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Gender differences in completed suicidal hangings from 2013 to 2018 in Muğla, Turkey

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BACKGROUND: Hanging is the most preferred among suicide methods. Although methods vary based on age groups and social and cultural conditions, many studies have reported it as the most common suicide method in Turkey.

OBJECTIVE: Assess autopsy findings of suicidal hangings according to gender differences.

DESIGN: Retrospective, cross-sectional.

SETTING: Local morgue.

SUBJECTS AND METHODS: The autopsy reports of hanging autopsies between 2013-2018. Data was retrospectively collected from autopsy reports. Sociodemographic features, reasons, suicide notes, the news media, and macroscopic autopsy findings were evaluated. Findings were statistically compared by gender.

MAIN OUTCOME MEASURE: Gender differences in autopsy findings.

SAMPLE SIZE AND CHARACTERISTICS: 175 autopsy reports of suicide by hanging.

RESULTS: Among 2534 autopsies, 175 (6.9%) cases involved hanging. Most (76%, n=133) were males; the median (interquartile range) age was 42.0 (29.5), the male/female ratio was 3:1. Suicide notes were found in 42 cases; 81 (24%) were from men. The most common reason for suicide was a mental illness (n=51, 29.2%), followed by family problems (n=26, 14.9%), but the cause was unknown in 42 cases (24.0%). More than half of the events were covered in the news media (58.9%). Rope was most commonly used with women preferring a softer material. Men were more frequently single than women. Men were more frequently single and not actively working than women (P=.026 and P≤.001, respectively). The incidence of atypical hanging was higher for males than females (P<.05).

CONCLUSION: The findings showed that there were some statistically significant differences in socioeconomic and mental health factors between men and women in hanging suicide. This study may serve as the basis for more comprehensive studies to investigate the causes of suicide.

LIMITATION: Single-center, retrospective.

CONFLICT OF INTEREST: None.

Suicide is an important public health problem throughout the world.[1-3] It is estimated that 10 to 20 million people try to commit suicide each year and one million people die due to suicide.[3] The reasons for suicide vary depending on cultural, economic, religious and social factors, and is generally preventable. Suicide has international aspects in terms of its consequences. Although suicide methods vary based on age and social and cultural conditions, many studies have reported hanging as the most common suicide method in Turkey and the rest of the world.[2-22] Hanging is usually deliberate; less frequently accidental, and homicide is often suspected but is rare.[23,24]

Classified under 'asphyxia' in classical forensic medicine books,[25-27] hanging is a form of ligature strangulation, in which fatal pressure is applied to the neck with rope, or other material, resulting in gravitational drag due to the weight of the body or part of the body. If the whole body is hanging off the ground and the full weight of the body is suspended from the neck, then hanging is considered to be 'complete', whereas if part of the body is in contact with the floor or another supporting object, the hanging is 'incomplete'. In this study, our aim was to analyze autopsy data to find regional features and gender differences in hanging events. Another aim was to raise awareness of preventive measures and to create a database for future studies.

SUBJECTS AND METHODS

The data are derived from forensic reports of suicide by hanging from autopsies carried out in the Council of Forensic Medicine (Turkey)-Muğla Branch between January 2013 and December 2018. The reasons for suicide and demographic and socioeconomic features were obtained from the crime scene investigation reports. the news media were analyzed using these keywords 'muğla', 'suicide', 'name of individual victims'. The state of leaving suicide note was evaluated as a suicide letter or note from in the crime scene investigation reports and as suicide notes shared by social media or telephone messages. Reasons for suicide (from crime sceen investigation reports, suicide notes) are grouped as family problems, psychiatric illness/mental disorder, physical illness, emotional relationships, occupational failure/economic difficulties. Age groups were divided into four based on the World Health Organization definitions: 24 years and younger, 25-44 years, 45-64 years, and 65 years and older. The nature of the ligatures was divided into two categories: hard materials (rope, tether, rope, steel rope, cable, belt, strap, duct tape, wire, laundry wire, garden hose) and soft materials (bedsheet, clothes, towel, bathrobe belt, headscarf).

All data were statistically compared by gender. The Pearson chi-square and Fisher exact tests were used for categorical data and the results were presented as frequency and percentage. The study was approved by the Committee of the Council of Forensic Medicine Directorate (25/12/2018, Decision number: 21589509/2018/974).

