International Journal of
Medical Toxicology & Forensic Medicine

Spring 2021, Volume 11, Number 2

Original Article: Assessing Substances Abuse-Induced Mortality Rates by Autopsy Method in Iran

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Citation: Baberi F, Kavousi A, Mirtorabi D, Parsa N, Mahdavi SA, Hashemi Nazari SS. Assessing Substances Abuse-Induced Mortality Rates by Autopsy Method in Iran. International Journal of Medical Toxicology and Forensic Medicine. 2021; 11(2):32400. https://doi.org/10.32598/ijmtfm.v11i2.32400

https://doi.org/10.32598/ijmtfm.v11i2.32400

Article info:
Received: 27 Sep 2020
First Revision: 14 Oct 2020
Accepted: 30 May 2020
Published: 30 Jun 2021

Keywords:
Death Rate, Substance abuse, Autopsy, Toxicology, Iran

ABSTRACT

Background: Substance abuse is among the main causes of preventable diseases and premature deaths worldwide. Despite legal efforts to prevent substance abuse, it has increased and imposed significant economic costs on societies. This analytical cross-sectional study aimed to explore the rate of substance abuse-induced mortality in the provinces of Iran, in 2017. We elaborated an evaluation structure to identify nationwide different substance abuse-related mortality rates.

Methods: We employed the retrospective data extracted from autopsy, forensic medicine examination, and demographic characteristics from the recordings in the Iranian Legal Medicine Organization (ILMO). Stata and ArcGIS were applied for data analysis.

Results: Nationwide, 3089 substance abuse-related deaths were recorded in the ILMO; the incidence rate was 38.17 per million subjects. The deaths mostly occurred in the 30-39 age group and males accounted for 90% of cases. The provinces of Kermanshah, Lorestan, Fars, Hamadan, and Semnan reported significantly higher rates, compared with the provinces of Mazandaran, West-Azerbaijan, and Golestan with the lowest mortality rates per million (74.72, 69.81, 63.42, 61.70, 58.53 vs. 10.82, 12.11, 14.30, respectively). Mortality rates due to the abuse of methadone (20.29), morphine (12.34), amphetamine (5.32), methamphetamine (7.05), codeine (4.21), tramadol (5.96), benzodiazepine (1.47), and diphenoxylate (0.05) were calculated per million populations of Iran.

Conclusion: The obtained data suggested that preventive interventions should focus on the 20-40 age group. Methadone, morphine, and methamphetamine were associated with the highest mortality, compared to other substances; thus, they require effective treatment and preventive programs. Iranian Drug Control Headquarters, police department, and policymakers should act more efficiently regarding a preventive strategic plan in this respect.

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1. Introduction

Substance Dependence (SD) is a psychosocial disorder that causes biopsychological consequences. It severely threatens individuals' social life and sometimes leads to related disorders [1]. Substance abuse is among the main causes of preventable diseases and premature deaths worldwide. Despite legal efforts to prevent substance abuse, it has increased and imposed significant economic costs on societies. According to most studies, young adults are the most involved group with SD and substance abuse [2]. Substance abuse accounts for approximately 5% of all deaths, 10% of total Years Lost Due to Disability (YLD), and 8.5% of total Disability Adjusted Life Year (DALY) in 15-49 year-olds globally [3]. The DALY related to substance abuse has significantly increased from 2000 to 2016. According to the latest World Health Organization (WHO) report (2016), 275 million subjects experience substance abuse at least once and about 3.3 million individuals die due to substance overdose worldwide annually [3]. Approximately, 3.5%-5.7% of 15-64 year-olds experience illicit substance abuse in Southeast Asia, and 10%-15% of them become dependent on substances [4]. The substance abuse-induced mortality rate has increased in the United States from 1990 to 2016 and has changed rank from 79 to 31 in the country [5]. Additionally, it was reported as the fifth leading cause of death in 15-49-year-old males in 2016 [6].

The most mortality rates due to cocaine, amphetamine, and other drugs, were reported in the United States (16.5, 8.2, & 55.1 per 1000000 population, respectively); these rates were 1, 0.5, and 5 per 1000000 population, respectively, in Iran [7].

