
Poisoning	7	5.7
Firearm injury	4	3.2
Freezing	3	2.4
Suffocation	1	0.8
Burns	1	0.8
Wild animal attack	1	0.8
Exhumation	1	0.8
<b>Total</b>	<b>123</b>	<b>100.0</b>

**Table 3**— Distribution of Types of Death Events in Male and Female Elders.

Gender	Female		Male	
	n	%	n	%
Suspicious	11	33.4	40	44.5
Traffic accidents	9	27.3	18	20.0
Falls	4	12.1	15	16.7
Hanging	2	6.1	6	6.7
Poisoning	4	12.1	3	3.3
Firearm injury	–	–	4	4.4
Freezing	–	–	3	3.3
Suffocation	1	3.0	–	–
Burns	1	3.0	–	–
Wild animal attack	–	–	1	1.1
Exhumation	1	3.0	–	–
<b>Total</b>	<b>33</b>	<b>100.0</b>	<b>90</b>	<b>100.0</b>

Male elders were involved in more than four fifths of suspicious deaths and two thirds of those in traffic accidents (Table 3). A majority of the incidents (n=47; 39%) happened at home (Table 4).

Most of the events happened during spring (n=40; 32.5%), followed by the autumn season (n=30; 24.4%) (Table 5).

No signs of traumatic injury were detected in 47.2% (n=58) of the corpses. In 30 cases (24.4%), the wounds were all over the body, while the head and neck regions were injured in 14 (12.2%) and 9 (6.5%) cases, respectively.

There were no admissions into any health care center in ninety-one (74.0%) cases. Death happened in those consulted

**Table 4**— Distribution of Scene of the Death Events Between Genders.

Gender	Female		Male	
	n	%	n	%
Home	16	48.4	31	34.5
In an open field	2	6.1	11	12.2
Motor road	3	9.1	7	7.8
Street	2	6.1	7	7.8
Roof-construction	–	–	6	6.7
Workplace	–	–	3	3.3
Hospital	2	6.1	1	1.1
Prison	–	–	2	2.2
Cemetery (exhumation)	2	6.1	–	–
Unknown	6	18.1	22	24.4
<b>Total</b>	<b>33</b>	<b>100.0</b>	<b>90</b>	<b>100.0</b>

to a health care center when they were hospitalized in an intensive care unit (n=12; 59.8%), in a neurosurgery department (n=8; 6.5%) or in a central intensive care unit (n=7; 5.7%).

## DISCUSSION

As is the case throughout the world, advancements in diagnostic, and therapeutic modalities, advantages of early treatment, and improvement in nutritional habits thanks to innovations in medical technology, the average age of death has increased in Turkey. The increasing number of elder individuals in the community have led to analysis of causes of death among the elderly, and more frequent investigations more relevant to this issue (3,5).

**Table 5**— Distribution of Date of Death According to Crime Scene Investigation.

Crime Scene Investigation	Spring	Summer	Autumn	Winter	Total
Suspicious	17	9	9	16	51
Traffic accidents	8	6	11	2	27
Falls	6	6	7	–	19
Hanging	4	2	–	2	8
Poisoning	1	1	1	4	7
Firearm injuries	3	–	1	–	4
Freezing	0	–	–	3	3
Suffocation	1	–	–	–	1
Burns	–	–	–	1	1
Wild animal attack	–	1	–	–	1
Exhumation	–	–	1	–	1
<b>Total n (%)</b>	<b>40 (32.5)</b>	<b>25 (20.3)</b>	<b>30 (24.4)</b>	<b>28 (22.8)</b>	<b>123 (100.0)</b>



