



## Heroin overdose – suicide or accident?

### Predoziranje heroinom – suicid ili zadesno predoziranje?

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#### Abstract

**Background/Aim.** Suicide is a public health problem. Due to frequent overdose among drug addicts, there is a question about suicidality in this population. The aim of this study is to determine the specificity and distinctive factors in opiate addicts who have overdosed with an intention to commit suicide compared to addicts who have overdosed accidentally. **Methods.** The survey included 150 heroin addicts who were in the substitution program: 49 subjects who overdosed with a clear suicidal intention and 101 addicts who overdosed without suicidal intention. The subjects filled out the questionnaire about socio-demographic data and data regarding their addiction, the *Minnesota Multiphasic Personality Inventory-2* (MMPI-2) as well as the *Manchester Short Assessment of Quality of Life* (MANSA) questionnaire about the quality of life. For statistical analysis, Pearson's  $\chi^2$  test, Student *t*-test and univariate variance analysis were used. **Results.** The addicts who attempted suicide were younger persons (29.7 vs. 36.3 years of age), started to take heroin earlier (17.8 vs. 21.3 years of age;  $p=0.013$ ), they use it for a longer period (14.1 vs. 9.2 years;  $p=0.00$ ) and take it intravenously for a longer period (11.6 vs. 6.5 years;  $p=0.00$ ). The suicide was preceded by a traumatic event ( $p=0.015$ ) and there were several attempts of suicide ( $p=0.004$ ). The quality of life regarding accommodation, friends and organization of their free time was assessed as not so good ( $p=0.03$ ). **Conclusion.** In accordance with the obtained data, it is necessary to design programs for the prevention of suicide among addicts in general and especially programs that would be aimed at younger addicts.

**Key words:** heroin dependence; opiate substitution treatment; drug overdose; suicide; risk factors.

#### Apstrakt

**Uvod/Cilj.** Samoubistvo je značajan socijalno medicinski problem. Zbog čestih predoziranja među zavisnicima, postavlja se pitanje suicidnosti ove populacije. Cilj rada bio je utvrđivanje specifičnosti i distinktivnih faktora kod zavisnika od opijata koji su se predozirali sa namerom da počine suicid u odnosu na zavisnike kod kojih je predoziranje bilo zadesno. **Metode.** Istraživanjem je obuhvaćeno 150 ispitanika: 49 zavisnika od heroina na programu supstitucije koji su se predozirali sa jasnom suicidnom namerom i 101 zavisnik koji se predozirao bez suicidne namere. U istraživanju je korišćen socio-demografski upitnik i upitnik sa podacima o adiciji, *Minnesota Multiphasic Personality Inventory* (MMPI-2) i *Manchester Short Assessment of Quality of Life* (MANSA) upitnik kvaliteta života. Za statističku analizu su korišćeni Pearsonov  $\chi^2$  test, Studentov *t*-test i univarijatna analiza varijanse. **Rezultati.** Zavisnici sa suicidnim pokušajem bili su mlađi (29,7 : 36,3 godine), ranije su počeli da uzimaju heroin (17,8 : 21,3 godine;  $p=0,013$ ), duže ga koriste (14,1 : 9,2 meseci;  $p=0,00$ ), i duže ga uzimaju intravenski (11,6 : 6,5 godine;  $p=0,00$ ). Suicidu je prethodio traumatski događaj ( $p=0,015$ ) i imali su više pokušaja suicida ( $p=0,004$ ). Kvalitet života su procenili kao manje kvalitetan ( $p=0,03$ ) u oblasti zadovoljstva smeštajem, prijateljima i organizacijom slobodnog vremena. **Zaljučak.** U skladu sa dobijenim podacima potrebno je koncipirati programe prevencije suicida među zavisnicima uopšte, a posebno programe koji bi bili usmereni ka zavisnicima mlađe životne dobi.