RESULTS

Of 2534 autopsies performed in the 6 years between 2013 and 2018, 175 (6.9%) were hanging cases. About three-quarters (76%, n=133) were male and the male/female ratio was 3: 1. The median (interquartile range) age was 42.0 (29.5), and the range was between 17-91 years. There were two males of age 17 years, both high school students and it was learned from the crime scene investigation report that both had emotional problems with their girlfriends. Among the age groups, the largest group consists of cases between the ages of 25-44 (42.9%, n=75). There was a statistically significant difference between age groups according to gender; males in the age group of 24 and younger, and females in the age group of 65 and older occurred statistically more frequently than the other groups ($P<.05$) (**Table 1**).

On a seasonal basis, 35.5% (n=62) of the hangings took place in the spring, 26.3% (n=46) in the summer, 17.1% (n=30) in the autumn, and 21.1% (n=37) in the winter. One hundred and three (58.9%) of the cases were covered in the news media (male: 79.6%- n=82, female: 20.4%-n=21). Although men were more often in the news than women, there was no significant difference ($P>.05$). Suicide notes were found in 42 cases (24%); 81% of them were men (n=34) and 19% were women (n=8). There was no difference between the presence of a suicide note and the gender ($P>.05$). Less than half (45.1%) of the cases who committed suicide by hanging were married (**Table 1**). Men living alone (single-widow-divorced) were more common in frequency than married men or men not living alone ($P<.05$). Housewives constituted 72.4% of the females. The rate of those who were in active working life in men, and the rate of those who were in non-active working life in women was statistically more frequent than the other group ($P<.001$).

The most common reason in all cases was a mental illness with 29.2%, followed by family incompatibility with 14.9%. Psychiatric/mental illness was most frequent in women ($P<.01$). There was no significant gender difference in terms of physical illness. Emotional relationships as a reason were higher in males. Suicide was significantly more frequent in males due to occupational failure/economic difficulties ($P<.05$).

Table 1. Demographic and socioeconomic characteristics of study subjects by gender (n=175).

	Female	Male	Total	*P* value
Age group (years)				
24 and below	2 (4.8)	21 (15.8)	23 (13.1)	
25-44	18 (42.9)	57 (42.8)	75 (42.9)	
45-64	9 (21.4)	36 (27.1)	45 (25.7)	
65 and above	13 (30.9)	19 (14.3)	32 (18.2)	.042
Total	42(100)	133 (100)	175 (100)	
Unknown	6 (22.2)	21 (77.8)	27 (15.4)	
Total	42 (24)	133 (76)	175 (100)	
Marital status[a]				
Married	25 (31.6)	54 (68.4)	79 (45.1)	
Unmarried	4 (8)	46 (92)	50 (28.6)	
Widow	6 (40)	9 (60)	15 (8.7)	.026
Divorcee	1 (25)	3 (75)	4 (2.2)	
Unknown	6 (22.2)	21 (77.8)	27 (15.4)	
Total	42 (24)	133 (76)	175 (100)	
Employment status				
Housewife /unemployed	30 (17.1)	9 (5.1)	39 (22.3)	
Retired	-	11 (6.3)	11(6.3)	
Student	2 (1.1)	5 (2.9)	7 (4)	
Total (not actively working)	32 (18.2)	25 (14.3)	57 (32.6)	
Employee	1 (.6)	19 (10.9)	20 (11.3)	
Self-employed	1(.6)	16 (9.1)	17 (9.7)	<.001 (actively working vs non-actively working)
Farmer	1 (0.6)	20 (11.4)	21 (12)	
Officer	1 (0.6)	5 (2.9)	6 (3.5)	
Other	2(1.1)	10 (5.7)	12 (6.9)	
Total (actively working)	6 (3.5)	70 (40)	76 (43.4)	
Unknown	4 (2.3)	38 (21.7)	42 (24)	
Total	42 (24)	133 (76)	175 (100)	
Reasons for suicide				
Family problems	5 (19.2)	21 (80.8)	26 (14.9)	
Psychiatric illness/mental disorder	19 (37.2)	32 (62.8)	51 (29.1)	
Physical illness	4 (22.2)	14 (77.8)	18 (10.3)	.026
Emotional relationships	0	11 (100)	11 (6.3)	
Occupational failure/ economic difficulties	2(7.4)	25 (92.6)	27 (15.4)	
Unknown	12 (28.6)	30 (71.4)	42 (24)	
Location of event				
Home	34 (81)	53 (39.8)	87 (49.7)	<.001
Outdoors	7 (16.6)	46 (34.6%)	53 ( )	

Data are number (%). Row percentages for women and men, column percentage in total. aComparing cases with partners and without partners.

