

Kermanshah University of  
Medical Sciences

## Study of the Cause-Specific Mortality of Substance Abuse-related Deaths in Kermanshah Province 2010–2015

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### Abstract

**Introduction:** Abuse and dependency on opiates and stimulant substances are a huge challenge to the world today. Because of their potential for causing mortality among consumers in addition to imposing an economic burden and endangering the health of the individual, from the perspective of general public health, this issue is very important to society.

**Methods:** This was a descriptive-analytical study, which included all deaths in 2010–2015 that were referred to Kermanshah forensic medicine in the west of Iran due to the abuse of substances. Data collection used a checklist based on the information contained in the files of the deceased, including demographic information, diagnostic medical records, body examination, and the results of autopsy, toxicology and pathology.

**Results:** The total recorded deaths included 490 people (458 men, 32 women) with an average age of 35.7 years. The most common types of used substances were opium and its derivatives (59%). In the final diagnosis of deaths, according to autopsy, the bodies had the highest detection rates for pulmonary tuberculosis (37.6%) followed by cardiac arrest (32.2%). It is imperative to note that in 14.5% of the deceased, HIV was diagnosed. Most of the diagnoses of substance abuse were based on urinary samples (57.7%).

**Conclusion:** Considering the high rates of deaths found on autopsy to be due to tuberculosis, as well as the prevalence of hepatitis and other disorders and concomitant diseases, attention to infection prevention methods and formulation of an application in line with harm reduction policies seems necessary.

### Introduction

Substance addiction is one of the health problems of today's world. The increasing trend of substance abuse in lower-age groups and the increasing prevalence of high-risk behaviors in the last two decades, including alcohol consumption, smoking, and substance abuse among young people, has caused deep concern(1-3), and in addition to serious and dangerous physical harm, such as the spread of infectious and contagious diseases such as HIV, hepatitis, and tuberculosis, it is accompanied by numerous complications and social and economic problems (4). About 37% of the population over the age of 12 years and older has experienced substance use once during their lifetime, and 5.5% had at least one exposure to substance abuse problems (5).

Our country is also in a state of emergency and a special condition for a number of reasons, and in the neighborhood with the countries producing narcotics. The official authorities in the country of Iran cited the prevalence of substance dependency as around 2 million people, according to the Counter Narcotics Intelligence Directorate, and after car crashes, the second cause of

death among suspicious deaths is complications of addiction(6, 7).

Substance-related deaths are usually due to multiple reasons; many studies have shown that access to and use of gross substances and high-risk methods of use, such as heroin and opium injection, and the use of other narcotics can be cited as the cause of death in this group(8). Renal failure is one of the causes of death in these patients(9). The term “opioids” was initially used to describe the substances extracted from opium, such as morphine and codeine, as well as semi-synthetic derivatives such as heroin, but nowadays new agonist compounds and antagonists of narcotics such as methadone, buprenorphine and other substances are also included in this category (10). The most commonly abused substances in Iran are opioids. Common opioids in Iran are opium, extract of opium, heroin, and codeine, which are used orally, by inhalation and by injection (11).

Comprehensive management of substance abuse disorders is an important part of epidemiological studies, and by providing the necessary and appropriate information to custodians, this information helps them

formulate effective and efficient policies. Hence, epidemiological surveillance of various aspects of narcotics is one of the main and most important components of the national substance countermeasures strategy(12, 13). The assessment of several factors leading to such deaths is among the research needed for this purpose. In many developed and developing countries, features related to substance-related deaths have been investigated through various methods, including promotion of related research. Improving the autopsy and toxicology process and increasing the efficiency and cooperation between the investigating sectors has been paid attention to and considered by the authorities and researchers (14).

In this regard, the aim of this study was to determine the epidemiological trend and to investigate the specific causality of mortality among substance-related deaths in Kermanshah province in the west of Iran during a five-year period from 2010 to 2015.

### Materials and Methods

In this analytical cross-sectional study, all dead bodies whose cause of death was based on the use of narcotics according to the legal medicine as well as the system for recording and categorizing the cause of death in the health department of the University of Medical Sciences from 2010 to 2015 referred to Kermanshah province were selected as the target population and they entered the study using a census method.

