

ORIGINAL ARTICLE

Toxicologic Laboratory Findings in Cases Reported with Hanging Death: a Two-Year Retrospective Study in Northeast Iran

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Abstract

Background: Suicide is one of the leading factors of death worldwide. Hanging is one of the most common methods of suicide. This study was designed to evaluate post mortem toxicology laboratory findings of subjects with hanging death in northeast Iran.

Methods: This study was carried out on reported cases with hanging death to Razavi Khorasan Province-General Office of Iranian Legal Medicine Organization during 2009 to 2011. In this study, toxicologic investigations were performed on urine samples using thin layer chromatography and gas chromatography mass spectrometry techniques. For cases which required confirmation, another sample was also obtained from blood or the vitreous. Autopsy and scene investigation findings were also studied and entered into a predesigned checklist.

Results: In total, 94 men (90.4%) and 10 women (9.6%) were studied. Suicide was proven in one hundred and one (97%) corpses and according to primary scene investigations and autopsy findings three (3%) cases were highly suspicious of non-suicidal events which eventually were clarified with the help of toxicology tests. No drug metabolites, substance or ethanol were noticed in 68 (65%) cases. Among 36 cases with discovered substances, morphine was the most common substance which was found in 27 (75%) cases. Ethanol and codeine came next and were reported in 9 (25%) and 8 (22%) cases, respectively. After plotting discovered substances against age groups, it was found that the presence of ethanol was significantly higher in younger individuals ($P = 0.04$).

Conclusion: Although the nature of hanging death can be clarified by scene investigations, performing postmortem toxicology tests are also crucial to specify suicidal, homicidal or accidental background. In this study morphine was the main substance found in suicidal hanging cases. Hence, the abuse of opioids can be considered as one of the major risk factors of committing suicidal hanging in Iran.

Keywords: Forensic Toxicology; Morphine; Psychiatry; Substance-Related Disorders; Suicide

INTRODUCTION

Nowadays, suicide is one of the leading causes of death worldwide (1). Although there have been some programs to prevent it, World Health Organization predicts that in 2020, suicide will be the cause of death for 1.5 million people worldwide (2,3). Likewise, in Iran, suicide is one of the main killers (4,5). According to Iranian Ministry of Health and Medical Education statistics, there have been 3170 suicides in Iran in 2012 (5).

Hanging is one of the most frequent methods of suicide (suicidal hanging). In different studies in Iran, suicidal hanging has been one of the very common methods of lethal suicide (4,6,7). It is a common belief among some authorities that a case with hanging without any evidence of homicide is definitely a suicidal manner which needs no more investigations. However, in some cases criminal nature of the event can be revealed by the help of post mortem toxicology tests (8). On the other hand, it has been shown that in some occasions, suicide was a result of psychologic distraction without any strong suicidal ideation (9). One of the main risk factor for psychologic disorders and thus attempting suicide is the abuse of illicit drugs and

alcohol (10,11). Correspondingly, some studies in Iran have proven the link between illicit drug abuse and suicidal attempts (12). Toxicologic findings may disclose either poor medical adherence or lack of medication management in a patient with a psychiatric disorder or may reveal the presence of abusable illicit substances as the triggers of suicide (13).

This study was designed to evaluate post mortem toxicology laboratory findings of subjects with hanging death in northeast Iran.

METHODS

This study was carried out on reported cases with hanging death during 2009 to 2011 in Mashhad. The data including gender, age and type of substance found in specimens were collected from archived files of Razavi Khorasan Province-General Office of Iranian Legal Medicine Organization and entered into a predesigned checklist. This office is a referral center in northeast Iran and includes pathology, toxicology, serology and genetic laboratories. In this study, toxicologic investigations were performed on urine samples using thin layer chromatography and gas chromatography mass spectrometry techniques. For cases which required

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confirmation, another sample was also obtained from blood or the vitreous. Autopsy and scene investigation findings were also studied. For comparison of differences among age groups, Kruskal Wallis H test was used. Data analysis was performed using Statistical Package of Social Sciences (SPSS Inc., Chicago, IL, USA).

RESULTS

Demographic

In total, 94 men (90.4%) and 10 women (9.6%) were studied (Figure 1). The mean (SD) age was 30.9 (12.1) year. Suicide was almost proven in one hundred and one (97%) corpses and according to primary scene investigations and autopsy findings three (3%) cases were highly suspicious of non-suicidal events which eventually were clarified with the help of toxicology tests. Fifteen (14%) victims had unsuccessful previous suicidal attempts.

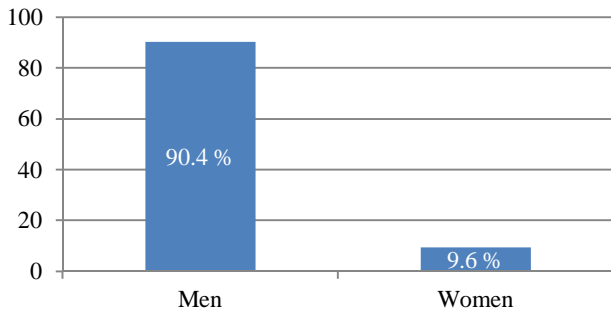


Figure 1. Gender distribution of cases studied (n = 104)

Type of substance

No drug metabolites, substance or ethanol were noticed in 68 (65%) cases. Among 36 cases with discovered substances, 35 victims were drug abusers and 8 had a history of alcohol abuse. Morphine was the most common substance which was found in 27 (75%) cases. Ethanol and codeine came next and were reported in 9 (25%) and 8 (22%) cases, respectively. Acetaminophen was found in only one blood sample. Sertraline and imipramine were also present

simultaneously in one sample. It should be noted that in some cases more than one substance were found (Figure 2).