**Ključne reči:** zavisnost od heroina; opijati, supstitucionna terapija; predoziranost; samoubistvo; faktori rizika.

## Introduction

Everyone who works with drug addicts is concerned with a possibility of overdose. Suicide is a well-known risk for patients with mental health problems, but among addicts, a special attention should be paid to a risk of suicide. Suicide is nearly 6 times more likely to happen among drug and alcohol abusers than in the general population<sup>1</sup>. The rate of suicide among male addicts is 2–3 times higher than among non-addict males<sup>2</sup>. Among women, substance (ab)use increases a risk of suicide from 6.5 to 9 times comparing to non-addict women<sup>3</sup>. Heroin addicts attempt suicide 13 times more frequently than their peers, and suicide attempts among addicts is in a range of 3%–35%<sup>4</sup>.

About one-third of persons who commit suicide have been under the influence of drugs, usually opiates or alcohol<sup>5</sup>.

Regarding the suicide of addicts, there is a question whether it is more frequently caused by an accidental overdose, or whether it is profiled as a suicide. Overdose could be accidental or intentional. In the United States, in 2014, more than 10,500 people died from heroin overdose<sup>6</sup>. The Centers for Disease Control and Prevention (CDC) found that mortality among women have doubled since 2002. The CDC found that there were 43,982 deaths due to drug poisoning in 2013, out of which 81% were accidental, 12% were intentional suicide while 6% were caused by the unknown motives<sup>7</sup>. According to data from 2013, heroin overdose was fatal for 59% of addicts who, beside heroin, also use another psychoactive substance, usually cocaine or alcohol. There are some key questions to be asked: whether the dependence *per se* bears a high risk of suicide, or, whether some specific subpopulation overdose accidentally, or, whether the addicts overdose with clearly defined suicidal intention.

The aim of this study was to determine the specificity and distinctive factors in opiate addicts who overdosed with an intention to commit suicide and the ones who overdosed accidentally.

## Methods

### Sample

This cross-sectional study included consecutively recruited 150 opiate addicts who overdosed and were on substitution treatment with methadone [International Classification of Diseases-10 (ICD-10:) F 11.22]. Besides methadone, the patients were taking benzodiazepines, hypnotics and psychostabilizers. Other psychoactive drugs were not prescribed. After overdose, they were divided into two groups: those who had suicidal intentions and ideas, and made a suicidal attempt by overdosing, and those who accidentally overdosed. Suicidal intentions and ideas were assessed by structured interview designed for this research. Thus, the test group included 49 addicts who attempted suicide by overdosing (the first group) and 101 drug addicts who overdosed accidentally (the second group). The study was approved by the Institutional Ethics Committee. All subjects gave written consent and the study was performed in accordance with the

Declaration of Helsinki (1965) and later revisions. The survey was conducted from January 2014 to March 2016.

Excluding factors for the study were the following diagnosis (ICD-10): organic, including symptomatic mental disorders, schizophrenia, schizotypal and delusional disorders, mood [affective] disorders, mental retardation<sup>8</sup> and some other addictions.

The average age of the first group was 29.76 years (standard deviation = 9.06) and in the second group it was 36.36 years (standard deviation = 7.96). There were a total of 127 men of whom 38 attempted suicide and 23 females of whom 11 attempted suicide.

### Procedure

In this cross-sectional study, the opiate addicts, after the overdose and decision whether it was a suicide attempt or an accidental overdose, completed a set of questionnaires that included: socio-demographic characteristics (gender, age, education level, marital status, children and employment status); family history (family history of psychiatric and suicidal behavior); data regarding dependency (at what age they started using drugs, for how long they used drugs and duration of intravenous drug use) and questions related to whether they were using a psychoactive substance other than regular therapy before overdose, whether it was directly preceded by a traumatic event and whether they previously overdosed and/or had suicide attempts.

The Manchester Short Assessment of Quality of Life<sup>9</sup> focuses on satisfaction with life as a whole and particular life domains (job, financial situation, friends, free time organization, accommodation, personal safety, people who the patient lives with, sexual life, family, health and mental state). MANSA evaluates 12 aspects of quality of life through 7 degrees Likert scale<sup>9</sup> (see Table 4 in the section Results).