This study encompassed 123 (20.2%) cases of death of individuals over 65 years of age among a total of 540 elders autopsied in the morgue of Sivas Cumhuriyet University Hospital during a four-year period. In a similar study performed during a five year interval (1996-2001) (5), autopsied elder deceased constituted 7.8% of all autopsies carried out within the same period. Another investigation carried out in Ankara covering a two year-period (2004-2006) found the incidence of elder deaths to be 12.4 percent (6). In a study conducted between 1996 and 2005 in Denmark, (7) there were 14,990 autopsy cases and 3,645 (24.3%) of them were aged 65 years and over. In a similar study conducted in Egypt (8) between 1996 and 2005 there were 2,967 autopsy cases and 681 (22.95%) of them were 50 years old and over; in a similar study performed in Nigeria (9), 7.2% of all deaths were of people aged more than 60 years. Today, people who are 65 years of age or older represent approximately 12% of the population in United States. In the year 2030, this ratio is expected to rise to 21 percent (10). It is obvious that the increase in the elderly population will be reflected in the ratio of elderly autopsies.

Our investigation and the studies performed in Ankara (6), Istanbul (5), and Bursa (11) revealed similar rates of male deaths among the elderly (73.2%, 72.5%, 71.6% and 62.3%, respectively). Similar rates of male deaths were found in the investigations conducted abroad, with 74% in Portugal (1) and 68% in Denmark (7).

In this study, most of our cases (60.2%) were in the 65-74 age group. Similarly, most of the deaths (n=225; 60.0%) among the elderly in a study by Cantürk et al. (6) happened in this age group.

Further, a majority of deaths among the elderly occurred in the spring (n=40; 32.5%), followed by autumn (n=30; 24.4%) months (Table 5). In accord with findings in the literature, no striking difference was found in the distribution of death events among months and years. However, some studies reported a non-significant difference in death rates between the spring and autumn months (12-14).

In our study, a great proportion (n= 47; 39%) of deaths occurred at the deceased's home. In a study by Ince et al. (5), the deaths events of both genders (40.3%) were reported to the legal authorities as an initial report of "found dead at home." A study conducted in Portugal (1) revealed that crime scenes were often the victim's own home (68%).

In this study, suspicious deaths ranked above top of other causes, with an incidence of 41.5%. In a study by Ince et al (5), deaths for pathological reasons constituted 35.2% of all elderly deaths; on the other hand, pathological reasons were

responsible 60.9% of the cases found in death at home. In a similar study in Ankara (6), 54.4% of elderly deaths were attributed to natural causes. In the Danish study (7), 35-38% of all the medicolegal autopsies were natural deaths.

Various literature reports have indicated increasing rates of suicide among the elder population. In almost all industrialized countries, men 75 years and older have the highest suicide rate among all age groups (15).

In a study conducted between 1997 and 2004 in Afyon, suicide death rates among people 65 years old and above was 7.4%. There has been a large increase in the rate of suicide originated deaths in Turkey in the last 10 years. The suicide rate in 1999 was 2.8%, and the rate was 3.7% in 2001. "Suicide rates are increasing in our country, but is still lower than other countries. We think that this situation can be associated with life style, cultural values and socio-economic level of the countries" (16).

Hungary, Austria and Finland have the highest rates of suicide in the elderly. This rate is lowest in Turkey, Greece and Chile (17). Two different studies in Ankara (6) and Istanbul (5) revealed that hanging deaths in the elderly were found to be 6.1% and 6.3%, respectively. In accord with these studies, hanging deaths were found to be 6.5% in our study.

In this study, six of eight cases (75%) of suicide by hanging were by males. Ng and Lau (18) also observed higher rates of death by hanging in male elders.

Except for hanging cases, origin of death was not determined in deaths caused by gun shot wounds, falling and poisoning due to the incompleteness of forensic investigation.

In our study, the second most frequently (22%) seen, and relatively significant cause of death in the elderly was traffic accidents. A similar investigation performed in Istanbul (5) implicated traffic accidents in 16.1% of deaths among the elderly. In Nigeria (9), deaths by traffic accidents (64.3%) are more frequent than by other types of accidents. Moore (19) indicated that elder individuals are mostly exposed to falls from a height and traffic accidents. Being found dead in his/her home, and traffic accidents, are the most frequently seen types of elderly deaths both in our country and in the rest of the world (5).

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