



## Original communication

Suicidal hanging in Istanbul, Turkey: 1979–2012 Autopsy results<sup>☆</sup>Safak Taktak<sup>a</sup>, Bahadır Kumral<sup>b,\*</sup>, Ayla Unsal<sup>c</sup>, Taskin Ozdes<sup>d</sup>, Yalcin Buyuk<sup>e</sup>, Safa Celik<sup>e</sup><sup>a</sup> Department of Psychiatry, Ahi Evran University, Education and Training Hospital, Kirsehir, Turkey<sup>b</sup> Department of Forensic Medicine, Namik Kemal University, Faculty of Medicine, Tekirdag, Turkey<sup>c</sup> Department of Nursing, Ahi Evran University, School of Health, Kirsehir, Turkey<sup>d</sup> Department of Forensic Medicine, Abant Izzet Baysal University, Faculty of Medicine, Bolu, Turkey<sup>e</sup> The Ministry of Justice, Council of Forensic Medicine, Istanbul, Turkey

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## ABSTRACT

A retrospective study was carried out on 4549 which is the total number of hanging cases autopsied at Forensic Medicine Institute in Istanbul, Turkey. 4502 hanging cases of suicidal origin were detected and evaluated in terms of demographic features, the type of hanging material used for ligature, internal findings in neck organs, toxicological findings and microscopic findings. Of these suicides, 3295 (73.2%) were males and 1207 (26.8%) were females. The average age of the victims was 37.8 (SD 1.6). Crude suicidal hanging rate is approximately two-fold increase in women, while it is about five-to six-fold increase in men during 33 years. 1424 of the victims committed suicide by hanging themselves at home, and 441 of them in prison and indoor areas. The alcohol in the blood of all autopsy victims was tested and results were positive for 687 people. A drug active agent was detected in 108 (2.4%) victims: 70 (1.5%) of them were antidepressants, 20 (0.5%) of them were analgesic/anti-inflammatory/anti-histaminic and 18 (0.4%) of them were antipsychotic. In the examination of the psychoactive substances in blood and urine, any of such substances was not detected in 4146 of the victims. However, victims' blood and urine contained a sedative-hypnotic-anxiolytic with 74 (1.6%), a cannabinoid with 16 (0.4%) and an opioid with 12 (0.3%). Psychoactive substance examination was not carried out for 243 victims. Of these cases, 4060 (90.2%), ecchymosis in soft tissues and 2800 (62.1%) fracture in neck organs was found.

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## 1. Introduction

The epidemiologic characteristics and recent trends of common suicide methods reflect specific socio-cultural, economic, and religious situations in the region. Hanging is universally available and it is the most common method of suicide globally.<sup>1–4</sup> Incidence, methods and underlying motives of strangulation cases may show differences from place to place.<sup>5</sup>

Hanging is a form of ligature strangulation in which the force affecting the neck region is resulting from the gravitational drag of the weight of the body or part of the body.<sup>6</sup> The human neck is vulnerable to many types of life-threatening compression injuries like hanging due to its relatively small diameter, lack of bony support, close relation to the airway, spinal cord and major vessels.<sup>7</sup>

In autopsies of strangulation cases including hanging, the important aspect of the post-mortem examination is the careful analysis of neck organs.<sup>8</sup> The post-mortem appearances of hanging provide the evidence to ascertain the cause and the nature of death. The ligature mark in the neck is the most important and specific sign of death from hanging. The hanging mark almost never completely encircles the neck unless a slipknot was used. In most instances the point of suspension is indicated by a gap in the skin mark, where the vertical pull of the rope leaves the tilted head to ascend to the knot and thence to the suspension point. This gap is usually seen at one or other side of the neck or at the centre of the back of the neck. Apart from the appearances of the hanging mark, internal cervical findings (ecchymoses in soft tissue, fracture in hyoid bone and/or thyroid cartilage) play a decisive role in the diagnosis of these cases.<sup>6,8–10</sup>

Cases of suicide by hanging comprise most of the hangings in Turkey, while accidental hanging represents a minority of total cases and homicidal hangings are extremely rare.<sup>11</sup> The current study focused specifically on suicide by hanging alone due to fact that great majority of the hanging cases, i.e., approximately 95%, are

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suicide-associated in Turkey and hanging as a means of suicide is a common, simple and effective method to terminate one's life.<sup>12</sup>