Hard material was used in 92.5% (n=148) of the cases, and most commonly a rope (78.1%, n=116). Only 7.5% (n=12) of the cases had used soft materials such as clothes, robe belt, linens, headscarf. Females used soft materials (16.7%) significantly more than males (4.8%) ($P<.05$). In a typical hanging the knot was at the back of the neck in 61.7% of the cases. Males (42.9%) used atypical hanging significantly more than females (23.8%) ($P<.05$). The hanging methods were reported in 117 cases; 72 of them (61.5%) were complete hangings, 45 of them (38.5%) were incomplete. There was no significant relationship between the method and gender ($P>.05$).

In 57.1% (n=100) cases they practiced daily shaving of pubic hair. The daily pubic hair shaving rate was 47.4% in men and 88.1% in women. There was a significant relationship between gender and daily pubic hair shaving ($P<.001$). Fecal incontinence was observed in 33.7% (n=59) of the cases. There was a significant relationship between fecal incontinence and gender. Fecal incontinence was more observed in men (39.1%) than in women (16.7%) ($P<.05$). Soft tissue hemorrhage and bone/cartilage fracture in the neck structure occurred in 79.4% (n=139), and 61.1% (n=107) of the cases had soft tissue hemorrhage in the upper and lower neck regions. There was no significant gender differences ($P>.05$); 37.7% (n=66) of all cases had hyoid cartilage fracture, 29.1% (n=51) had thyroid cartilage fracture, and 5.7% (n=10) had vertebral fracture. There were no significant gender differences with hemorrhage and bone/cartilage fractures ($P>.05$). In the post-mortem toxicological examination, 28% (n=49) of the cases had been consuming ethyl alcohol, 2 cases methyl alcohol and 8 cases were using addictive substances, while 36.6% had no toxicological substances. The rate of cases a blood level of with ethyl alcohol rate above 150 mg/dL was 5.7%. **Table 2** gives methods of all suicides by gender between 2002-2018 in Turkey. **Table 3** gives the distribution of the numbers of suicidal hangings and the numbers of all suicides between 2013 and 2018 by gender in Muğla.

DISCUSSION

Suicide ranks first among the main causes of death in Turkey.[1] According to Turkish Statistical Institute (TUIK) data, in Turkey, the years between 2002-2018 on average 8 people per day ended his/her own life by suicide.[28] It was reported in almost all studies related to suicide conducted in Turkey that the most common method is hanging.[1-4,6,7,11,12] According to TUIK data, 317 suicides occurred in Muğla province between 2013-2018, and 175 of them (55.2%) were hanging.[29]

According to the results of our study, the mortality rate due to hanging in the 6 years between 2013 and 2018 in Muğla was 6.9% and the rate in men was three times higher than women. In studies from different regions of our country and in different countries around the world, the excess of males was emphasized in cases of death of hanging.[5,6,8-22,30] According to a study that examined suicide cases in Turkey using the TUIK data in the period between 2002 to 2015 it was reported that compared to women, men conduct suicide more often. In both genders hanging was the method often used. The number of suicide showed significant statistical differences according to age and in the 20-49 age range it was more common.[1] In the study of Oner et al on suicide, covering the 10-year period between 1990-2000, it was reported that suicide occurred most commonly in the 20-34 age group and in males, most often by hanging.[4] In the study of Al Madni et al the rate of males in hanging-related deaths was reported to be 86.5%, and the ratio of males to females was 6.38:1.17. In our study, the largest group was the 25-44 age group. A statistically significant difference was found between age groups according to gender: males in the younger age group of ≤24, females in the elderly group aged ≥65 were statistically more frequent than the other groups.

According to TUIK data, suicide figures increased from 2002 to 2015.[1] In the present study, an increase in cases of hanging-related deaths was observed over the years. This increase has become an important public health problem not only in Turkey but also in the world.[17-22] The young age group and the male majority are remarkable features. This might be caused by many biological, psychological and sociological reasons.

The average number of suicides was highest in spring and lowest in the winter season.1 In studies from different countries, it is more common in spring and summer seasons.[17] Many of the cases (58.9%) of the cases were covered by the news in the media after the incident. Although men are more often on the news than women, there was no significant difference between news status and gender. In similar studies, there was no assessment of media coverage. The suicide note is one of the important indications that a hanging incident intention is suicide. In our study, 24% left a suicide note. Although not statistically significant, males left more suicide notes. It was reported that less than 1/3 of the cases left a suicide note in one study, while 5.26% of the cases left a suicide note in another study.[17,19] It is reported that the rate of leaving suicide notes varies from country to country, and this rate varies between 5.26-43% in all suicide cases.[17,19]

According to TUIK data, the number of suicides was statistically different by marital status in Turkey between the years 2002-2015. Those who were married or single were more likely to commit suicide than those whose spouse died or divorced.[1] Men living alone (single-widow-divorced) committed suicide at higher frequency, which was statistically significant. In another study it was reported that hanging is mostly seen in farmers, students, housewives and self-employed people.[24] In another study, it was reported that 75% of the cases were male workers, 11.3% were housewives and 9.8% were unemployed.[17] In the present study, the frequency of suicide in those in active working life in men was statistically higher while most women were housewives. We thought that being an employee might be a risk factor for men, and not working is a risk factor for women. Gender equality should be promoted so that women can participate more in working life, and so that the economic burden will not rest only on men.

