Psychoactive Drug Related Traumatic Deaths in Istanbul between 1990-2000

Sadik Toprak*, Bulent Sam, Esin Akgül, Coşkun Silan, Ersin Baysal

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Abstract: The objective of this study was to identify characteristics of drug related traumatic deaths in Istanbul between 1990 and 2000. This retrospective descriptive study was set in the Council of Forensic Medicine, Ministry of Justice. During the period studied 143 people (86 % males, 14 % females) who took a drug died after traumatic events. The mean age was 37.7 ± 13.6 years. The most common causes of deaths were asphyxia and blunt force injury. Benzodiazepines, cannabis and heroin were the most commonly used drugs. While benzodiazepines are common in self-directed violence cases such as suicide by asphyxia, cannabis was frequent among interpersonal violence cases as homicide by shooting. Heroin was approximately equally seen in all traumatic deaths. Benzodiazepine and heroin use are especially frequent among non-violence deaths (road traffic accidents).

Key words: cause of death; drug abuse; trauma; violence

Worldwide drug abuse and violence remain as a significant issue. Annually 200,000 deaths are attributed to illicit drugs [1, 2]. The highest percentage of drug related deaths is attributed to direct acute overdose (suicidal or accidental). Other major causes of death among drug users are from correlative medical conditions (e.g. of pneumonia, AIDS and other infections, cardiovascular, cerebrovascular and liver diseases, malignant neoplasm and unknown causes) and due to intentional or unintentional trauma and its associated violence, which includes suicide, homicide, and road traffic accidents [3-11].

For decades researchers and public health professionals have grappled with the complex relationship between substance abuse and violence [12]. The relationship between drug abuse and violence a dichotomy. Substance abuse is a major comorbid factor in patients with fatal and non-fatal physical trauma [13-17]. In addition, violent injuries are more common in people who abuse drugs [18].

Physicians are frequently involved in emergency room assessment and treatment of patients who may be victims of violence [17, 19]. Specialists of forensic medicine evaluate victims and suspects following bodily harm and attempted homicidal and suicidal acts [20].

Worldwide, deaths from violence exact a high burden of suffering. In 2000, an estimated 1.6 million worldwide deaths resulted from self-directed, interpersonal, or collective violence for an overall age-adjusted rate of 28.8 per 100 000 population. Nearly half of these 1.6 million violence-related deaths were suicides, almost one-third were homicides, and about one-fifth were war-related [2].

Turkey, a historical opium producer, has continuously dealt with abuse and addiction [21,22]. Strong increases in heroin use have been witnessed in countries such as Turkey that lie along the main drug-trafficking routes [23]. From 1987 to 2006 Turkey held the record for the most opiate seizures in Europe [23]. Despite its role in drug trafficking, the issue of psychoactive drugs related to traumatic deaths in Turkey has not been properly investigated.

*) Corresponding author; Forensic Medicine Department, Gaziosmanpasa University, Tip Fakultesi, Adli Tip AD, Tokat 60100, Turkey. sadik_toprak@yahoo.com
In this study, we aim to analyze violence and harmful drug use and the characteristics of the victims of violence who abuse drugs in the Turkish population. The data produced in this study is useful in setting priorities, guiding programme design, and monitoring the progress of action plans against violence.

Materials and Methods

Data sources
An autopsy is required in all suspicious deaths in Turkey. In the case of suspected deaths due to the possible trauma from a third party an autopsy is required to be performed at the Council of Forensic Medicine, Ministry of Justice in Istanbul. For all cases selected, the autopsy report copies, including the Medical records at death time, information from police records, results of the toxicological analyses, and the statement of the forensic medicine specialist regarding the cause of death, were available.