Approximately half of all suicides in Turkey are by hanging, as shown by a number of different studies for different time periods, i.e., the percentage of suicide by hanging comprised 51.54%, 51%, 43.10%, 44.50%, 44.42%, 46.03%, 44.11%, 44.40%, 45.35%, 47.44%, 49.43%, 53.73%, 52.10%, and 51.96% of all suicide cases in the years 1991, 1992, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, and 2011, respectively. Similarly, 52.45% of all suicide cases were suicide by hanging in the year 2011 in Istanbul.<sup>13</sup>

Istanbul is the most populated city in Turkey, is culturally more diverse than the rest of the country and has the highest economic power. The city's population in 1979 was more than 4.5 million (crude suicidal hanging rate of 0.510 per 100,000 persons). But by 2012, this rose to more than 13.48 million (crude suicidal hanging rate of 2.047). Turkey's total population in 2011 was 74,724,269, with a crude suicide rate of 3.62 per 100,000 persons.<sup>13,14</sup>

In recent years, similar studies were carried out in Turkey.<sup>5,8,15–17</sup> However, this study includes the results of a longer period (33 years) than the other studies. The aim of this study is to determine the prevalence of suicidal hanging in Istanbul, the largest city of Turkey.

## 2. Methods

The study design is a retrospective study based on the autopsy records of the Institute of Forensic Medicine that is responsible for the post-mortem examination of all forensic deaths in Istanbul. Because of the fact that almost all hanging-related fatalities are sent to the Institute for autopsy, autopsy records of the Institute at the same time reflects the current status of this type of deaths in Istanbul.

We retrospectively analyzed the autopsy records of the Institute of Forensic Medicine during the thirty three years (33-year) period between January 1, 1979 and December 31, 2011 to document the characteristics of fatalities resulting from hanging, which is the most common mode of suicide in Istanbul. Upon analyses of death scene investigation and autopsy reports together with the information gathered from the police, the cases of hanging fatalities of suicidal origin were selected. All of the files have crime scene reports, but especially before 2005, although instrument and location weren't denoted by police in some cases, forensic specialists draw a conclusion of hanging fatalities of suicidal origin. Additionally, forensic specialists didn't need explore of bioanal/biovaginal flux, medicine and psychoactive substance in blood/urine in some cases. Autopsy archive contained 82,871 files in total. All the autopsy files in the archive were examined one by one, the total number of hanging is 4549, 27 cases who under ten years old (because of incomplete cognition maturation prevents planning and realizing suicide in children under 10 years of age) and 20 cases with little, deficient and suspicious information about the manner of death were excluded. 4502 hanging cases of suicidal origin were detected and evaluated in terms of demographic features, the type of hanging material used for ligature, internal findings in neck organs, toxicological findings and microscopic findings. The Ministry of Justice approved this study.

A semi-structured questionnaire was used for data collection. The questionnaire was developed by the researchers after a review of the related literature.<sup>15,16,18</sup> The questionnaire was composed of information about gender, age, alcohol/medicine/psychoactive substance in blood/urine, suicide scene, hanging instrument, existing trauma in neck, ecchymosis, hyoid fracture, thyroid fracture, spinal fracture, bioanal and biovaginal discharge. While the data of the Turkish Statistical Institute does not include any information about whether the victims who hanged themselves took

drugs or any other toxic substance, this study includes these findings, as well.

We analyzed the evolution of rate of crude suicidal hanging during 33 years by means of a graph. The outcomes were evaluated in terms of gender in Istanbul.

Toxicological analyses were performed in the laboratory of the Forensic Medicine Institute, in Chemistry Specialization Department. Substances in blood and urine tests routinely are sought antidepressants, benzodiazepines, antipsychotics, analgesics/anti-inflammatories, cardiovascular system drugs, antihistamines, barbiturates, anesthetics, antiepileptics, anti-infectives, gastrointestinal system drugs, insecticides, cannabis and its metabolites, opioids (6 monoasetilmorf, buprenorphine, fentanyl, codeine, methadone, morphine, pethidine tramadol), stimulants (amphetamine, methamphetamine, methylenedioxyamphetamine, MDA, MDEA, cocaine), cocaine metabolites (benzoylecgonine, metilekgo) and others (biperiden, dextromethorphan, metoclopramide, metformin, pseudoephedrine). For their investigation methods: 1) HS/GC (Headspace Gas Chromatography) in the blood samples for the quantitative analysis of ethanol 2) Immunoassay methods, 3) GC/MS (Gas Chromatography/Mass Spectrometry), 4) LC/MS (Liquid Chromatography/Mass Spectrometry), 5) HS/GC/MS (Headspace Gas Chromatography/Mass Spectrometry), 6) CO-Oximeter.