Due to the latest Global Bank Data (GBD) report in 2017, the fourth leading cause of disability concerned the consequences of substance abuse in Iran. Tobacco and other drugs rank as the sixth and eighth leading risk factors of death and disability [8].

Narcotics and their subsequences are persisting issue in Iran; however, it has become a large-scale problem causing widespread socioeconomic consequences [9]. Opium production in Afghanistan plays a major role in the dramatic increase of substance abuse in Iran. Therefore, neighboring Afghanistan significantly affected Iran in the past decades [10]. Generally, 0.89% of all deaths, 6.72% of the YLL, and 4.17% of the YLD were related to substance abuse in Iran [6]. Substance abuse-induced mortality was reported as 38.23 per million, in Iran in 2016. Although substance abuse-concerned mortality rates vary in different places of Iran, most deaths were accrued in the western provinces [11]. Considering the increasing trend of substance abuse-related mortality from 2014 to 2018 in Iran, further attention should be paid to this issue [10]. Based on recent epidemiological studies, the prevalence of drug-related consequences increased in the last decade and will also elevate in the next 40 years [12]. Disability and death due to substance abuse can be easily prevented using integrated social, psychological, and medical interventions. Considering substance abuse and its outcomes, identifying substance abuse-elated mortality rates per province will help policymakers act appropriately in each region. This study aimed to investigate substance abuse-concerned mortality rates by autopsy method in all provinces of Iran.

2. Materials and Methods

This geographical analytical and cross-sectional study aimed to explore the rates of substance abuse-induced mortality in all provinces of Iran, in 2017. We aimed to provide an evaluation structure to identify nationwide different substance abuse-related mortality rates. The inclusion criterion of the study p was the extraction of at least one or more substances by autopsy examination test. The obtained ethical code for this was IR.SBMU.PHNS.REC.1398.107.

In total, 3089 drug-related deaths were registered in the Iranian Legal Medicine Organization (ILMO), in 2017. The medical records of 78.6% (2706 deaths) were collected. Among the cases referred to the ILMO, 2119 subjects were autopsied; accordingly, different drug-related mortality rates were calculated by province. Regarding the total number of deaths in the country (3089), the final rate was relatively estimated in each province (Figure 1).

The abstracting tools, i.e., applied for data gathering included sociodemographic characteristics, autopsy results, and laboratory information. These data included variables, such as age, gender, marital status, educational level, nationality, place of death, occupational status, type of abused drugs, and the province of residence. The types of the abused drugs were determined by laboratory toxicology results, i.e., required for this research. All collected data were monthly updated by responsible physicians in each province to the LMO in Tehran City, Iran. Some general information was extracted from the National Statistics Office. Additionally, the relevant face validity was obtained by the opinions of experts within and outside the LMO.

To determine the cause of death based on the type of abused drugs, immunochromatography screening methods were applied to examine the presence or absence of the target drug compounds.

Urine samples, abdomen, gallbladder, and liver contents and tissue were used to identify illicit drugs, such as morphine or other compounds with similar chemical structures in forensic toxicology laboratories.

For Quality Assurance (QA) and Quality Control (QC) of false-positive results from true positive ones, confirmatory methods, such as Total Leucocyte Count (TLC), High-Performance Liquid Chromatography (HPLC), and Gas Chromatography/Mass Spectrometry (GC/MS) were applied. In this study, substance abuse-related deaths were evaluated according to the International Classification of Diseases (ICD-10) codes, such as T40, T43, F10 - F19, X42, X62, and Y12.

The collected sociodemographic data were analyzed by Stata. Relative frequency and mortality rates were used for data description. The total mortality rates of each drug were estimated for the total number of deaths based on the mortality rates of the cases that were autopsied; all of the calculations and estimation of the total mortality rates were separately performed per province (in one million residents).

