



## 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

## ARTICLE INFO

## Article history:

Received 3 July 2014

Received in revised form

16 March 2015

Accepted 22 March 2015

Available online 31 March 2015

## Keywords:

Suicide

Hanging

Autopsy results

Turkey

## 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

<sup>☆</sup> A part of this article was presented at the 49 National congress of Psychiatry, Izmir, Turkey, 2013.

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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-Oximetry.

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.

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