Samples were taken from the anus and vagina with the aid of a speculum and sterile cotton swabs by forensic medicine specialists. All the samples were examined in biological and histopathological laboratories.

Data were assessed by psychiatrists and forensic medicine specialists basing on the results of post-mortem examination and statistically analyzed using the SPSS 16.0 software (SPSS Inc. Technology, Chicago, IL). For the analysis of data, statistical methods such as; frequency and percentage were used.

## 3. Results

The total number of hanging is 4549, 27 cases who under ten years old and 20 cases with little, deficient and suspicious information about the manner of death were excluded. It is seen that 98.9% of those who died by hanging is suicidal have originated hanging. There were 4502 suicidal hangings fatalities in Istanbul between the years 1979 and 2012. These fatalities constituted 5.43% of all forensic autopsies carried out by Institute of Forensic Medicine in that time period. During the study period, 33 years, 82,871 death cases were determined involving 4502 suicidal hanging. 73.2% of the victims were men and 26.8% were women. The male, female ratio in the present study was 2.73. The average age of the victims was 37.8 years (SD 1.6), ranging from 10 to 96 years. Most cases were in the age group of 19–41 (53.1%). (Table 1).

Of location of suicides, unknown is 1998 (44.4%), known is 2504 (55.6%). Number of committed suicide at home is 1424 (56.8%) among cases known where suicide occurred in the prisons and lockups 441, open and built areas 260, workplaces 201, hotels and nursing homes 53, military areas 43, psychiatry clinics 34, graveyards 25, and hospital except psychiatry clinic 23 (Table 2).

The suicides used different methods of suicidal hanging. Of instrument used, known is 23.1%. Among the all cases known which instrument used rope, with the highest proportion, 43.8%, 430 of them used belt, cloth, necktie, and dress, 81 of them used cable, wire, and hose; 44 of them used sheet; 28 of them used gauze and scarf to hang themselves. The instruments used by 76.9% of the suicides are not known. (Table 2).

As a shown in Fig. 1, crude suicidal hanging rate is approximately two-fold increase in women, while it is about five-to six-fold increase in men during 33 years.

**Table 1**  
Socio-demographic characteristics of cases.

Socio-demographic characteristics	n	%
Age (mean = 37.8 ± 1.6) (min = 10, max = 96)		
18 age and ↓	440	9.8
19–41 age	2391	53.1
42–64 age	1264	28.1
65–87 age	397	8.8
88 age and ↑	10	0.2
Gender		
Male	3294	73.2
Female	1207	26.8

Fractures in neck organs were detected in 2800 (62.1%) of the cases. In fracture-determined cases, fracture in hyoid bone was seen in 1372, in thyroid cartilage 1594, in both hyoid and thyroid in 610. Spinal fracture was detected in 444 cases and fractures both in hyoid, thyroid and spinal fracture were found in 25 cases. Hyperemic lines around the ligature were prominent in 4060 of the cases

**Table 2**  
General informations of suicide of cases.

General informations of suicide	N	%	
Location of suicides	Unknown	1998	44.4
	Known	2504	55.6
	Home	1424	56.8% (rate of known loc.)
	Prison and lockup	441	17.6%
	Open and built area	260	10.3%
	Workplace	201	8%
	Hotel and nursing home	53	2.1%
	Military area	43	1.7%
	Psychiatry clinic	34	1.3%
	Graveyard	25	1.0%
	Hospital except psychiatry clinic	23	0.9%
Instruments of suicides	Unknown	3464	76.9
	Known	1038	23.1
	Rope	455	43.8% (rate of known inst)
	Belt, cloth, necktie, dress	430	9.6%
	Cable, wire, hose	81	1.8%
	Sheet	44	1.0%
	Gauze, scarf	28	0.6%
	Alcohol in blood/urine	Present	687
Absent	3815	84.7	
Medicine blood/urine	Absent	4134	91.8
	Unexplored	260	5.8
	Antidepressant	70	1.5
	Analgesic/Anti-inflammatuar Antihistaminic	20	0.5
Psychoactive substance blood/urine	Antipsychotic	18	0.4
	Absent	4146	92.0
	Unexplored	243	5.3
	Sedative-hypnotic-anxiolytic	74	1.6
	Cannabinoid	16	0.4
	Opioid	12	0.3
	Amphetamin	6	0.2
	Cocaine	3	0.1
MMDM (Ecstasy)	2	0.1	
Ecchymosis in soft tissues	Present	4060	90.2
	Absent	64	1.4
	Unexplored	378	8.4
Fracture in the hyoid bone	Present	1372	30.5
	Absent	3130	69.5
Fracture in the thyroid cartilage	Present	1594	35.4
	Absent	2908	64.6
Fracture and vertebral dislocation in the servical spinal	Present	444	9.9
	Absent	4058	90.1
Neck trauma findings	Present	4091	90.9
	Absent	411	9.1
Bioanal fluiux	Present	7	0.2
	Absent	779	17.3
	Unexplored	3716	82.5
Biovaginal fluiux	Present	37	0.8
	Absent	815	18.1
	Unexplored	3650	81.1