Autopsy results identified that a majority of the corpses simultaneously consumed multi-drugs. The toxicological results of the study were calculated thereby 3 methods, as follow:

- Mortality rates due to the consumption of a single substance,

- Mortality rates due to the simultaneous consumption of at least two drugs,

- Mortality rates due to the simultaneous consumption of multi drugs.

We used the 2016 population census report to calculate the growth rate of the population and finally estimated the population of 2017 in Iran.

3. Results

According to the population study data, 3089 registered cases existed in the ILMO. The sample size of the study was 2119 deaths and the substance abuse-induced mortality rate was calculated to be 26.49 per million. Based on Table 1, 90% (2425) of death cases

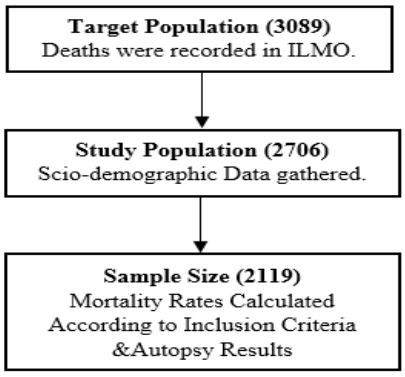

Figure 1. A summary of the final sample size after QA and QC as per the inclusion and exclusion criteria of the study

were males. Mortality in the 20-49-year-old age group was higher than that in other age groups (74% vs. 26%) (2003). The deaths mostly occurred in married individuals (75.9%) with high school and college educational levels 1435(53%). A majority of the study subjects were not living alone 68%(1846) and 32%(860) of them lived alone or unspecified. Of the 2706 deaths, 59%(1818) were self-employed or unemployed and 41%(888) shaped the other class. The Mean±SD age of the illicit drug users and the age of the onset of drug use were 37.06±13.34 and 25.51±8.04 years, respectively.

Considering the time of deaths, the majority of deaths occurred in summer (25.46%), followed by spring (24.24%), autumn (21.35%), and winter (20.69%). Approximately 96% of the deceased individuals were Iranians and 2.48% had unknown nationality; a majority of other nationalities who died were Afghan.

Overall, Kermanshah, Lorestan, Fars, Hamedan, Semnan, and Tehran provinces, respectively presented the highest mortality rates per 1000000 residents (74.72, 69.81, 63.42, 61.70, 58.53, & 49.79, respectively); Mazandaran, West-Azerbaijan, and Golestan provinces had the lowest death rates (10.82, 12.11, 14.30), respectively (Figure 2). All the rates in figures were reported in one million populations.

In the provinces with the highest mortality rates, the main drugs that had led to death were methadone in Kermanshah (40.14), Fars (39.35), Hamedan (41.520), Semnan (40.78), and Ghazvin (35.69), as well as morphine in Lorestan (18.56). In the provinces that substance abuse led to the lowest mortality rates, the first cause of death was methadone overdose in Mazandaran (7.21) and West-Azerbaijan (6.73) as well as morphine in Golestan (9.54). Based on the obtained results, the most critical