The MMPI-2 is used to objectively assess personality structure<sup>10</sup>. The MMPI is the most frequently used standardized psychometric test of adult personality and psychopathology. The test was designed to help identify personal, social and behavioral problems in psychiatric patients. The original MMPI was replaced by the standardized version for adults, 18 years old and over. The new MMPI-2, was released in 1989 and subsequently revised in 2001. The MMPI-2 has 567 items, or questions (true or false format) and comprises 10 clinical scales which assess 10 major categories of abnormal human behavior (hypochondriasis, depression, hysteria, psychopathic deviate, masculinity/femininity, paranoia, psychasthenia, schizophrenia, hypomania and social introversion) and 4 validity scales (L, F, F<sup>b</sup>, K), which assess the person's general test-taking attitude and whether the items on the test are answered in an accurate manner<sup>10</sup>. To ensure the anonymity of the subjects, the data were coded and entered into the Excel file.

For statistical analysis, we used Pearson's  $\chi^2$  test, Student *t*-test and univariate variance analysis. Odds relations and confidence intervals (CIs) at 95% were also calculated. Due to the large number of variables we mainly showed those which demonstrated a statistically significant difference.

## Results

The results of the analysis of sociodemographic factors were shown in Table 1.

In relation to socio-demographic characteristics as well as statistically significant factors, education level and marital status were singled out, and statistical significance of em-

ployment status was a borderline. Compared to other variables, a statistically significant difference was reported for the occurrence of traumatic events immediately before the suicide and previous suicide attempts.

The results of the pattern and duration of opiate use analyses were shown in Table 2.

**Table 1**

**The sociodemographic data of the opiate addicts**

Variables	Non-suicidal (n %)	Suicidal (n %)	$\chi^2$	<i>p</i> value
Employment status				
employed	12 (24.5)	25 (24.7)	5.85	0.953
unemployed	37 (75.5)	76 (75.3)		
disabled	0	0		
Education level				
no primary school	2 (4)	9 (9)	77.18	0.026
primary school	8 (16)	21 (21)		
high school	36 (74)	64 (63)		
graduated college	2 (4)	4 (4)		
graduated faculty	1 (2)	3 (3)		
Marital status				
married	15 (30.6)	18 (17.8)	10.50	0.014
unmarried	28 (57.1)	56 (55.5)		
divorced	5 (10.2)	19 (18.8)		
widowed	1 (2.1)	8 (7.9)		
Children, yes	6 (30)	14 (70)	0.02	0.880
Hereditary, confirmed	22 (34.9)	41 (65.1)	0.69	0.376
Suicide in family, confirmed	36 (45.6)	43 (54.4)	2.87	0.174
Traumatic event, confirmed	23 (31.1)	51 (68.9)	6.236	0.015
Previously overdose, confirmed	26 (35.6)	47 (64.4)	0.024	0.534
Previously suicide, confirmed	1 (14.3)	6 (85.7)	7.956	0.004

**Table 2**

**Characteristics of addiction**

Opiate use	Suicidal mean $\pm$ SD	Non-suicidal mean $\pm$ SD	<i>t</i> -value	df	<i>p</i>	F ratio	<i>p</i>
Start (age), years	17.832 $\pm$ 4.947	21.340 $\pm$ 5.272	1.520	20	0.051	1.225	0.013
Duration, years	14.138 $\pm$ 6.264	9.264 $\pm$ 5.635	1.437	20	0.024	1.475	0.000
Duration of i.v. use, years	11.645 $\pm$ 5.917	6.573 $\pm$ 6.465	1.939	29	0.037	1.187	0.000

**i.v.** – intravenous; **SD** – standard deviation; **df** – degrees of freedom.

Statistically significant suicide occurred to the addicts who started taking opiates early, who (ab)used drugs for a long period and who were long-term intravenous heroin users.

**Table 3**

**Minnesota Multiphasic Personality Inventory 2 (MMPI 2) among opiate addicts**

Personality structure	Suicidal n (%)	Non-suicidal n (%)
Psychopathy	8 (16.3)	11 (10.9)
Hypersensitivity	9 (18.4)	13 (12.9)
Aggravated	3 (6.1)	5 (4.9)
Passive dependent	12 (24.5)	22 (21.8)
Narcissistic	1 (2.0)	10 (9.9)
Borderline	10 (20.4)	23 (22.8)
Passive-aggressive	2 (4.1)	8 (7.9)
Schizoid	4 (8.2)	9 (8.9)

The assessment of personal psychopathology was presented in Table 3.