Substances vs. Age groups

After plotting discovered substances against age groups (Table 1), it was found that the presence of ethanol was significantly higher in younger individuals (P=0.04). For other substances, analyses showed no significant difference among age groups.

DISCUSSION

Suicide is increasingly being considered as a cause of death (1). Determination of its risk factors can help to reduce its impacts in each society. In the present study, men outnumbered women, 9.4 to 1. In several other studies, similar results have been found (13-15). This reflects greater incentives for selecting more lethal methods for suicide in men.

One of the strongest risk factors of suicidal behaviors is alcohol and illicit substance dependency and abuse (10-12). According to our study, in the majority of cases, some sort of illicit substances (according to Iranian law) were found. Morphine was the most common substance found in corpse whereas ethanol and codeine were in the next ranks, respectively. In several studies from other countries various results were found. A study by Shields et al. done in Kentucky, United States, from 1993 to 2002 showed that cannabinoids were the most common substances found in hanging bodies (13). However, in a study by Darke et al. alcohol was the most common substance present in toxicology lab findings of suicidal hanging cases (15). In another study, Darke et al. similarly demonstrated the alcohol as the major substance found in the specimens of cases with violent death in the United States (16). Similar to the present study, toxicology findings in suicide cases in Virginia between 1987 and 2003 showed that among 23 hanging cases, 13 of them (56%) had recreational drugs in their samples (17).

It has been shown that alcohol and opioids abuse expose individuals to depression (18,19). Hence, physician education about early diagnosis and treatment of depression can reduce suicide rates (20). Moreover restriction of access to these substances may also be another prevention strategy (20).

Table 1. Substance found in specimens according to age groups (n = 36)

Age group	Substance						
	Morphine	Ethanol	Morphine and ethanol	Morphine and Codeine	Morphine, codeine and ethanol	Acetaminophene and Codeine	Sertraline and Imipramine
10-20	3	2	1	1	1	0	0
20-30	4	5	0	1	0	1	1
30-40	7	0	0	2	0	0	0
>40	5	0	0	2	0	0	0
Total	19	7	1	6	1	1	1
P Value	0.2	0.04	0.3	0.5	0.3	0.3	0.3

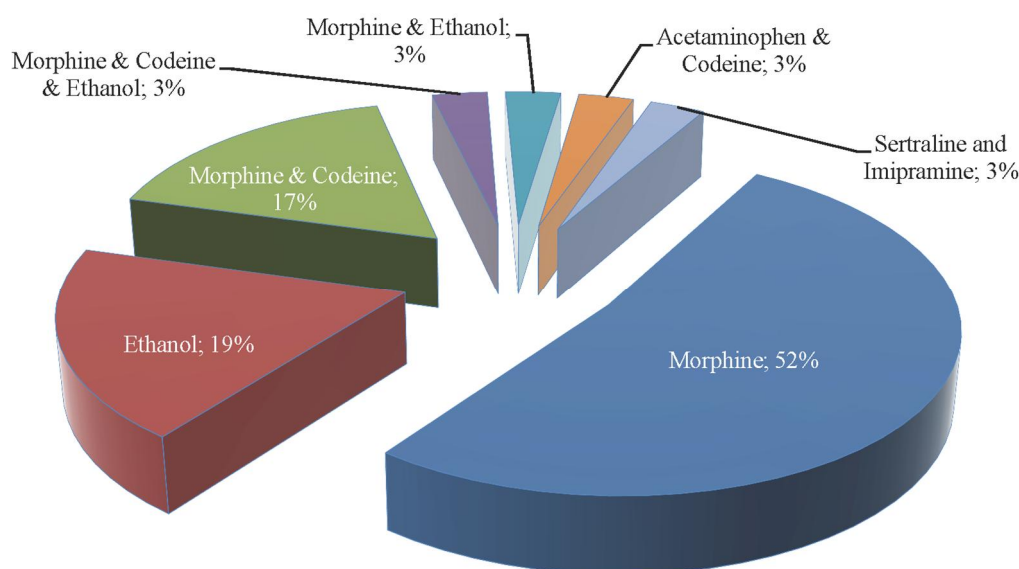


Figure 2. Substances found in specimens of victims with hanging death (n = 36)

Apart from the suicidal intention which is the main background in hanging death (14,16), criminal aspect of each hanging case should always be kept in mind. In a recent paper, a man was reported without a history of addiction and psychiatric disease which was found hanged in his house with positive morphine and benzodiazepine metabolite in the post mortem toxicologic investigations (8). At the first glance, the scene investigations were suggestive of a suicide, but post mortem laboratory tests made a clue for criminal investigators. They ultimately found that the victim was poisoned and made unconscious by his coworkers and subsequently was murdered through hanging, and finally all the evidences were eliminated by the coworkers (8). The story behind this death may not have been disclosed without the help of post mortem toxicology tests.

CONCLUSION

Although the nature of hanging death can be clarified by scene investigations, performing postmortem toxicology tests are also crucial to specify suicidal, homicidal or accidental background. In this study morphine was the main substance found in suicidal hanging cases. Hence, the abuse of opioids can be considered as one of the major risk factors of committing suicidal hanging in Iran.

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