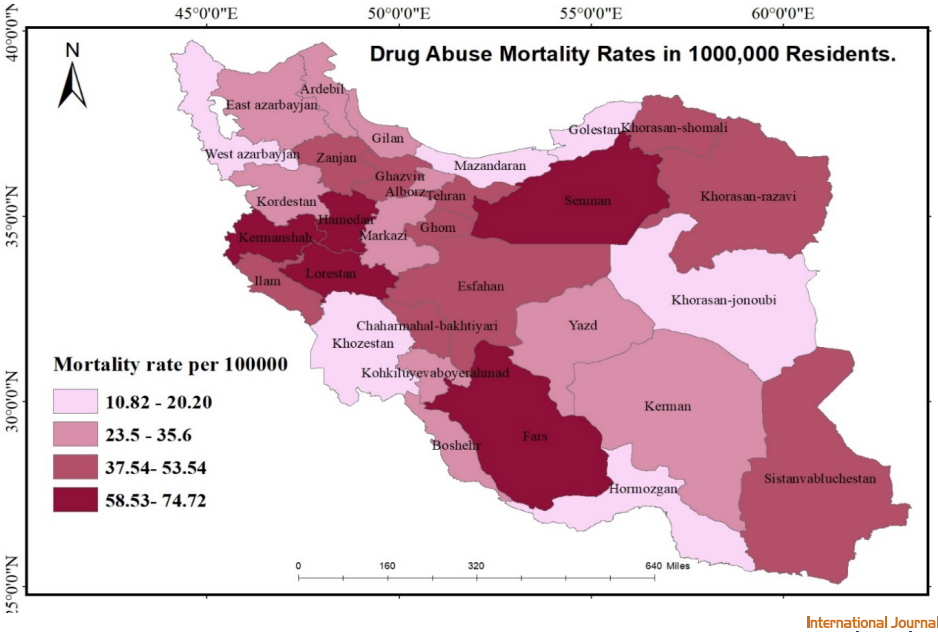

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Figure 2. Distribution of substance abuse-concerned mortality rates per 1000000 residents in Iran, in 2017

drugs leading to death in Iran were methadone, morphine, and methamphetamine. According to Figure 3, provinces with the highest mortality rates due to methadone overdose were Fars, Semnan, and 3 provinces in the west of Iran (Kermanshah, Hamadan, Ghazvin). Respecting morphine, Lorestan province had the highest rate, and Tehran had the highest mortality rate due to amphetamine abuse.

Mortality rates were estimated in 3 forms, as follows:

1- Mortality rates due to the consumption of a single substance (Table 2),

2- Mortality rates due to the simultaneous consumption of at least two drugs (Table 3),

3- Mortality rates due to the simultaneous consumption of multi drugs (Table 4). All the figures are reported based on total mortality rates per drug in Iran.

In total, mortality rates due to methadone, morphine, amphetamine, methamphetamine, codeine, tramadol, benzodiazepine, and diphenoxylate abuse were reported to be 20.29, 12.34, 5.32, 7.05, 4.21, 5.96, 1.47, and 0.05 respectively per million population of Iran. All rates are reported in detail in Tables 2, 3 & 4.

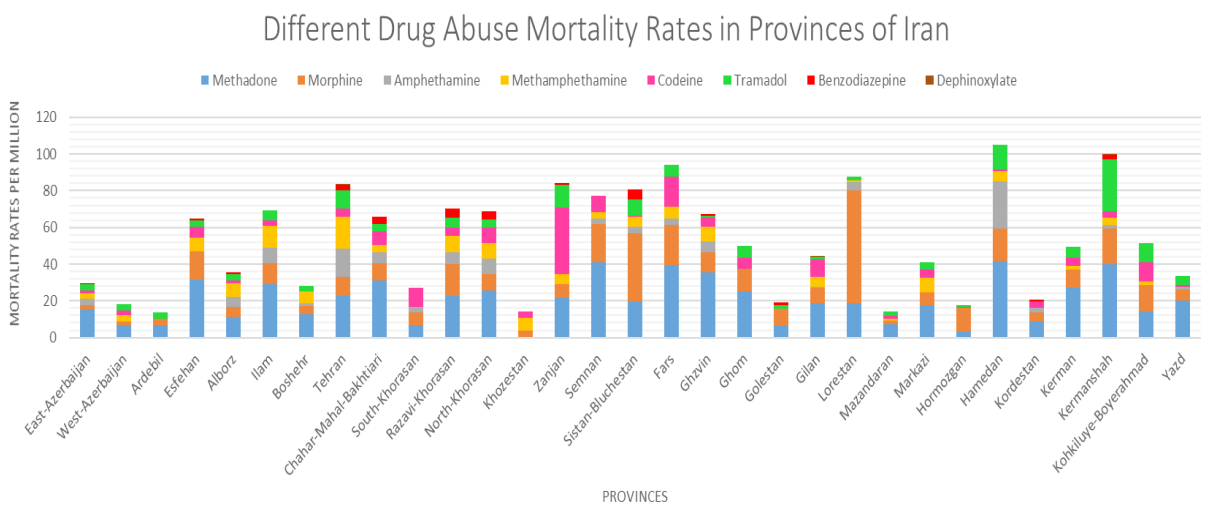

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Figure 3. Distribution of substance abuse-related mortality rates for different drugs in 1000000 residents in Iran, 2017

