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Characteristics of suicide in the city of Niš within the period 2000–2010

Karakteristike samoubistva u gradu Nišu u periodu 2000–2010. godine

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Abstract

Background/Aim. Suicide is a significant public health problem worldwide. Numerous factors contribute to suicide. The aim of this study was to investigate the characteristics of suicide in the city of Niš in the period 2001–2010. **Methods.** The retrospective study consisted of 608 persons divided into three groups: suicide committers with mental disorders, somatic disorders or without registered disorders. Data on socio-demographic characteristics, previous suicide attempts, methods of suicide and presuicidal syndrome were obtained from the Police Directorate for the city of Niš, Ministry of Internal Affairs, Republic of Serbia and from the Statistical Office of the Republic of Serbia. **Results.** Persons with mental disorders were the most prevalent group of people who committed suicide (54.3%), followed by persons without registered disorders (31.9%) and with somatic disorders (13.8%). Persons with mental disorders who committed suicide were most often divorced, with high school education, monthly salary and with at least one previous suicide attempt. The hanging was the most frequent method of committing suicide in all investigated groups, followed by self-poisoning using drugs or liquid substances. The presuicidal syndrome was significantly more frequent among persons with mental disorders compared to persons with somatic disorders or without registered disorders others (45.8% vs. 16.7%, and 45.8% vs. 28.4% respectively $p < 0.001$). **Conclusion.** Although the persons with mental disorders are in the greatest risk of suicide, they are under medical care. In this regard, the prevention programs should be directed towards persons with severe somatic disorders and to old persons without registered disorders.

Key words:
suicide; risk factors; comorbidity; mental disorders; psychophysiologic disorders; serbia.

Apstrakt

Uvod/Cilj. Suicid je značajan svetski zdravstveni problem. Mnogobrojni faktori doprinose nastanku samoubistva. Cilj ovog istraživanja bio je ispitivanje karakteristika suicida na teritoriji grada Niša u periodu 2001–2010. godine. **Metode.** Ovo retrospektivno istraživanje obuhvatilo je 608 osoba koje su izvršile samoubistvo podeljenje u tri grupe: osobe sa psihičkim poremećajima, osobe sa fizičkim poremećajima i osobe bez registrovanog poremećaja. Podaci o sociodemografskim karakteristikama, prethodnim pokušajima i načinima izvršenja samoubistva i prisustva presuicidnog sindroma prikupljani su iz Ministarstva unutrašnjih poslova Republike Srbije, Policijske uprave grada Niša i Zavoda za statistiku Republike Srbije. **Rezultati.** Suicid su najčešće izvršile osobe sa psihičkim poremećajima (54,3%), zatim osobe bez registrovanog poremećaja (31.9%), a najmanje osobe sa somatskim smetnjama (13.8%). Osobe sa psihičkim poremećajima najčešće su bile razvedene, sa srednjim obrazovanjem, mesečnim primanjima i bar jednom su prethodno pokušale samoubistvo. Najčeši metod suicida bio je vešanje a zatim samotrovanje lekovima. Presuicidni sindrom najčešće je uočen kod osoba sa psihičkim poremećajima u poređenju sa osobama sa somatskim poremećajima ili sa osobama bez registrovanih poremećaja (45,8% prema 16,7%, i 45,8% prema 28,4%, redom $p < 0.001$). **Zaključak.** Iako su

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osobe sa psihičkim smetnjama pod najvećim rizikom da izvrše suicid, one su pod psihijatrijskom kontrolom, stoga bi program prevencije suicida trebalo da bude usmeren na osobe sa teškim somatskim smetnjama i invaliditetom, kao i na stare, usamljene osobe bez dijagnostikovanih poremećaja.

Ključne reči:
samoubistvo; faktori rizika; komorbiditet; psihički poremećaji; psihofiziološki poremećaji; srbija.

Introduction

Suicide is defined as the act of deliberately killing oneself. There is no single explanation of why people commit suicide. Moreover, there is no single factor responsible for suicide death. It is a complex psychopathological phenomenon that is influenced by several interacting factors, such as personal, social, psychological, cultural, biological and environmental [1].