Data were obtained for the checklist by one person and were based on archived files of the deceased, which

consisted of legal information; interviews with the deceased's family; diagnostic, medical and hospital records of the deceased; a description of the examination of the bodies and the results of autopsy, toxicology and pathology; demographic information including age, sex, type of substance, and type of use; as well as specific causes of death, diagnostic method, and death time were collected. In the process of collecting data, in order to comply with the established diagnosis of the cause of death, data from available banks such as the Center for Combating Pulmonary Diseases and the Behavioral Disease Counseling Center were used.

Data were analyzed by SPSS software version 18. Descriptive indices, drawing tables and also statistical tests such as t-test, ANOVA and Chi-square were used.

### Results

The total number of deaths recorded during the five-year period was 490 people (458 males, 32 females), and the age range of the deceased was between 16 and 80 years old with an average of 35.7 ( $\pm 11.46$ ) years. The highest death rates were for the age group of 30–39 years old with 183 people (37.3%). In total, 363 (74%) of the deceased were people under 40 years of age, and in terms of marital status, the largest group included 292 (59.6%) single individuals.

Table 1 represents the frequency and the percentage of substance-related mortality by sex, age, marital status, occupational status, educational level, history of substance addiction by year, history of smoking, and it also shows the judicial records of the deceased.

**Table 1-** Frequency and percentage of deaths in drug-related deaths in Kermanshah province during 2010–2015 by demographic indicators

Index	Group	Female		Male		Total		Significance level
		frequency	percentage	frequency	percentage	frequency	percentage	
Age group	15–29	6	33	174	38	180	36.7	0.021
	30–39	10	31.2	173	37.8	183	37.3	
	40–49	9	28.1	66	14.4	75	15.4	
	50–59	3	6.3	29	6.3	32	6.6	
	60–80	4	12.4	16	3.5	20	4.1	
	Total	32	6.5	458	93.5	490	100	
Marital status	Single	8	25	284	62	292	59.6	<0.001
	Married	15	46.9	128	27.9	143	29.1	
	Divorced	5	18.8	11	2.4	17	3.5	
	Widow	2	6.2	5	1.1	7	1.4	
	Unknown	1	3.1	30	6.6	31	6.3	
Occupational status	State employee & retired (government, army, social security)	1	3.1	20	4.3	21	4.2	<0.001
	Contract and freelance jobs	3	9.3	210	45.6	213	43.4	
	Unemployed	25	78.1	195	42.6	220	44.9	
	Unknown	3	9.3	33	7.2	36	7.3	
Educational level	Illiterate and elementary	15	46.8	180	39.3	195	39.8	0.022
	Middle school	7	21.9	144	31.4	151	30.8	
	Diploma and higher	7	20.8	90	19.6	97	19.8	
	Unknown	3	9.4	44	9.6	47	9.6	
Addiction history (years)	1–4	7	21.9	132	28.8	139	26.9	0.121
	5–9	7	21.9	113	24.7	120	24.5	
	10–14	13	41.3	131	28.6	144	29.4	
	15 and higher	5	15.6	82	18	87	17.8	
Smoking	Smoker	20	62.5	374	81.6	394	80.4	0.003
	Non-smoker	12	37.5	84	18.4	96	19.6	
Judicial history	Has	5	15.6	111	24.2	116	23.7	0.266
	Does not have	19	59.4	238	52	257	52.4	
	Unknown	8	25	220	48	228	46.5	

As shown in Table 2, the samples used to detect substance abuse in the deceased included blood, tissue, urine, and toxicological findings, and the most commonly used method was a urine sample in 283 (57.7%).

Among the results obtained from the corpses were those based on interviews with the deceased's family; diagnostic, medical and hospital records of the deceased; and a description of the examination of the bodies and the results of autopsy, toxicology, and pathology.

A high percentage of the deaths were attributed to pulmonary tuberculosis, a total of 184 cases (37.6%), and there were 71 cases due to HIV/AIDS (14.5%).