Data collecting procedure
This piece of research is a retrospective, registry-based, descriptive study. All autopsies (26421) that were performed at the Council of Forensic Medicine, Ministry of Justice in Istanbul, between 1990-2000 were reviewed. On the basis of toxicological findings in autopsy reports, during this period 143 deaths were identified as psychoactive drug related traumatic deaths. As drug-related traumatic deaths in this study, the following inclusion and exclusion criteria were evaluated:

a) The traumatic deaths are the suicidal, homicidal, or accidental deaths where toxicology reports showed the postmortem presence of any psychoactive drugs.

b) Deaths where positive toxicological findings of the combined usage of alcohol and drugs were included, whereas deaths finding only alcohol were excluded.

c) There is a detectable psychoactive drug level in chemical analyzed.

d) The detected psychoactive drugs are not enough for causing a drug overdose (by suicidal or accidental manner).

e) Cases that received any medical intervention were excluded.

Case categorization
The cases were categorized according to type of violence as defined in the 2002 World Health Organization world report on violence and health. Cases were divided into three groups. Group 1: Self-directed violence cases, including suicides. Self-directed violence cases consist of suicide by asphyxia, jumping from a high place and firearm. Group 2: Interpersonal violence cases, include homicides. Interpersonal violence cases consist of homicide by firearm, sharp force, blunt force and asphyxia. Group 3: Non-violence cases include accidents.

Types of Injuries
Blunt force injury: Constitutes any injury from blunt force declared to be the cause of death in the autopsy. The causes of death include self-directed blunt force (suicide by jumping from a high place), interpersonal blunt force (homicide by blunt force), and accidental blunt force (road traffic accident).

Firearm and sharp force injury (Penetrating injuries): Any firearm or sharp object injury declared to be the cause of death by self-directed violence (suicide) or by interpersonal violence (homicide) in the autopsy report.

Asphyxia: Cases in which asphyxia was declared to be the cause of death in the autopsy report as either by suicide or homicide (hanging, suffocation, and others).

Chemical analyses
Blood samples taken at autopsies performed between 1990 and 2000 were subjected to a range of tests. Several different testing methods were employed; Radioimmunoassay (RIA) was used between 1990 and 1993, enzyme multiplied immunoassay (EMIT) was used from 1994 to 2000, and cloned enzyme donor immunoassay (CEDIA) was used in 2000. Thin layer chromatography was used throughout the whole period. To confirm positive results, gas chromatography-mass spectrometry (GC/MS) was used after 1997 and GC/MS was used after the second half of 2000.
**Statistical analysis**

Data were analyzed by Epi-Info version 3.5.1 software by CDC.

**Results**

From January 1990 to December 2000, 26,421 autopsies were performed at the Council of Forensic Medicine, Ministry of Justice in Istanbul. In this period 143 deaths were classified as drug related traumatic deaths.

Victims were mostly male with a mean age of 37 years. In our sample, asphyxia was the most common way of suicide with 29 cases. Asphyxia was followed by falling and shooting, 14% and 9.1% respectively. Although there were 11 female cases committed suicide by asphyxia and falling, all suicide by shooting deaths were male. Shooting by homicide and suicide was found to be more common among young people, aged approximately 35 years old, whereas suicide by asphyxia and blunt force by homicide was more prevalent among those in their forties. The most common manners of death were suicide (n: 62), homicide (n: 53), and accident (n: 28). In all subgroups suicide by asphyxia cases were the most common (n: 29) and accident by blunt force (RTA) cases were the second most common (n: 28) (Table 1).