By using the MMPI, we detected personality disorders which were categorized into eight categories: 1) psychopathy, 2) hypersensitivity structure, 3) aggravation of symptoms, 4) passive-dependent structure, 5) narcissistic structure, 6) borderline personality disorders, 7) passive-aggressive-structure, and 8) schizoid structure. In both groups, the most common was a borderline structure. Statistical analysis did not show statistically significant difference between groups in relation to structure of personality:  $\chi^2 - 163.766$ ,  $df-24$ ,  $p = 0.076$ .

The results of quality of life were shown in Table 4.

Significantly different variables of the MANSAs questionnaire were isolated using univariate analysis, and they were: dissatisfaction with friends, free time organization and conditions of accommodation.

Table 4

## Manchester Short Assessment of Quality of Life (MANSA) questionnaire

	Univariate analysis results for each different variable sigma-restricted parameterization effective hypothesis decomposition				
	DF	SS	MS	F	<i>p</i>
How much are you satisfied in general?	1	0.436	0.436	3.0890	0.081
How much are you satisfied with the job?	1	0.302	0.302	2.1404	0.146
How much are you satisfied with the financial situation?	1	0.129	0.129	0.9157	0.340
How much are you satisfied with your friends?	1	0.547	0.547	3.8729	0.051
Are you satisfied with the organization of your free time?	1	0.918	0.918	6.498	0.012
How much are you satisfied with your accommodation?	1	0.542	0.542	3.838	0.052
How much are you satisfied with your personal safety?	1	0.264	0.264	1.870	0.173
How much are you satisfied with people with whom you live?	1	0.123	0.123	0.876	0.351
How much are you satisfied with your sexual life?	1	0.361	0.361	2.555	0.112
How much are you satisfied with your family?	1	0.023	0.023	0.168	0.682
How much are you satisfied with your health?	1	0.024	0.027	0.170	0.680
How much are you satisfied with your mental state?	1	0.226	0.084	0.050	0.401
Total	150	0.887	0.886	5.648	0.038

DF – degrees of freedom; SS – sum of squares; MS – mean square; *p* – probability.

### Discussion

Drug dependence does not only increase the risk of suicide, but the drugs are used as a tool for suicide. While (excessive) alcohol consumption leads to behavioral disinhibition and loss of fear making the person susceptible to an easier suicide attempt, heroin users attempt suicide in order to alleviate dissatisfaction, anxiety or other bad feelings<sup>11</sup>.

A suicide attempt as a common occurrence in drug and alcohol abusers could be observed in several ways. The first aspect is the comorbidity. Research showed that 44%–86% heroin addicts had some mental disorder in their lifetime<sup>12–14</sup>. According to a research done by Brooner et al.<sup>12</sup>, among Axis I disorders, the mood disorders were the first in terms of frequency, with depressive disorder (lifetime prevalence of 15.8%, the current prevalence of 3.2%) occurring more frequently than bipolar affective disorder (lifetime prevalence of 0.4%, the current prevalence of 0.4%). Anxiety disorders also gave high comorbidity with opiate dependence (lifetime prevalence of 8.2%, the current prevalence of 5.0%)<sup>15,16</sup>. Although various psychotic disorders are relatively frequent cause or consequence of opiates consumption, diagnosis of schizophrenic disorder is, on average 1 per 100 addicts. The risk of suicide was increasing with underlying comorbid psychiatric disorders<sup>17</sup>. In this work, the addicts who had a primary affective disorder were excluded (among others) so that the emotional state was understood as a consequence of their “addictive life”.

According to this study, 32% of the opiate addicts who overdosed had suicidal intentions. The sample was dominated by the male subjects 3.5 times more frequently (of 49 subjects, 38 were men). The study did not confirm the information according to which the female addicts were about 4 times more likely to attempt suicide than the male ones<sup>3</sup>. The reason for these inconsistent data is that men are mostly (4/5) users of health services in our community. According to relevant literature, older men who use drugs are at a higher risk of suicide attempts than younger addicts<sup>18,19</sup>. This study confirmed also that suicidal intentions

were more likely to appear in older men. It can also be added that they were persons who had previously started with using heroin and continued to use it intravenously for a long time,<sup>20</sup>. The suicidal addicts brought the decision, earlier and easier, to use intravenous injections of heroin, so heroin administration might be a risk factor for suicidal attempt. The results of our study are in line with the results of this study and other ones<sup>21,22</sup>.