Table 1. Demographic characteristics of the subjects who died due to substance abuse (N=2706)

Characteristic	Description	N(%)
Gender	Female	268(9.9)
	Male	2425(89.62)
	Unknown	13(0.48)
Age, y	>19	163(6.29)
	20-29	614(22.69)
	30-39	807(29.72)
	40-49	582(21.51)
	50-59	279(10.31)
	>60	120(4.4)
	Unknown	115(4.25)
Educational level	Illiterate	2(0.07)
	Elementary school	456(16.85)
	Junior high school	423(26.79)
	High school	779(28.79)
	BSc	210(7.8)
	MSc and higher	23(0.85)
	Unknown	511(18.88)
Marital status	Married	996(75.91)
	Single	4(0.3)
	Divorced	288(21.95)
	Partner deceased	24(1.82)
	Missing	1394(51.51)
Living conditions	Alone	483(17.45)
	Not alone	1846(68.22)
	Unknown	377(13.93)
Occupational status	Unemployed	772(28.5)
	Self-employed	1046(38)
	Blue-collar	392(14)
	White-collar	142(5.25)
	Unknown	354(13.08)
The age of onset of drug use, y	0-19	220(17.99)
	20-29	629(51.43)
	30-49	347(28.37)
	>50	18(1.47)
	Missing	1483(54.8)

Table 2. Mortality rates due to the consumption of a single drug in Iran per 1000000 residents, in 2017

Province	Metha-done	Morphine	Amphet-amine	Metham-phetamine	Codeine	Tramadol	Benzodi-azepine	Diphenox-ylate
East-Azerbaijan	6.04	0	0.33	0	0.33	2.01	0	0
West-Azerbaijan	1.34	0	0	0.67	0	2.69	0	0
Ardebil	3.47	0	0	0	0	3.47	0	0
Esfahan	12.17	1.55	.0	0.44	0	0.22	0	0
Alborz	1.11	1.11	0	0.55	0	0.55	0	0
Ilam	11.56	0	0	0	0	0	0	0
Boushehr	4.70	0	0	0	0	0	0	0
Tehran	2.96	2.31	0.28	1.66	0	1.29	0.09	0
Chaharmahal-bakhtiari	15.49	0	0	0	0	0	1.93	0
South Khorasan	3.36	0	0	0	3.28	0	0	0
Razavi Khorasan	4.89	1.05	0	0.17	0	1.40	0	0
North Khorasan	4.29	4.29	0	0	0	0	0	0
Khuzestan	0	0	0	0	0	0	0	0
Zanjan	5.20	2.07	0	0	0	4.16	0	0
Semnan	10.65	5.32	0	0	0	0	0	0
Sistan-Baluchistan	4.73	19.51	0.59	0	0	0.59	0	0
Fars	16.66	2.31	0	0	0.46	2.78	0	0
Ghazvin	6.94	0.99	0	0	0	0	0	0
Ghom	6.24	6.24	0	0	0	6.24	0	0
Golestan	0	1.59	0	0	0	0	0	0
Gilan	8.86	0	0	0.98	0.49	0.49	0	0
Lorestan	1.48	34.16	0	0	0	0.74	0	0
Mazandaran	1.80	0	0	0	0	0.36	0	0
Markazi	9.28	2.32	0	1.55	0	0.77	0	0
Hormozgan	0	2.25	0	0	0	0	0	0
Hamedan	7.85	4.49	0	0	0	1.12	0	0
Kurdistan	1.62	0.81	0	0	0	0	0	0
Kerman	5.38	.77	0	0	0	0.38	0	0
Kermanshah	10.50	1.23	0	0.62	0	4.94	0	0
Kohgiluyeh-Boyerah-mad	2.95	2.07	0	0	0	6.21	0	0
Yazd	6.23	2.49	0	0	0	0	0	0
Total	3.73	2.72	0.09	0.50	0.07	1.15	0.04	0