and soft tissue hemorrhages in all cases. A very low percentage, 0.8% and 0.2% of the victims, have shown the presence of discharge in biovaginal and bioanal areas (Table 2).

In toxicological analysis, alcohol was detected in 687 (15.3%) cases, medicine was detected in 108 (2.4%), explication; antidepressant in 68 (1.5%), analgesic/anti-inflammatuar/antihistaminic in 20 (0.5%), antipsychotic in 18 (0.4%). It was detected that imipramine was found in the blood in 1988 as the first anti-depressant drug. Sedative-hypnotic-anxiolytic in 74 (1.6%), cannabinoid in 16 (0.4%), opioid in 12 (0.3%), amphetamine in 6 (0.2%), cocaine in 3 (0.1%), MDMA (ecstasy) in 1 (0.1%) were found and 243 victims weren't searched. The morphine metabolite and barbiturate derivatives were found for the first time in 1994.

#### 4. Discussion

As hanging is universally available, it makes sense that it is the most common suicide method in worldwide. Morid M Hanna et al. revealed that hanging as a method of suicide is the most lethal one

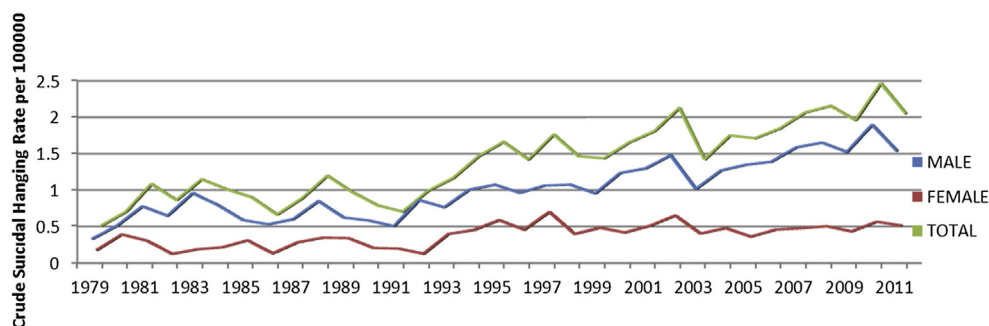


Fig. 1. The evolution of rate of crude suicidal hanging during 33 years.

followed by jumping, burn, cutting wrist, chemical poisoning and least lethal one is drug overdose.<sup>19,20</sup> Within the context of the European Alliance Against Depression (EAAD) project, an international partnership of 16 European countries, hanging was found to be the most frequent means of suicide (49.5%), followed by poisoning by drugs (12.7%).<sup>21</sup> Like many parts of the World, hanging is still a common method of suicide in both genders in Asia. Similar to this countries, hanging was the most prevalent suicide methods in many countries including Japan, Iran, Australia, Canada, Pasific Islands, Saudi Arabia, Dubai, United Kingdom. In US, despite the fact that the suicide patterns differ according to the states, hanging was reported to be the second leading method of suicide after firearms in general.<sup>3,5,10,22–25</sup>

Similar to mentioned countries, hanging is the most using suicide methods in Turkey. In studies Cantürk et al. and Gören et al., suicide by hanging is more than 95%, 96.3%.<sup>12,26</sup> We reached a similar conclusion in our study, 98.9%.