Table 3 shows the frequency and percentage of cause-specific mortality of substance use related death based on the autopsies.

A total of 171 cases (34.9%) of co-morbidity with several factors simultaneously were reported after autopsy, and there was a significant relationship between co-morbidity and cause-specific mortality among the deceased due to the use of multiple substances and combined uses of the substances ( $P < 0.001$ ). Also, the association between multiple and combinations of substances in the deceased with pulmonary tuberculosis, venous thrombosis and suicide was also reported to be at a significant level ( $P < 0.001$ ).

**Table 2-** Frequency and percentage of drug use related deaths in terms of methods and sample used in the diagnosis of drug use in Kermanshah province in 2010–2015 depending on the sex

Sample	Female		Male		Total		
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Sample used to diagnose the substance	Blood	6	18.7	76	16.6	82	16.7
	Tissue	10	3.13	75	16.4	85	17.3
	Urine	11	34.4	272	59.4	283	57.7
	Toxicology	5	15.6	35	7.6	40	8.2

**Table 3-** Frequency and percentage of cause-specific mortality of substance use related death in Kermanshah province based on autopsies 2012–2015

2010–2015	Female		Male		Total		The significance level	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage		
cause-specific mortality of death	Hepatitis B	5	10.7	49	15.6	54	11	0.39
	Hepatitis C	2	6.3	43	9.4	45	9.2	0.75
	Tuberculosis	12	37.5	172	37.6	184	37.6	1
	Trauma,(traffic accidents and others)	3	9.4	55	12	58	11.8	1
	Cardiac arrest	13	40.6	145	31.7	158	32.2	0.32
	Venous thrombosis	2	6.3	19	4.1	21	4.3	0.64
	HIV	5	15.6	66	14.4	71	14.5	0.79
	Suicide	4	12.5	45	9.8	49	10	0.54
	Total	46	100	592	100	638	-	

## Discussion

Today, deaths due to substance use occur due to a variety of causes, and a preliminary survey showing that gross substance use and dangerous and unusual ways of consumption, such as intravenous injection of opium or heroin, are the causes leading to death among these people.

In our current study, the age range of those registered as deceased was between 16 and 80 years, with an average age of 35.7 years, with the highest death rate for the age group of 30–40 years old (37.3%); 93% of the deceased were men and 7% were women, and the most commonly consumed substances were opium and extract of opium.

A study that was conducted in Isfahan had similar results in terms of gender composition and the predominantly consumed substance, but not the age group(8). In that study conducted in Isfahan, the mean age of the subjects was 30.6 years old, among which 77.2% were men and 22.8% were women, and substances and psychotropic compounds accounted for a high percentage of the cases of poisoning, including substance poisoning more than by psychotropic substances, with 77.3 of cases of poisoning due to consumption of opiates and 18% due to the use of industrial stimulants, and 4.7% were combined (15).

In our view, the difference in the mean age may be

due to the target population enrolled in this study, and that the use of stimulants and industrial drugs in younger age groups is more common than among other age groups.

Also, it is pertinent to state here that, according to a study done by Salari and Alikhani in Kermanshah, it was shown that the most frequently involved age group was between 30 and 40 years old (44.8%), and it was revealed that most were single (62.7%) and the most frequent method used among the drug abusers was injection (45.8%) and the most consumed substances, as the survey indicated, were opium and its extracts (46.3%) (16).

For deaths caused by substance abuse in 2010–2015, according to the autopsy of the bodies following the survey, the most common cause was pulmonary tuberculosis (37.6%), followed by cardiac arrest (32.2%). It can also be noted that 14.5% of the deceased were diagnosed with HIV.

Also, most diagnoses in terms of substance abuse symptoms in substance-related deaths during 2010–2015 used urine samples (57.7%) followed by tissue and blood samples (34%).

A study with similar results was conducted in Tehran forensic medicine in 2003, and 56 cases (51.37%) were diagnosed with urine symptoms of substance abuse and 33 cases (30.27%) were diagnosed via tissues and blood.

The most common pathologic finding was pulmonary edema with 48 cases (44.03%) (17).