Another problem is that addiction is associated with multiple economic and social consequences, first of all crime, destruction of families, unemployment, homelessness, etc. These conditions would often be the cause of the “balanced” suicide attempts<sup>23</sup>. Life in marriage and/or extramarital community can be singled out from the socio-demographic data. Of the total number of the drug addicts who had attempted suicide, 30% were in the community (married) while in the second group, this percentage was 18%. It can be assumed that the life in marriage and/or extramarital community was an additional requirement that were imposed on addicts, and if they were not able to comply, mental distress was increasing as well as a risk of suicide<sup>24,25</sup>.

Among the addicts in both groups who overdosed, borderline structure of personality dominated. There was the high suicide rate among borderline structure of personality (8%)<sup>26</sup>, and suicide was the leading cause of death among heroin users having borderline structure of personality<sup>27,28</sup>. Our results also suggest that the percentage of borderline structure of personality among the addicts, especially the addicts who had suicidal intentions was as high as 23%. This pattern was highly selective for opiate addicts with clear suicidal intent, and that is why we had so high percentage borderline structure of personality in the sample.

In this research, the drug addicts with suicide intentions frequently experienced some traumatic event before the suicide attempt, which was presented as a statistically significant result, and they had more suicide attempts in the previous period. Similar results was obtained by Maloney et al.<sup>28</sup>. In their research, as many as 19% of the addicts had more suicide attempts. Respondents reported different traumatic

events. These were: arguments with loved ones, loss of income, physical assault, loss of a close person in one case and the weight of a family member's disease in two cases. Earlier research had recognized the tendency for borderline structure of personality and traumatic events, especially posttraumatic stress disorder (PTSD) to co-occur in suicidal addicts<sup>29-31</sup>.

A statistically significant difference was obtained in relation to a variable regarding quality of life. Systematic use of life quality indicators to monitor the outcome was poor, despite the wide-ranging effects which substance use disorders had on patients, families, and society<sup>32</sup>. Substance-dependent individuals had lower quality of life<sup>33</sup>. For example, the drug addicts scored significantly lower than the general population as far as physical and mental functioning was concerned, as low as, or lower than patients with lung disease and diabetes and significantly lower than patients awaiting cardiac surgery<sup>34</sup>. The biggest difference in our research appeared in relation to the satisfaction with housing conditions, friends and free time.

By integrating the data obtained, we made two assumptions. One is that a suicide addict is not an uniform phenomenon, but is affected by multiple bio-psycho-social factors. Etio-pathogenic, these are generally addicts who had previously began using drugs, and it lasted for a long time. It can be assumed that the earlier onset partly interplay with borderline personality structure. Combinations of that personality structure and early opiate dependency caused impulsiveness, tendency to risky behavior and a lower quality of life. This aspect will be the research topic in the following works.

There are several limitations of the generalizability of the findings in this study. The cross-sectional design was

used on relatively small sample and thus the observed differences in the personality traits do not provide explanation whether they are the causes or consequences of heroine dependence development. Furthermore, the patients in substitute treatment program are likely to have more severe psychopathology and comorbidities compared to the general population. Also, patients' personality traits scores were not pre-morbid and chronic heroin use may modify the assessment of personality traits. The larger prospective study with both gender subjects is needed for further study of complex interplay between heroine addiction, suicide attempts and personality traits. Thus, these findings might inform early interventions and treatments that target heroin addicts at a risk of overdose and suicide attempts during substitute treatment.

### Conclusion

The suicide attempts were more frequent among the male opiate users. It was associated with younger age, early onset, intravenous administration of heroine, longer period of taking heroine and risks.

Among the addicts with suicide attempts, borderline personality structure dominated. They reported traumatic events before suicide attempt and more suicide attempts in the previous period.

Addicts with suicide attempts had low quality of life, particularly in the areas of housing satisfaction, friends and the organization of free time.

In accordance with the obtained data, it is necessary to design programs for the prevention of suicide among addicts in general, and especially programs that would be aimed at younger addicts.

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