In Turkey, psychological reasons were the most common reason for suicide.[1] In a study from in Damman, psychological diseases were reported in 19 cases (14.28%)

Table 2. Methods of suicide in Turkey between 2002-2018 (Turkish Statistical Institute).

Years	Gender	Hanging		Gunshot		Others		Total	
		n	%	n	%	n	%	n	%
2018	Male	1222	48.3	810	32.0	497	19.7	2529	100.0
	Female	368	45.3	107	13.2	338	41.5	813	100.0
2017	Male	1134	46.4	874	35.7	437	17.9	2445	100.0
	Female	358	49.5	116	16.0	249	34.5	723	100.0
2016	Male	1126	46.4	774	31.9	526	21.7	2426	100.0
	Female	369	48.1	106	13.8	292	38.1	767	100.0
2015	Male	1099	46.6	729	30.9	540	22.5	2368	100.0
	Female	429	48.3	144	16.2	315	35.5	888	100.0
2014	Male	1098	46.7	689	29.3	565	24	2352	100.0
	Female	393	48.1	127	15.5	297	36.4	817	100.0
2013	Male	1206	50.6	719	30.2	457	19.2	2382	100.0
	Female	426	49.0	139	16.0	305	35	870	100.0
2012	Male	1199	50.4	701	29.5	477	20.1	2377	100.0
	Female	442	48.6	137	15.1	331	36.3	910	100.0
2011	Male	948	50.5	561	29.9	367	19.6	1876	100.0
	Female	443	55.3	137	17.1	221	27.6	801	100.0
2010	Male	1080	52.1	574	27.7	419	20.2	2073	100.0
	Female	448	52.1	119	13.8	293	34.1	860	100.0
2009	Male	1121	53.1	627	29.7	363	17.2	2111	100.0
	Female	436	55.4	133	16.9	218	27.7	787	100.0
2008	Male	973	50.6	583	30.3	368	19.1	1924	100.0
	Female	419	47.0	171	19.2	300	33.8	892	100.0
2007	Male	888	49.1	542	30.0	378	20.9	1808	100.0
	Female	437	44.4	137	13.9	411	41.7	985	100.0
2006	Male	872	48.9	530	29.7	338	21.4	1782	100.0
	Female	411	39.3	137	13.1	541	47.6	1047	100.0
2005	Male	813	46.7	509	29.3	418	24	1740	100.0
	Female	387	40.2	147	15.3	429	44.5	963	100.0
2004	Male	774	46.0	482	28.7	425	25.3	1681	100.0
	Female	420	40.9	146	14.2	460	44.9	1026	100.0
2003	Male	784	49.8	420	26.7	370	23.5	1574	100.0
	Female	461	40.8	140	12.4	530	46.8	1131	100.0
2002	Male	675	48.5	313	22.5	374	29	1392	100.0
	Female	347	38.2	104	11.4	488	50.4	909	100.0

and family incompatibility in 6%.[17] In general, among the reasons for suicide, social variables such as education, income, gender, marital status, age, and work were reported. The presence of mental disorders such as mood disorders, schizophrenia, chronic physical disease, and alcohol use poses a high risk.[1,23]

Muğla, which has a coast in both the Aegean and the Mediterranean Sea, is an important tourism city. Due to its geographical features, it varies in lifestyle and social structure. More than half of the population lives in villages, while the coastal areas have seasonal variations in the population. The population is occupationally concentrated in the sectors of farming/animal husbandry and seasonal workers.[23] In the present study, the most common reason for suicide was a psychiatric/mental illness in all cases followed by family problems and physical illness. Psychiatric/mental illness is more common in women while occupational failure/economic difficulties are more common in men.

The most common location of the event was in the home in our study. Women frequent the home more than men. In other studies, the place of the hanging was often the home or other indoor spaces, while gender differences were not specified.[8,18,31] Many different materials have been reported as a hanging tool, but the most common is rope.[8,21,32,33] Similarly, in our study, rope was used most frequently. In females, softer material was more often used, and the gender differences were statistically significant.