Table 3. Mortality rates due to the simultaneous consumption of at least two drugs in Iran per 1000000 residents, in 2017

Province	Metha-done	Morphine	Amphet-amine	Metham-phetamine	Codeine	Tramadol	Benzodi-azepine	Diphenox-ylate
East-Azerbaijan	9.06	2.35	3.35	3.02	1.34	1.34	0.67	0
West-Azerbaijan	5.38	2.02	0	2.69	2.69	0.67	0	0
Ardebil	3.47	3.47	0	0	0	0	0	0
Esfahan	19.26	14.16	0	6.64	5.98	3.32	1.11	0
Alborz	9.96	4.43	5.53	6.64	1.66	2.77	1.11	0
Ilam	17.36	11.58	8.67	11.58	2.87	5.78	0	0
Boushehr	7.83	4.70	1.57	6.27	0	3.12	0	0
Tehran	19.88	7.86	15.17	15.72	4.62	8.69	2.40	0.09
Chaharmahal-bakhtiari	15.49	9.68	5.80	3.86	7.75	3.87	1.93	0
South Khorasan	3.36	6.73	3.37	0	6.73	0	0	0
Razavi Khorasan	17.97	16.23	6.28	8.55	4.19	4.01	4.89	0
North Khorasan	21.46	4.29	8.58	8.58	8.58	4.29	4.29	0
Khuzestan	0	3.54	0	7.08	3.54	0	0	0
Zanjan	16.62	5.20	0	5.20	36.37	8.31	1.03	0
Semnan	30.15	15.96	2.55	3.54	8.86	0	0	0
Sistan-Baluchistan	14.78	17.74	5.91	5.32	0.59	8.28	5.32	0
Fars	22.68	19.90	3.24	6.48	15.74	3.70	0	0
Ghazvin	28.75	9.92	5.95	7.92	4.95	0.99	0.99	0
Ghom	18.72	6.24	0	0	6.24	0	0	0
Golestan	6.36	7.95	0	0	0	1.59	1.59	0.66
Gilan	9.84	8.36	0.49	4.43	8.86	0.98	0	0
Lorestan	17.08	27.48	4.45	0.79	0	1.48	0	0
Mazandaran	5.41	1.80	0	1.44	1.08	2.16	0	0
Markazi	8.51	4.64	0	6.18	4.63	3.09	0	0
Hormozgan	3.30	10.50	0	0	0.75	0.75	0	0
Hamedan	33.65	13.46	25.80	5.32	1.12	12.34	0	0
Kurdistan	7.33	4.07	2.44	0	3.35	0	0.84	0
Kerman	21.50	9.22	0	1.92	4.61	5.76	0	0
Kermanshah	29.64	17.91	1.85	3.71	3.09	23.47	2.47	0.62
Kohgiluyeh-Boyerahmad	10.95	12.42	0	2.07	10.35	4.14	0	0
Yazd	13.70	3.73	1.23	0	1.24	4.98	0	0
Total	15.30	9.68	5.24	6.55	4.26	4.81	1.44	0

Table 4. Mortality rates due to the simultaneous consumption of multi-drugs in Iran per 1000000 residents, in 2017