As a result of the study it was found out that most of the cases (53.1%) were in the age group of 19–41, and their average age was  $37.8 \pm 1.6$ . This result is compatible with many studies.<sup>5,15,16,18</sup> In a study, it was reported that the average age was 37.2.<sup>5</sup> Another study has a similar result stating that the mean age of the cases was 32 years, ranging from 21 to 48 years.<sup>15</sup> Another study reported that 60% of cases are 18–35 years old, and their average age was 28.<sup>16</sup> Almost half of suicidal hangings occurred in the 21–30 year age group.<sup>27</sup> Similar to our study, Uzun et al.<sup>8</sup> found out that the youngest case was 10 years old and the oldest one was 96. There was an increasing trend of hanging among people between the ages of 21 and 50 and no suicide was found younger than 10 years old.<sup>22</sup> The youngest suicide case was 8 years old and the oldest was 87 years old.<sup>28</sup>

The preponderance of male cases in our autopsy population was also detected in suicidal hanging cases. Suicidal hanging in Istanbul is a predominantly male affair with 73.2% of cases being male and only 26.8% of those being female as similar to study of Uzun et al.<sup>3</sup> In the study of Varnik A et al.,<sup>8</sup> 54.3% of males and 35.6% of females died from hanging. This figure contrasts with high incidence of hanging in woman (40%) reported in Denmark by Simondsen and those of London, Northern Ireland.<sup>10</sup> The preponderance of male cases in suicidal hanging fatalities is a common feature in some of other studies like Cardiff study and in general males constitute approximately 60% of these cases.<sup>29</sup>

The male, female ratio in the present study was 2.73. Majorities of the studies related to strangulations have shown male dominance with ratio varying from as high as 3:2,<sup>18</sup> 2:1.<sup>1</sup> The gender structure showed that within persons who committed suicide there were 78.5% men and 21.5% women.<sup>30</sup> The gender ratio (male:female) in the overall period of study was 6.38,<sup>22</sup> 5.18.<sup>28</sup> These rates are considered to be different from the global rates. The fact

that hanging is also more common in males is also a poorly understood statistic.<sup>28</sup>

Fig. 1 shows that Istanbul's population in 33 years has increased three-fold (from 4.5 million to 13.5 million), whereas suicidal hanging crude rate per 100,000 has increased by approximately 4-fold. In terms of gender, this rate is approximately two-fold increase in women, while it is about five-to six-fold increase in men. In women compared to men have a lower rate of suicide. These rates can suggest that with the participation of women in working life in a developing country, partially freed women from domestic conflict. Legislative measures against violence against women may also have been partially effective on these rates.

Similar to the studies of Uzun et al.,<sup>8</sup> Gören et al.<sup>26</sup> and Abd-Elwahab Hassan D,<sup>10</sup> the most commonly used tool is rope in terms of which instrument is known to have committed suicide cases. It is followed by belt, cloth, necktie, and dress respectively.

In this study, most of the victims committed suicide at home (known location of suicide). However, they committed suicide in different areas too, such as prison, open and built area, workplace. The victim's home is the most frequent site, but hangings also occur in outside locations.<sup>8,10,29,31,32</sup>

The reason of lack of information about location and instrument used for hanging were assessed by Aşıröz et al., in 2001. In their study, as the deficiencies of crime scene investigation, it is mentioned respectively the lack of coordination between officials (82%), lack of training of crime scene investigation teams (72%), and in the number of forensic experts deficiency (59%). This information has demonstrated there are deficiencies in crime scene investigation and evidence collection in Turkey.<sup>33</sup> Thanks to a new law in 2005 changed, it is tried to eliminate the deficiencies mentioned above. Constituting 40.5% of the study in 2005 and subsequent years information about the phenomenon of the forensic team verbally rather than in writing from judicial authorities to find an opportunity has been identified. Moreover, with this new law crime scene investigation data has been attempted to be relatively accurate.

Generally, similar to this study, posthanging decapitation is typically associated with a relatively thin ligature of poor stretchability (e.g., nylon rope, electric cable, wire).<sup>5,34,35</sup>

Alcohol was detected in the blood of 15.3% of cases in the present study. A study showed that alcohol levels of suicidal hanging victims is 11.9%.<sup>8</sup> Taktak and his colleagues 25 found in the study conducted at the Council of Forensic Medicine that 14.5% alcohol was detected in the blood of victim and according to the information received from the family of victim, the victim took drug in 1.6%, and Ekici and his colleagues 26 showed in the study conducted with the patients who receive psychiatric treatment that 35.5% alcohol usage disorder were detected in the completed suicides.<sup>36,37</sup> This study revealed a similar result, as well. Al Madni et al.<sup>22</sup> found out

that ethyl alcohol was determined in 6.76% of victims in Dammam, Kingdom of Saudi Arabia. This can also be explained by the religious and cultural background. Similar to this present study, other drugs were detected in the current work, amphetamine in 3%, and cannabinoids in 2.25%.<sup>22</sup>

Psychiatric disorder co-morbidity is an important risk factor in suicide for alcohol and other drug users. It was stated in the literature that suicide attempts and completion rates are high in these people and alcohol and drug abuse and poisoning can cause an increase in the impulses of suicide and trigger the suicide.