Table 3. Number of suicides by hanging and all suicides between 2013 and 2018 by gender in Muğla.

Year	Gender	Suicidal hanging (n)	Total (n)
2013	Female	8	13
	Male	16	41
2014	Female	3	8
	Male	11	29
2015	Female	3	7
	Male	24	46
2016	Female	12	15
	Male	15	37
2017	Female	7	11
	Male	28	36
2018	Female	9	14
	Male	39	60
Total	Female	42	68
	Male	133	249
		175	317

Typical and atypical hanging rates vary in studies; Kurtuluş et al found 52.9% of the cases were typical hanging; Sharma et al and Talukder et al found 88% and 78.8% of the cases were atypical hanging, respectively.[5,32,34] In our study, 'typical hanging' was observed in the majority of cases. The incidence of atypical hanging in men was higher than in women. In other studies, the hanging method varied from region to region and from country to country; completed hanging rates were reported to vary between 16.5% and 88%.[19,21,22,32] In the study by Sahoo et al it was reported that 88.2% of cases were complete hangings, 11.8% were incomplete, and male and female gender ratio was similar in terms of hanging method.[35] Likewise, in our study, there was no significant relationship between the hanging method and gender. Traumatic injuries to the hands and feet may occur as a result of hitting objects in the immediate vicinity during the agonal processes of hanging. In the present study, abrasion and minor ecchymoses were seen in hands, feet, and in the neck. No gender differences were detected. In studies referring to traumatic injuries, similarly, traumatic injuries are mentioned in the skin of the hands, feet, and neck.[8,18,19]

Different socio-cultural and religious structures can cause differences in suicide rituals. One of these differences is the daily shaving of pubic hair. This is part of the spiritual preparation for suicide. In a previous study from Turkey, Demirci et al reported that among all suicide cases, daily axillary/pubic hair shaving occurred in 58% of cases, and most frequently in the 20-29 age group, but no gender differences were reported.[36] In our study, it was observed that 57.1% of cases performed daily shaving of the pubic hair, but no statistical relationship was found between daily shaving of pubic hair and age groups; it wassignificantly higher in women. Fecal incontinence may be observed in hanging cases as in the other asphyxial deaths depending on the disappearance of postmortem anal sphincter tone. In our study, it was found that males have more fecal incontinence than females. However, in 116 cases where fecal incontinence could not be detected, no definitive interpretation could be made as to whether incontinence really occurred. It is believed that some cases may have been interfered with during the period from both the finding of the remains and the autopsy procedure, and the frequency of fecal incontinence may be higher than detected. Sahoo et al reported semen/faeces incontinence in 13 of 77 cases (16.88%) and attributed this to a sudden increase in intra-abdominal pressure and/or

relaxation in the sphincter muscles.35 Pal et al reported semen/faeces output in 50% of the cases, while Rawat et al reported that they did not detect incontinence in any of their cases.[18,30]

The question of whether the hanging action has taken place while the person was still alive is one of the most important questions that forensic medicine specialists must answer at autopsy.

It is important to show the presence of antemortem vitality findings with a detailed and careful examination of soft and bone tissues in the neck. In our study, hemorrhage in soft tissue/muscles were detected in 79.4% of the cases in the upper neck of the neck and 61.1% in the lower neck of the neck. When evaluating vitality findings, all neck structures should be evaluated in detail. For instance, after the signs of vitality are detected in the upper neck, other regions should not be excluded from the examination. No gender differences were reported in studies reporting hemorrhage in the soft tissues and neck muscles in hanging cases.[5,9,33,37-39] Like other studies, in our study, no gender differences were detected.

In post-mortem toxicological examination, ethyl alcohol was detected in 28% of cases. In the study by Üzün et al, alcohol was detected in the toxicological analysis in 91 of 761 hanging cases (12%).[8] In a study from in Dammam, the rate was reported to be 6.76%.[17] In our study, no gender differences were detected in use of ethyl alcohol.

In conclusion, according to the results of our study, which revealed gender differences in hanging cases, it is obvious that there were some differences between men and women. Suicide, which is an important social problem can lead to psychosocial and economic consequences affecting productive people. To prevent suicidal behavior, it is necessary to conduct comprehensive studies that can identify people at high risk of suicide and the causes of suicide, and examine the origin of the problem. In the formation of suicidal behavior, both personal and social reasons should be examined, and measures should be taken to prevent their recurrence. Our study should serve as a database for more comprehensive studies.

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