Suicide still represents a significant public health problem worldwide. Despite global increase in population between 2000 and 2012, the absolute number of suicides fell about 9%. The World Health Organization (WHO) estimated that 804,000 suicide deaths occurred worldwide in 2012 represented an annual global age-standardized suicide rate of 11.4 per 100,000 population (15.0 for males and 8.0 for females). In 2012 suicide accounted for 1.4% of all deaths worldwide, making it the fifteenth leading cause of death. Additionally, it is the second leading cause of death in population aged 15–29 years[2].

The prevalence, characteristics and methods of suicide vary widely according to different geographic regions, different communities and ethnic origin, gender, age and time. Although the age-standardized rate of suicide is slightly higher in high-income countries (HICs) than in low-income and middle-income countries (LMICs), 12.7 vs. 11.2 per 100,000 people, 75.5% of all global suicides occur in LMICs. Significantly more men than women die by suicide. In HICs male-to-female suicide ratio is higher compared to LMICs (3.5 vs. 1.6). In most countries, the highest suicide rates is recorded among elderly people. With regard to the age, the highest suicide rates are noted among persons aged 70 years or over, both of men and women in almost all regions of the world. However, over the past 50 years, suicide rates have risen among young people [1–3].

In Serbia, in the period from the early 1950s to the mid-2010s, the total number of suicides exceeded 75,000. In the mid-2010s, the average age-standardized mortality rate was 16 suicides per 100,000 inhabitants. The differences in suicide deaths according to gender and age in Serbia followed the world trend. In the last two decades, out of a total number of suicides, 70.7% were committed by males and only 29.3% by females.

In addition, 48.1% of persons who committed suicide were aged 60 years or over. Although downward trend in suicide mortality in the last two decades was observed, Serbia is still significantly above the world and slightly above the European average [4–6].

It has been reported that numerous factors contribute to suicide. In general, these factors can be categorized as state-dependent, or, proximal and trait-dependent, or distal factors. The distal factors increase predisposition, whereas the proximal ones act as precipitants. Mental and somatic disorders, psychosocial crisis, availability of means and exposure to models are common proximal risk factors. On the other side, genetic loading, personality characteristics, restricted fetal growth and perinatal circumstances, early traumatic life events and neurobiological disturbances are recognized as distal risk factors [7, 8]

Years of research on suicide show that people with current mental disorders are the most common group dying by suicide. Previous studies reported that mental disorders are present in about 80%–90% of persons who kill themselves and contribute with 47%–74% to population risk of suicide. Specific disorders associated with suicide include mood disorders, substance use, anxiety, impulse control disorders, personality and psychotic disorders [9, 10]. In addition, previous findings confirmed that persons with more than one mental disorder are at a higher risk of suicide, especially those with both depressive and substance use disorders [11]. Furthermore, suicide is associated with poor physical health and disabilities [12].

Recent studies reported the suicide mortality of Serbian population in different time periods related to age and gender [5, 6, 13]. On the other side, there are no previously reported findings of suicide among the persons with mental or somatic disorders. Therefore, this study aimed to investigate the suicide deaths at the territory of the city of Niš in the period 2001–2010. Furthermore, this study investigated the possible differences in age, gender, socio-demographic characteristics and presuicidal syndrome among the persons with mental and somatic disorders who committed suicide.

Methods

This retrospective, psychological autopsy study [14] consisted of 608 persons who committed suicide at the territory of the city of Niš, Republic of Serbia in the period within 2001–2010. Data on persons who died of suicide and self-inflicted injury [site codes X60-X84 revision 10th of the International Statistical Classification of Diseases and Related Health Problems (ICD-X)] [15] were obtained from the Police Directorate for the city of Niš, Ministry of Internal Affairs, the Republic of Serbia and Statistical Office of the Republic of Serbia, Department of Demography. We included only those reports where death occurred from self-inflicted or intentional self-harm.