Province	Metha-done	Morphine	Amphet-amine	Metham-phetamine	Codeine	Tramadol	Benzodiaz-epine	Diphenox-ylate
East-Azerbaijan	15.10	2.35	3.69	3.02	1.67	3.35	0.62	0
West-Azerbaijan	6.73	2.02	0	3.36	2.69	3.36	0	0
Ardebil	6.95	3.47	0	0	0	3.47	0	0
Esfahan	31.43	15.71	0	7.08	5.98	3.54	1.11	0
Alborz	11.07	5.54	5.53	7.19	1.66	3.32	1.11	0
Ilam	28.92	11.58	8.67	11.58	2.87	5.78	0	0
Boushehr	12.52	4.70	1.57	6.27	0	3.12	0	0
Tehran	22.83	10.17	15.44	17.39	4.62	9.99	2.50	0.09
Chaharmahal-bakhtiari	30.98	9.68	5.80	3.86	7.75	3.87	3.87	0
South Khorasan	6.73	6.73	3.37	0	10.10	0	0	0
Razavi Khorasan	22.86	17.28	6.28	9.18	4.19	5.41	4.89	0
North Khorasan	25.75	8.58	8.58	8.58	8.58	4.29	4.29	0
Khuzestan	0	3.54	0	7.08	3.54	0	0	0
Zanjan	21.83	7.28	0	5.20	36.37	12.48	1.03	0
Semnan	40.78	21.27	2.55	3.54	8.86	0	0	0
Sistan-Baluchistan	19.51	37.25	3.67	5.32	0.59	8.87	5.32	0
Fars	39.35	22.22	3.24	6.48	16.20	6.54	0	0
Ghazvin	35.69	10.90	5.95	7.92	4.95	0.99	0.99	0
Ghom	24.95	12.48	0	0	6.24	6.24	0	0
Golestan	6.36	9.54	0	0	0	1.59	1.59	0
Gilan	18.70	8.36	0.49	5.41	9.35	1.48	0	0.49
Lorestan	18.56	61.64	4.45	0.79	0	2.22	0	0
Mazandaran	7.21	1.80	0	1.44	1.08	2.52	.0	0
Markazi	17.80	6.97	0	7.73	4.63	3.87	0	0
Hormozgan	3.30	12.74	0	0	0.75	0.75	0	0
Hamedan	41.50	17.94	25.80	5.32	1.12	13.46	0	0
Kurdistan	8.92	4.88	2.44	0	3.35	0	0.84	0
Kerman	26.88	9.98	0	1.92	4.61	6.14	0	0
Kermanshah	40.14	19.14	1.85	4.32	3.09	28.41	2.47	0.62
Kohgiluyeh-Boy-erahmad	13.94	14.49	0	2.07	10.35	10.35	0	0
Yazd	19.93	6.23	1.23	0	1.24	4.98	0	0
Total	20.29	12.35	5.32	7.05	4.21	5.96	1.47	0.05

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4. Discussion

This study investigated substance abuse-induced mortality rates in Iran. The mortality rates associated with substance abuse were higher in males (89.62%), as other studies also claimed [9, 13-16]. The highest mortality rate was among married study subjects (75%), followed by the divorced ones (21.95); however, other studies in Iran reported most drug-related deaths to be in single subjects [16, 17]. The results documented by Shahbazi and Ghoreishi were in line with those of this study [10, 11]. Stringer identified that the tendency to SD treatment was more frequent among single subjects or single parents This is because married parents, especially women, stated stigma as a barrier to substance abuse treatment. In other words, women attributed the barriers of substance abuse treatment to their social roles, like being a mother or a wife [18]. The highest mortality rate was observed among the 20-40-year-old age group; this result was consistent with those of the previous studies [15, 17]. The highest mortality rate detected among the 20-40-year-old group affects the community's general health, especially in the workforce population [19, 20]. Furthermore, Nielson and Mokri reported the highest substance-related mortality rates to be in individuals, aged 42 and 33 years [9, 21]. Among different illicit drugs, methadone, with 20 deaths per million, was correlated with the highest mortality rate in Iran. In support of our study, a 7-year overview study in Iran by Akhgari identified methadone abuse-related deaths drastically increased 7.7 times from 2009 (3.93 per million) to 2015 (30.42 per million) [16]. Additionally, Alinejad stated that the increase of methadone therapy has led to a progressive increment of methadone abuse-induced mortality rate [22]. In a study in Italy in 2015, Claudia has attributed 90% of substance-related deaths to methadone abuse; it was noted that two-thirds of the deceased were on methadone maintenance treatment and one-third obtained the methadone from illegal markets [23]. The availability of illicit drugs in black markets in Finland and other communities is a serious issue [24]. Another study in the USA also reported that methadone metabolites were the most common substance extracted in autopsy examination [14]. Nielsen's study in Denmark also reported the highest frequency of drug-related deaths was due to methadone [21]. The leading cause of substance-related mortality attributed to methadone was in the western provinces of Iran (Hamadan, Kermanshah, etc.). A study on the prevalence of drug abuse among high school students in Hamadan identified at least one type of drug use in 20% of students [25].