In another study conducted in the Khorasan Medical Department, the findings showed that lung congestion (36.5%) and chronic hepatitis (32.2%) were the most common causes of death (4).

In a study by Chen and De Jong, the results of an autopsy of people who died of substance abuse has shown that in these people, their lungs had become heavier compared with those who died of non-substance-related deaths who had normal weight lungs, with a confidence interval of 98.75%, and an average heavier weight of 245–378 grams (18).

In this study, while studying co-morbidity in the deceased according to autopsy, 34.9% of these cases were reported to be involved simultaneously with several factors. Also, there was a significant relationship between co-morbidity in the deceased due to substance abuse with multiple and combined substances used according to available data ( $P < 0.001$ ).

In a study conducted by Corkery Clarige et al. in the UK, the autopsy results showed that solo use of cocaine was involved in 23% of deaths, while its combined use and overdoses with the use of opium accounted for 58% of deaths (19). In another study conducted to determine the cause of death among people with HIV who had been infected via injection, the most important causes of death that had an increasing trend were liver, cardiovascular problems, and cancer (20).

Jorek and Rorat in Poland have shown the role of alcohol abuse in 41.8% of deaths caused by traffic accidents and trauma (21). Also, the study of Lusetti et al. in Italy, who were considering complications in methadone consumers, found that chronic myocardial and coronary complications, along with pulmonary disorders, were the main causes of death (22).

## Conclusion

As noted in the findings of this study and other studies, we took into account the increasing trend of opioids consumption in the world and the region, the availability, ease of use, and the development of methadone treatment centers and other agonists. According to statistics, there has been an increase in the use of a combination of various substances such as opiates and stimulants, providing the basis for more

diseases and disorders causing addicts' deaths.

Therefore, considering the results of our study and the high rate of deaths that resulted from tuberculosis at autopsy, and also the prevalence of hepatitis and other disorders and concomitant diseases, it seems necessary to pay attention to infection prevention methods and to formulate an application along with harm reduction policies to protect the health of this group and the families affected by these people.

It is also pertinent to state that drug and stimulant abuse prevalence in the world today has shown an upward trend over the past decades, and each year, we are coming across a growing prevalence and incidence of different types of new drugs all around the world. As a result, performing such studies seems to be of greater importance than ever before; accordingly, necessary plans and new strategies should be developed to perform similar studies nationwide, as, by assessing the existing situation, in the following years, the authorities and executives can be encouraged to offer new and appropriate approaches in this respect; in this way, the authorities and the decision-makers shall have the necessary information to establish first-level and second-level preventive plans to avoid spreading such behaviors as well as coping with the complications arising from them.

Among the limitations of this study include the lack of access to deceased cases, the lack of internal and external cooperation with researchers by some executive staff of relevant organizations, incomplete records of some of the deceased, and the different technical expertise of experts making the final diagnosis of the cause of death.

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## Conflict of interest statement:

The authors have no conflicts of interest in regards to this research.

## References

1. Khalili A, Sohrabi F, Radmanesh M, Afkhami M. [The Effectiveness of Training Critical Thinking Skills on Students' Attitude towards Substance Abuse (Persian)]. *Research on Addiction*. 2011;5(17):91-106.
2. Sohrabivafa M, Tosang MA, Molaie Zadeh SZ, Goodarzi E, Asadi ZS, Alikhani A, et al. Prevalence of Risky Behaviors and Related Factors among Students of Dezful. *Iran J Psychiatry*. 2017;12(3):188-193.
3. Abideen Z, Sabir A, Sajjad Z, Abbasi A. Exploring smokeless tobacco use in a multi ethnic society; a cross sectional study from Rawalpindi, Pakistan. *J Prev Epidemiol*. 2018;3(1):e02.
4. Hejazi A, Zare Gh, Zeyd Abadinejhad M, Shakeri M. [Epidemiologic study of deaths related to opiate abuse in Khorasan legal medicine center from March 20, 2004 to March 20, 2006 (Persian)]. *Medical Journal of Mashhad University of Medical Sciences*. 2009;52(2):101-6.
5. Deborah A. *Psychiatric Nursing Biological and Behavioral Concepts*, 1<sup>st</sup>ed, Philadelphia: WB Sanders.1995; 216-28.
6. Dehghani K, Zare A, Dehghani H, Sedghi H, Poormovahed Z. [Drug abuse prevalence and risk factors in students of Shaheed Sadoughi university of medical sciences, Yazd. (Persian)]. *JSSU*. 2010;18(3):164-9.
7. Cooper C, Bilbao J, Said S, Alkhateeb H, Bizet J, Elfar A, et al. Serum amyloid A renal amyloidosis in a chronic subcutaneous ("skin popping") heroin user. *J Nephropathol*. 2013; 2(3):196-200.
8. Jabalameli M, Ezadi N. [Frequency Distribution of Opiate Poisoning according to Individual Characteristics and Clinical Manifestations (Persian)]. *Armaghane danesh*.2005; 10(37): 71-80.
9. Gheshlaghi F. Malignant drug-induced rhabdomyolysis. *J Nephropathol*. 2012;1(1):59-60.