**Table 1: Baseline characteristics of drug related traumatic death victims (SD: Standard deviation)**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Subgroups</th>
<th>n (%)</th>
<th>Mean age ± SD</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1: Self-directed violence (Suicides)</td>
<td>Suicide by firearm</td>
<td>13 (% 9.1)</td>
<td>34.9 ± 10.8</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Group 2: Interpersonal violence (Homicides)</td>
<td>Homicide by firearm</td>
<td>16 (% 11.2)</td>
<td>35.3 ± 17.1</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Homicide by asphyxia</td>
<td>10 (% 7.0)</td>
<td>36.0 ± 9.8</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Homicide by sharp force</td>
<td>17 (% 11.9)</td>
<td>36.0 ± 15.8</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Homicide by blunt force</td>
<td>10 (% 7.0)</td>
<td>42.3 ± 11.6</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Group 3: Non-violence (Accidents)</td>
<td>Accident by blunt force (road traffic accidents-RTA)</td>
<td>28 (% 19.6)</td>
<td>35.9 ± 10.8</td>
<td>24</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>62</td>
<td>37.7 ± 13.6</td>
<td>123</td>
<td>20</td>
</tr>
</tbody>
</table>

**Table 2: Distribution of drugs according to type of violence and the cause and manner death**

<table>
<thead>
<tr>
<th>Type of Violence</th>
<th>Cause and manner of death</th>
<th>Amphetamine</th>
<th>Barbiturate</th>
<th>Benzodiazepine</th>
<th>Cannabis</th>
<th>Cocaine</th>
<th>Heroin</th>
<th>Alcohol</th>
<th>Other**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-directed violence</td>
<td>Suicide by Asphyxia (n: 29)</td>
<td>3</td>
<td>4</td>
<td>19</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suicide by Falling (n: 20)</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suicide by Firearm (n: 13)</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>(n: 62)</td>
<td>5</td>
<td>6</td>
<td>34</td>
<td>4</td>
<td>1</td>
<td>20</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Interpersonal violence</td>
<td>Homicide by Asphyxia (n: 10)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Homicide by Blunt force (n: 10)</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Homicide by Firearm (n: 16)</td>
<td>2</td>
<td>3</td>
<td>10</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Homicide by Sharp force (n: 17)</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>(n: 53)</td>
<td>1</td>
<td>6</td>
<td>9</td>
<td>15</td>
<td>3</td>
<td>21</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Non-violence</td>
<td>Accident by Blunt force (n: 28)</td>
<td>3</td>
<td>15</td>
<td>3</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total*</td>
<td>58</td>
<td>6</td>
<td>11</td>
<td>58</td>
<td>22</td>
<td>4</td>
<td>49</td>
<td>13</td>
<td>4</td>
</tr>
</tbody>
</table>

*The total number is 167 due to polydrug use. Benzodiazepine and heroin was found together in 8 cases and 13 cases combined alcohol with drugs.

**Tricyclic antidepressants, toluen, prolan**
The most common drugs found in victims were benzodiazepines and heroin (Table 2). These two drugs played an important role in most traumatic deaths in our sample. Also, we found that 8 out of 143 cases took both drugs at the same time. Benzodiazepines were found in two out of three cases in suicide by asphyxia and approximately half of the cases in accidental blunt force. Cannabis was the most common drug in shooting by homicide cases.

The number of cases had a bimodal distribution. There were two peaks in 1994 and 2000 (Fig. 1).

Discussion

The purpose of this study was to determine baseline characteristics and time trends of drug related traumatic death victims. Our results indicate that drug related traumatic deaths were mainly seen in males. The most common manner of death was suicide. The most common cause of death was asphyxia and accidental blunt force injury (RTA). The most frequent drugs were benzodiazepine and heroin.

Two major limitations of the study are the retrospective nature of the analysis and the several variables involved in interpersonal relations and violent crimes that were not addressed such as medical records, socioeconomic factors, and demographics. Another important limitation of this study is the lack of information concerning detailed forensic aspects of intoxication. The strongest point of this study is that the data completely covers Istanbul (approximate population of 14 million) over an 11-year period. Istanbul's population comprises 20% of Turkey's population.

In our study, we found homicide, suicide or accident, and drug related traumatic death victims were mostly males in their thirties. This finding was expected, as it mirrors results obtained by researchers in other countries [3, 8, 9, 10, 24-27]. Lastly, according to our findings, victims of suicide by asphyxia and blunt force homicide cases were older, 41.5 and 42.3 years old respectively.