The study sample was divided into three groups. The first group consisted of 330 persons, with previously diagnosed mental disorders, who committed suicide. The eighty-four suicide committers with previously diagnosed somatic disorders were included in the second group. Others were in-

cluded in the third group which consisted of 194 persons, without any diagnosed disorder, who committed suicide (Table 1). From each family interview, medical and police record, we extracted the details of age, gender, marital status, educational level, source of income, current diagnosed mental or somatic disorder, history of previous suicide attempts and methods of suicide. Additionally, we made a record of any reported presuicidal syndrome in the period before the suicide in all included patients. The presuicidal syndrome was defined as any change in the usual behavior of person during the lifetime before the suicide (i.e., sadness, tiredness, reticence, nervousness, worry, indecisiveness, poor concentration, etc.) [16].

Statistical analyses were performed by IBM SPSS Statistics for Windows Software (Version 20.0 < IBM Corp, Armonk, NY, USA). Results were presented as frequencies and percentages. The χ^2 analysis was conducted to assess a statistical significance of categorical data. All p values less than 0.05 were considered significant.

Results

A total of 608 (293 males and 315 females) suicide deaths occurred in the city of Niš during the investigated period. Persons with mental disorders were the most prevalent group among those who committed suicide (330, 54.3%), followed by persons without registered disorders (194, 31.9%) and with somatic disorders (84, 13.8%) (Table 1). The number of suicide deaths increased annually in all groups during the investigated period. Although the number of suicides in persons with mental disorders were higher compared to other groups, we did not observe any significant differences in the trend of suicide deaths among them (p = 0.088) (Figure 1).

The average age of suicide committers in the groups with mental and somatic disorders was as follows, 49.86 ± 18.10 and 49.69 ± 15.39 years. On the other hand, an average age of persons who committed suicide in the group of others without registered disorder were 55.82 ± 25.27 years.

Table 1

Distribution of suicide committers included in the study

Study group	Type of disorder	n
Persons with mental disorders	Depressive episodes (ICD-V-F 32)	104
	Disorders of adult personality (ICD-V-F 60-63)	103
	Disorders due to use of alcohol (ICD-V-F10)	69
	Disorders due to use of opioids (ICD-V-F 11)	33
	Schizophrenia (ICD-V-F-20-21)	21
Persons with somatic disorders	Malignant neoplasms (ICD-II-C-00-97)	61
	Invalidity (ICD-VI-G-10-14,35; IX-I-69)	23
Others (without disorders)		194
Total		608

ICD = International classification of diseases; n = number of persons.