10. Häkkinen M, Launainen T, Vuori E, Ojanperä I. Comparison of fatal poisonings by prescription opioids. *Forensic Sci Int.* 2012;222(1-3):327-31.
11. Hatami H, Razavi S, Eftekhari H, Majlesi F. *Comprehensive book of public health*, 1<sup>st</sup>ed, Tehran: Arjemand Publications. 2007:45-7.
12. Basu D, Mattoo S.K. Epidemiology of substance abuse in India: methodological issues and future perspectives. *Indian J Psychiatry.* 1999;41(2): 145-153.
13. Khodamoradi Z, Pakfetrat M, Torabinezhad S, Sagheb M. Acute interstitial nephritis in the south of Iran; an observational study. *J Nephropathol.* 2017;6(3):225-30.
14. Stone DM, Holland KM, Bartholow B, E Logan J, LiKamWa McIntosh W, Trudeau A, et al. Deciphering suicide and other manners of death associated with drug intoxication: A centersfor disease control and prevention consultation meeting summary. *Am J Public Health.* 2017;107(8):1233-9.
15. Izadi-Mood N, Tavahen N, Masoumi Gh, Gheshlaghi F, Siadat Z, Setareh M, et al. [Demographic factors, duration of hospitalization, costs of hospitalization, and cause of death in patients intoxicated with amphetamines and opioids (Persian)]. *Journal of Isfahan Medical School.* 2011; 29(146): 890-900.
16. Salari A, Alikhani M, Alikhani A, Zakiei A, Jamshidi T, Farnia V. [Registered Mortality in Kermanshah Legal Medicine Center Due to Taking Drug Abuse and Survey Demographics Variables and Doing Autopsy on their Body's (Persian)]. *IJFM.* 2016;21(4):255-62.
17. Amouei M, Taromian F. Study of 109 fatal cases of opiate abuse referring to Tehran Legal Medicine Organization. *Scientific Journal of Forensic Medicine.* 2002; 8(26):21-6.
18. Chen HI, deJong J. Increased lung weights in drug-related fatalities. *J Forensic Sci.* 2017; 62(6):1632-4.
19. Corkery JM, Claridge H, Goodair C, Schifano F. An exploratory study of information sources and key findings on UK cocaine-related deaths. *J Psychopharmacol.* 2017;31(8):996-1014.
20. Ferreros I, Lumberras B, Hurtado I, Pérez-Hoyos S, Hernández-Aguado I. The shifting pattern of cause-specific mortality in a cohort of human immunodeficiency virus-infected and non-infected injecting drug users. *Addiction.* 2008;103(4):651-9.
21. Jurek T, Rorat M. Fatal accidents at work in agriculture associated with alcohol intoxication in Lower Silesia in Poland. *Med Pr.* 2017;68(1):23-30.
22. Lusetti M, Licata M, Silingardi E, Bonetti L, Palmiere C. Therapeutic and recreational methadone cardiotoxicity. *J Forensic Leg Med.* 2016;39:80-4.