Although the important part of the post-mortem examination of strangulation cases is search for vital findings it is reported that detecting vital findings in strangulation cases is problematic due to the fact that fatal trauma to neck region is with very short survival period.<sup>38</sup> In the current study, the prevalence of neck bone and/or cartilage fracture and trauma findings was about 90.9%.

There was ecchymosis in soft tissues, fracture in the hyoid bone, thyroid cartilage, spinal cord, and neck trauma findings in suicidal hanging cases.<sup>5,8,18,28,29,34,39</sup> This review showed that above cited findings existed in the majority of the cases. Soft tissue hemorrhages around the neck organs were detected in all cases.<sup>8,39</sup> Similarly to this study, Uzun et al. reported that a hyoid fracture was seen in 23.2%; a thyroid fracture in 21.4% of the cases.<sup>8</sup> D. Abd-Elwahab Hassan et al.<sup>10</sup> reported that fractures in neck organs were detected in 44.07%. The fracture of thyroid and other laryngeal cartilages was observed in 44.9% cases, hyoid bone in 25.5%.<sup>18</sup> Sharma et al.<sup>40</sup> reported that there were fractures of hyoid bone in 37.5% and fractures of thyroid cartilage in 50% of 8 ligature strangulation cases. Dedouit et al.<sup>34</sup> reported that except for fractures of the extremities of the spinous processes of the second and third cervical vertebrae, no other bone injury of the spine was seen. Jayaprakash et al.<sup>41</sup> reported that vertebral fracture and dislocation were noted between third and fourth cervical vertebrae in 1.6% of cases. In our study, among 444 (9.9%) cases, not only servical fracture but also vertebral dislocation exist. Although it is not implicitly mentioned in the autopsy record, it is estimated that the victim might have stayed hanged for a long time. So, most of the cases may have been vertebral dislocation.

In forensic autopsies of these cases we use the palpatory and visual examination method for search of fractures and the percentage of fracture-determined cases of our series is about 62%. In a study comparing the classical method and preparation method, the ratio of false diagnosis for hyoid bone was reported to be 5% and 17% for throid cartilage after stereoscopic analysis of prepared specimens. The ratio of fractures was reported to be 76.6% in suicidal hanging fatalities by Streomicroscopy. Fort his reason, visual and palpatory examination method must be regarded as preliminary method.<sup>8,10</sup>

In this study, a very low percentage 0.8% and 0.2% of victims have shown the presence of discharge in biovaginal and bioanal areas. This situation suggests that victims were exposed to sexual offense before suicidal hanging. However, it should be considered that this might have contaminated the person himself as well as by the perpetrator. In addition to the discharge event, biovaginal and bioanal areas have been cared for twenty years in our country. Although the taking of vaginal and anal samples as a routine is not a standard forensic practice, after the sexual assault, suicide, or suicide disguised murder cases have been made to elucidate. There is a special place of the concept of honor in Turkish society. In Turkey, which has behavior, especially violence against women, that is one of the sexual offenses can be increased, from 6.2% to 85.2% in order to reduce marital rape, honor crimes, such as crimes of violence against women, especially in 1986, 2002 and 2005, the law will clarify that vaginal and anal examinations performed in the last twenty years.

At autopsy, sperm model taken from anal and vaginal area with sterile swap is searched by the spread method in the laboratory. If the sperm is determined, if necessary, DNA was detected and determined that the DNA who owns. Determination of sperm on victim may be help to identify the cause of suicide. Whether the sperm is a result of forced action or a consensual intercourse, it will gain a meaning only after it is considered with the information gathered from the investigation of both security forces and forensics.

This retrospective study attempts to enlighten the suicidal hanging case, which is of the most commonly used methods of suicide. It can be possible to collect more data (life stories, and old medical records) with regards to the victims and make more detailed toxicological analysis and psychological autopsy examinations in the future studies. In addition, the suicide rate of women over the years to remain at lower levels shows that this issue should be examined in more detail. The rate also shows more work needs to be done about this issue.

#### Conflict of interest

The authors declare that they have no conflict of interests.

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#### Ethical approval

None declared.

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