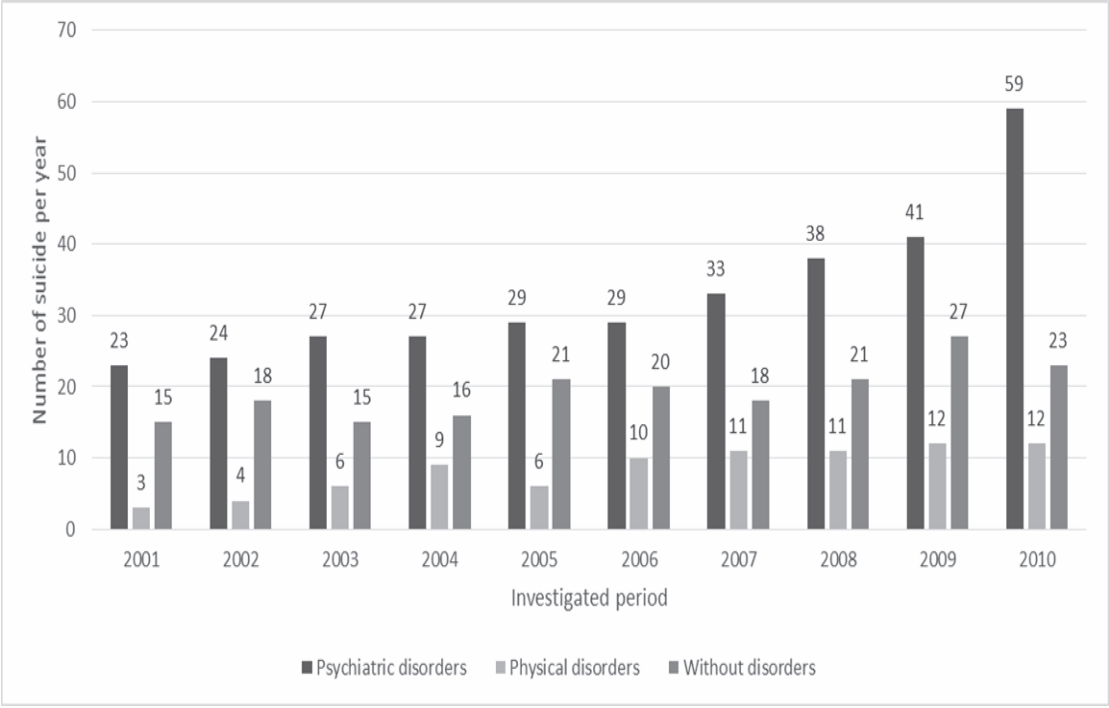

Fig. 1 – The number of suicides within 2001–2010 period.

The observed difference was statistically significant the groups ($p = 0.002$). Additional Bonferroni correction analysis revealed that a significant difference existed only between the group of persons with mental disorders and the one without registered somatic disorders ($p = 0.002$).

Most of the suicide committers with mental disorders were divorced (92; 27.9%) or single (87; 26.4%). Moreover, most of the suicide committers with somatic disorders were married (35; 41.7%) and persons without registered disorders were widowed (58; 29.9%) or single (57; 29.4%). Observed marital status differences were statistically significant ($p < 0.001$) (Table 2). In all investigated groups, the high school was the most frequent level of education (50.9%, 48.8%, and 53.1%, respectively). The frequencies of this type of education among suicide groups were significantly different compared to other education levels ($p < 0.001$) (Table 2). In regard to their source of income, most persons with mental and somatic disorders who committed suicide had a monthly salary (49.1%, and 63.1%, respectively). On the other side, the majority of persons without registered disorders were financially dependent (87, 44.8%). These observed differences were statistically significant ($p < 0.001$), (Table 2).

We did not record the previous suicide attempts in a majority of people with somatic disorders and without registered disorders (91.7%, and 86.7%, respectively) (Table 2). Moreover, the majority of persons with mental disorders had one previous suicide attempt recorded (42.4%). We observed a significant difference in previous suicide attempts between investigated groups ($p < 0.001$) (Table 2).

The hanging was the most frequent method of committing suicide in all investigated groups (35.5%, 33.3%, and 34.5%, respectively), followed by self-poisoning using drugs or liquid substances (25.2%, 27.4%, and 26.3%, respectively). However, differences between methods of suicide were not statistically significant ($p = 0.296$) (Table 3).

Most of suicide committers in all investigated groups did not have presuicidal syndorme (54.2%, 83.3%, and 71.6%, respectively). On the other hand, presuicidal syndrome was more frequent among the persons with mental disorders compared to the persons with somatic disorders or to those without registered disorder (45.8% vs. 16.7%, and 45.8% vs. 28.4%, respectively). These differences were statistically significant ($p < 0.001$) (Table 4).

Table 2

Socio-demographic characteristics

Socio-demographic status	Persons with mental disorders, n (%)	Persons with somatic disorders, n (%)	Persons without disorders, n (%)	*p* value [a]
Marital status				
single	87 (26.4)	16 (19.0)	57 (29.4)	
married	75 (22.7)	35 (41.7)	41 (21.1)	
extramarital community	26 (7.9)	14 (16.7)	16 (8.2)	$p < 0.001$
divorced	92 (27.9)	12 (14.3)	22 (11.3)	
widowed	50 (15.2)	7 (8.3)	58 (29.9)	
Education level				
no school	10 (3.0)	0 (0)	13 (6.7)	
elementary school	24 (7.3)	9 (10.7)	45 (23.2)	
high school	168 (50.9)	41 (48.8)	103 (53.1)	$p < 0.001$
faculty	128 (38.8)	34 (40.5)	33 (17.0)	
Source of income				
salary	162 (49.1)	53 (63.1)	35 (18.0)	
pension	61 (18.5)	6 (7.1)	52 (26.8)	
social care	21 (6.4)	3 (3.6)	20 (10.3)	$p < 0.001$
dependent	86 (26.1)	22 (26.2)	87 (44.8)	
Previous suicide attempts				
no	135 (40.9)	77 (91.7)	170 (86.7)	
yes, once	140 (42.4)	7 (8.3)	19 (9.8)	$p < 0.001$
yes, more than once	55 (16.7)	0 (0)	5 (2.6)	

[a] χ^2 test; n = number of persons.