Worldwide, self-inflicted injuries are the fourth leading cause of death among those aged 15–44 years [2]. Our findings show the most common manner of death to be suicide, and the least common to be homicide and accident. Similar to our findings, a vast number of studies showed substance abuse as a risk factor for suicide [2, 4, 5, 28-33]. However, geographically diverse patterns were identified in terms of manner of death for example, homicide rates are nearly three times greater than suicide rates among violent deaths in the African Region and the Region of the Americas [2].

In our study, suicidal asphyxia, blunt force, RTA, and falling were the most common causes of deaths in subgroups; however, different results were found in other research. A study performed between 2000 and 2003 recorded 600 fatalities where alcohol and illicit drugs in traumatic deaths were evaluated in which firearm injuries were found to be more common than RTA [25]. Another study published in 2008 concluded RTA to be more frequent than any other traumatic death [26]. However, as Oyefeso pointed out, studies on this subject have mainly focused on unintentional road traffic accidents (RTA) rather than on fatal injuries that happened to those under the influence of psychoactive drugs [27]. RTA, as one of the most common causes of death, is an important problem in Turkey where the road transport system is one of the most hazardous and deadly in the European Union [34].

Our study revealed specific patterns of trauma in some drugs. Specifically, amphetamine and benzodiazepine usage was found to be common in self-directed violence and cannabis in interpersonal
violence. However, barbiturates, heroin, and alcohol were not correlated with any specific pattern and are almost equally common in any type of trauma. As seen in our study, hypnotics, especially benzodiazepines, are common drugs in traumatic deaths [3, 7, 10, 24, 27, 32, 35]. Self-directed violence (suicide) is more commonly reported than homicide among benzodiazepine-related cases [3, 36]. “Paradoxical reactions” of aggressiveness under benzodiazepines is exhibited to describe reactions of agitation and disinhibition occurring during anxiolytic or hypnotic treatment; however, physical aggression, impulsive decision-making, and violence have been reported, as well as aggression while driving and suicide [37,38]. The most important parameter in drug-induced behavioural disinhibition has been found to be dosage [39].

We found heroin abuse to be more common in homicidal cases than cannabis, amphetamine, and cocaine. In contrast, other studies reported homicidal cases were lower among heroin users than cannabis, amphetamine, and cocaine users [24, 26, 40]. One of the possible explanations of this situation will be “penetrating trauma is less likely to be tested for substance than blunt trauma, but more likely to have positive test results” [41].

There is confusion about cannabis in the public spectrum. Cannabis is regulated with the same degree of severity as heroin and cocaine under the Single Convention on Narcotic Drugs, 1961; however, cannabis offences are treated far more leniently than those related to other narcotic drugs in many countries [23]. According to a 1996 United Kingdom audit commission report, cannabis was the most commonly used drug by over 60% of young offenders [42]. Moreover, cannabis was found in all categories of traumatic deaths in our sample, but was especially frequent in homicide cases involving firearm and sharp force injuries.

Worldwide, the use of ecstasy became popular during the 1990s [23]. In 2000 there were six fatalities with findings of amphetamine use in our study and half were found to be suicide by asphyxia.

In our study, the number of traumatic deaths increased 400% between 1990 and 2000. Similar results (530% increases) were observed in Vienna from 1985 to 1992 [7]. Nevertheless, the prevalence of drug use in Turkey seems to be less in comparison to other European Countries and the United States of America [43, 44].

Conclusion

We conclude that psychoactive drugs play a significant role in violence-related trauma, especially self-directed violence by asphyxia and falling and interpersonal violence by firearm and sharp force injuries. In addition, specific patterns were found for drugs in our sample; benzodiazepines and heroin were common among suicide cases and cannabis was frequent among homicide cases. However, more research is needed to identify trends in drug usage patterns and to understand the relationship between drug use and traumatic deaths before strategies can be developed to reduce drug-related morbidity and mortality.

References

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