Concerning the results of simultaneous substance abuse, methadone shaped the highest mortality rate in combinations with the other illicit drugs. In another study in Tehran, concurrent abuse of methadone with other illicit drugs was reported in 80% of deaths; methamphetamine and tramadol were the most commonly consumed substances with methadone [16]. A study in Denmark identified 97% of death cases concurrently consumed alcohol with methadone, followed by benzodiazepine, amphetamine, and morphine [21]. Moreover, Claudia reported the concurrent use of methadone and benzodiazepines in 63% of death cases in Italy [23]. Benzodiazepine was the most commonly used illicit drug in combination with methadone in Nielsen's study [21]. After methadone, morphine (12.35 per million) and methamphetamine (7.05 per million) were the causes of substance-related deaths in Iran. The concurrent use of morphine and codeine was observed in 65% of deaths in Akhgari's study [26].

The highest mortality due to morphine abuse was also reported in western Iran (Lorestan & Kermanshah), i.e., consistent with the results of previous studies [10, 11]. Increasing methamphetamine use among individuals receiving methadone maintenance treatment was identified as a new health concern in Iran. Besides, methamphetamine abuse increased from 3.9% in 2007 to 60.3% in 2014 in both genders, especially in women [27]. Regarding the current research results, most of the methamphetamine-related deaths occurred in Tehran and Ilam. A systematic review of methamphetamine abuse in Iran also supported the findings of our study; it was reported that due to the alarming increase of methamphetamine abuse, it is critical to ensure adequate resources for prevention and treatment, staff training, and measures to stop the illegal production of substances in Iran [28]. As Iranian researchers stated, methamphetamine was produced in illegal and secret laboratories, which 900 of them were dismantled from 2010 to 2013 [29-31]. Most of the amphetamine-related deaths occurred in western Iran (Hamedan, Ilam, & Tehran); codeine in Zanjan and Fars; tramadol in western Iran (Kermanshah, Hamadan, & Zanjan); benzodiazepines in Sistan-Baluchistan and Khorasan Razavi, and diphenoxylate in Kermanshah, Gilan, and Tehran provinces.

This study was accomplished based on one-year data. Therefore, findings are more efficient, reliable, valid, and generalizable due to the larger data set and longer study duration. The present study findings highlighted the importance of complete investigation of autopsy test, in addition to a dilated other risks factor related to motility rates.

The major strengths of this study included the reliability and generalizability of study data, as it was a nationwide study. Our results are valid, accurate, and consistent, as we applied the autopsy examination data of the ILMO.

5. Conclusion

The current study results demonstrated the need for a thorough data collection related to substance abuse presenting health problems. It is necessary to monitor effective treatment and preventive intervention programs for those receiving treatment in prioritized provinces with high mortality rates, compared to low mortality rates. A specific focus should be on the 20-40-year-olds age groups to decrease substance abuse and its social and medical consequences.

Ethical Considerations

Compliance with ethical guidelines

The obtained ethical code for this was IR.SBMU.PHNS.REC.1398.107.

Funding

This research received no specific grant from any funding agency.

Author's contributions

Conceptualization: Fatemeh Baberi, Seyed Saeed Hashemi Nazari; Methodology: Fatemeh Baberi, Seyed Saeed Hashemi Nazari, Davood Mirtorabi; Investigation: Fatemeh Baberi, Seyed Saeed Hashemi Nazari; Writing – original draft: Fatemeh Baberi; Software & analysis, writing – review & editing: All authors; Supervision: Seyed Saeed Hashemi Nazari

Conflict of interest

The authors declared no conflicts of interest.

Acknowledgements

The authors would like to thank the Legal Medicine Organization and Legal Medicine Research Center for providing the data of this research; also receiving support from the Center of Excellence in the Analysis of Spatio-Temporal Correlated Data at Tarbiat Modares University is acknowledged.

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