Table 3

Methods of suicide

Methods of suicide (ICD – X code)	Persons with mental disorders, n (%)	Persons with somatic disorders, n (%)	Persons without disorders, n (%)
Self-poisoning by drugs and by exposure to liquid substances (X60-65, X68-69)	83 (25.2)	23 (27.4)	51 (26.3)
Hanging (X70)	116 (35.2)	28 (33.3)	67 (34.5)
Drowning and submersion (X71)	31 (9.4)	10 (11.9)	30 (15.5)
Firearm and explosive material (X72-75)	60 (18.2)	9 (10.7)	28 (14.4)
Jumping from a high place (X80)	40 (12.1)	14 (16.7)	18 (9.3)

ICD-X – International Statistical Classification of Diseases and Related Health Problems, 10th revision; n = numbers of persons.

Table 4

The presence of presuicidal syndrome in investigated groups

Altered behavior	Persons with mental disorders, n (%)	Persons with somatic disorders, n (%)	Persons without disorders, n (%)	*p* value [a]
Yes	151 (45.8)	14 (16.7)	55 (28.4)	
No	179 (54.2)	70 (83.3)	139 (71.6)	$p < 0.001$

[a] χ^2 test; n = number of persons.

Discussion

Suicide is a complex and heterogeneous condition. It is known that numerous factors contribute to suicide, which is never the consequence of one single cause or stressor.

Previous psychological autopsy case-control studies showed a strong relationship between suicide and mental disorders [17, 18]. They have shown that mental disorders are present in 80%–90% of persons who kill themselves. Moreover, Harris and Barraclough [19] reported that the risk of suicide increased 5-fold to 15-fold in persons with mental disorders. Previous meta-analyses suggested that specific mental disorders were associated with a higher risk of suicide [9, 20]. They reported that mood disorders [summary odds ratio (SOR) = 13.4], substance-related disorders (SOR = 5.2), personality disorders (SOR = 4.5) and psychotic disorders (SOR = 6.6) were the most common mental disorders among the persons who committed suicide. These results are in accordance with the study of Ferrari et al. [21] who stated that the relative risk of suicide in an individual with major depressive disorder was 19.9 (OR = 9.5–41.7), with schizophrenia 12.6 (OR = 11.0–14.5), and with alcohol use 9.8 (OR = 9.0–10.7).

The results of our study are in accordance with previous reports. More than a half of persons who committed suicide in the city of Niš during the period between 2000 and 2010 had diagnosed mental disorders. The most frequently diagnosed disorders were depression episodes (34.3%), disorders of adult personality (34 %) and disorders due to the use of alcohol and opioids (33.7%). Depression is recognized as a leading diagnosis associated with suicide, occurring in almost two-thirds of the cases [22]. It is disturbing that around three-quarters of suicide occurred to individuals who were never examined at the second care services [23]. Recent systematic review of Hawton et al. [24] identified the following suicide risk factors in persons with depressions: male gender, family history of suicide or mental disorders, history of attempted suicide, hopelessness and comorbid disorders such as anxiety, personality disorder, misuse of drugs, and alcohol abuse. Additionally, Coryell and Young [25] reported that clinical predictors of suicide in persons with major depressive disorder include a history of attempted suicide, high levels of hopelessness and high ratings of suicidal tendencies.

For every suicide committed, there are significantly higher number of people who attempt suicide every year. Significantly, a previous suicide attempt is the single most important risk factor for suicide in the general population [1]. We showed that the persons with mental disorders who committed suicide more often previously tried to commit suicide compared to persons with somatic disorders and those without registered disorders (42.4% vs. 8.3%, and 42.4% vs. 9.8% respectively; $p < 0.0001$). These findings are in agreement with the previously reported results [24, 25]. Some investigations showed that besides depression, bipolar disorder, borderline personality disorder, opioid use, schizophrenia, anorexia nervosa and alcohol use disorder showed significantly increased rates of suicide compared with general population [10, 26, 27]. On the other hand, Cho et al. [28] reported that studies from East Asia had a significantly lower mean prevalence of mental disorders among persons who committed suicide [69%, 95% confidence interval (CI) = 56.8–80.0] than those in North America (88.2%, 95% CI = 79.7–93.5) and South Asia (90.4%, 95% CI = 71.8–97.2). The authors suggest that the sociocultural factors in different geographic regions may have a possible role in suicide occurrence [28].

Hawton and van Heeringen [7] stated that about 10% of individuals who died by suicide in most countries had no apparent mental disorder. Moreover, suicide is also associated with several somatic disorders, including cancer, multiple sclerosis, spinal cord injury and pain [29–32]. Our results are in accordance with findings of Fegg et al. [32] who observed that cancer was the most prevalent somatic disorder in persons who committed suicide. Patients with cancer are more emotionally distressed, with depressed mood and with suicidal ideation [31]. Vyssoki et al. [31] reported that suicide risk increases with cancer severity. Deeper feeling of hopelessness with disabilities and lack of willingness to think that situation will improve are overwhelming feelings of those people. Recent findings showed suicidality and depression as the important predictors of suicide acceptability regardless occurrence of somatic disability [33, 34]. Additionally, several studies reported that patients with cancer were more prone to develop depressive episodes, which is additional comorbidity to mental disorders and suicide death [35, 36].

The previous study of suicidal behavior in Dutch primary care, conducted in 30-years period, noted that more males than females committed suicide. Also, the trend of such behavior was increasing in men, while it was continuously declining in women [37]. These findings are in accordance with other studies showing larger suicide risk in men than women as found for suicide in general [7]. Such results were explained by economic recession and threats of losing a job or unemployment that affected HICs during this period of research. On the other hand, our study on 608 people who committed suicide showed similar frequencies between genders. This could be due to different socioeconomical status between our and West European countries. Also, our study

covered the population of only one city area with specifically observed gender distribution.

The meta-analysis found unemployment as a risk factor for suicide after adjusting for prior mental disorder [38]. Likewise, our results showed that majority of persons without registered mental or somatic disorders who committed suicide were financially dependent. Feeling of hopelessness, defeat, entrapment and lack of future prospective, were recognized as risk factors for suicidal behavior, arising from long-term unemployment, job loses, incapability of work due to chronic illness or handicap [39, 40].

Our findings reveled significantly greater percentage of people who are single, divorced or widowed regardless the presence of mental disorders. Living alone is a well-known suicide risk factor [41]. Therefore, general practitioners should provide closer attention to this group and to the group of old people.

The variations in suicide methods are observed in relation to different region, gender, age, urban versus rural residence, etc. [3] According to WHO mortality data, there are three suicide methods which are the most frequently used – hanging, pesticide poisoning and using firearms [42]. The findings of this study are similar to the ones published in previous Serbian investigations [5, 6] regarding the most frequently used suicide methods. Ilic et al. [5] reported that the leading methods in Serbia were suicides by hanging and firearms. In addition, similar findings were reported by Dedic [6]. Our results are in line with these results. Thus, we reported that the most frequent method of suicide was hanging, which is followed by self-poisoning. These results are also in agreement with international evidence, which, in general, describe a superiority of suicide by hanging [43–45].

Conclusion

Our study showed that different mental disorders were the most frequently registered among suicide committers in the city of Niš in the period 2000–2010. Presuicidal syndrome was significantly more frequent in suicide committers with mental disorders compared to those with somatic disorders or in others. It is important to emphasize that the city of Niš is the third largest city – in the Republic of Serbia and this results may be also representative of the national level.

Although there is no way to predict who would commit suicide, recognition of early signs of presuicidal syndrome should be the basis for future prevention. It is important to emphasize that any change in usual behavior in persons with mental and somatic disorders might be an indicator for the possible suicide. Although the persons with mental disorders are in the greatest risk for suicide, in most cases they are under medical care. In this regard, the prevention programs should be directed towards people with severe somatic disorders and to the old ones without registered disorders. That is why it is necessary to establish the national suicide prevention strategies with specific targets for suicides reduction.

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