

EPIDEMIOLOGY OF SUICIDAL BEHAVIOUR IN SHUMADIA DISTRICT, SERBIA: A FIFTEEN-YEAR RETROSPECTIVE STUDY

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SUMMARY

Objectives: The purpose of this study is to analyze epidemiological characteristics of suicide, as well as to emphasize possible risk factors.

Methods: This is a retrospective study, covering the period of fifteen years (1996–2010), which aims at discovering the relevant factors which have an influence on suicidal behaviour. This research uses the data from the documentation of the Ministry of Internal Affairs of Serbia and Police Department in Kragujevac, hospitalization reports of patients treated at Psychiatric Clinic of the Clinical Centre Kragujevac, as well as the medical records of patients treated at the Health Centre Kragujevac. χ^2 test was applied to examine the influence of all selected factors on incidence of suicide and for this purpose SPSS statistical software package was used.

Results: The analysis has shown that during the given period average suicide rate reached 11.8 per population of 100,000. The male to female suicide ratio of 3.6:1 obtained through this study suggests that men (78.4%) are more prone to suicide than women (21.6%). The highest number of suicides has been found within the age group of 65-year-olds (31.2%), while for the youngest age group (15–24 years) the lowest prevalence of 8.8% has been determined. In other words, the youngest subjects are 3.5 times less likely to commit suicide than the participants of the oldest age group. During the given period suicide was most often committed by married males and females with primary school education than by employed and retired people. The research has also revealed that most suicides came from urban areas (52.0%) and that the most common method of suicide is hanging (60.8%), followed by suicide by firearms, jumping from height, poisoning, and drowning.

Conclusion: In order to prevent suicide, it is essential to collect and analyze all information concerning suicide victims.

Key words: suicide, epidemiology, risk factors

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INTRODUCTION

Suicide, a self-directed violence, is an important but still largely preventable public health problem that has been an issue of growing concern throughout the world (1, 2). Suicide was the tenth leading cause of death in 2010 (3). According to the World Health Organization (WHO), every year almost 1 million people die from suicide, which is 1.4% of the global burden of disease or more than 20 million disability-adjusted life-years (1–4). In fact, based on current trends, by the year 2020, the annual incidence of suicide is expected to exceed 1.5 million (1–4). The economic costs of suicide are also high. In the USA, suicide results in an estimated \$34.6 billion of medical and work loss costs (3). Suicide is the most frequent cause of death at the population level especially in the age group which represents labour force able to participate in economic activities (5).

The latest estimates show that global annual suicide mortality is 14.5 deaths per 100,000 people (6). The rate of suicide is the highest in the Eastern European countries such as Belarus, Estonia, Lithuania, and the Russian Federation while the lowest

rates were recorded in Latin America and Muslim countries (7, 8). Worldwide suicide rates in males and females differ significantly in most countries. In developed countries, on average, males die of suicide 2 to 4 times more often than females. The only exception is China, where rates in females are consistently higher than suicide rates in males (6). The male – female rate ratio of suicide is estimated to be the highest in the European Region (4.0) and the lowest in the Eastern Mediterranean Region (1.1) (4).

Suicide is one of the three leading causes of death among those aged from 15–44 in some countries and the second leading cause of death in the age group of 10–24 (9). These figures do not include suicide attempts which are up to 20 times more frequent than completed suicides (10, 11). In addition, women attempt suicide three times more often than men but men choose more violent means of suicide (12).

Suicide is a complex phenomenon since it includes numerous psychological, social, biological, cultural, and environmental factors. Risk factors for suicide include mental and physical illness, alcohol or drug abuse, chronic illness, acute emotional distress, violence, a sudden and major change in an individual's

life, such as loss of employment, separation from a partner, or in many cases a combination of these factors (1). Suicidal ideations and attempts are among the most important risk factors for committed suicides (13).

The primary aim of this study is to analyze epidemiological traits of suicide and to indicate possible risk factors. The results of this research can be used to analyze the factors which trigger suicidal behaviour and can be consequently used in suicide prevention.

MATERIALS AND METHODS

This is a fifteen-year retrospective study (1996–2010), which provides a review of the factors that influence suicidal behaviour. The frequency and distribution of suicide have been analyzed in respect to gender, age, place of residence, migration, education, occupation, source of income, marital status, family structure, the place of execution, and manner of suicide.

The primary goal is to discover risk-motivation factors which in addition to disposition towards suicide often lead to completed suicide.

Observation units are those subjects that committed suicide in the city of Kragujevac during the given period. First, a complete list of all committed suicides was made. The data from the site of the Ministry of Internal Affairs of Serbia and Police Department in Kragujevac, hospitalization reports of patients treated at Psychiatric Clinic of the Clinical Centre Kragujevac, as well as the medical records of patients treated at the Health Centre Kragujevac were used in this study. The data provided by the Statistical Office of Serbia, located in Belgrade, were used for demographic research. The data on the number of employees per each year of observation were obtained from the report of the Institute for Labour Market – branch in Kragujevac.

For the statistical analysis, following methods were used: collecting and sorting of statistic data (grouping and presentation), statistical description and statistical analysis. χ^2 test was applied to examine the influence of all selected factors on incidence of suicide and for this purpose SPSS statistical software package was used. After statistical processing, the results were presented in Tables and Figures.

RESULTS

Over the 15-year observation period, there were 304 completed (fatal) suicide attempts. The average suicide rate was estimated at 11.8 (per population of 100,000) (Fig. 1.).

The average rate of suicide by gender (per population of 100,000) reached 18.9 for men and 4.9 for women. Analysis by gender showed that suicides in men were higher (78.4%) than in women (21.6%) with the male to female suicide ratio of 3.6:1.

The average age of all suicides for the given period was 52.27 years ($SD=19:28$). The youngest suicide was 15 and the oldest 91 years old. The average age of men who committed suicide was estimated at 51.98 years ($SD=19.69$) and the average age of women at 53.30 years ($SD=17.81$). The majority of suicides committed in the given period were among 65-year-olds (31.2%). The youngest age group (15–24 years) had the lowest prevalence

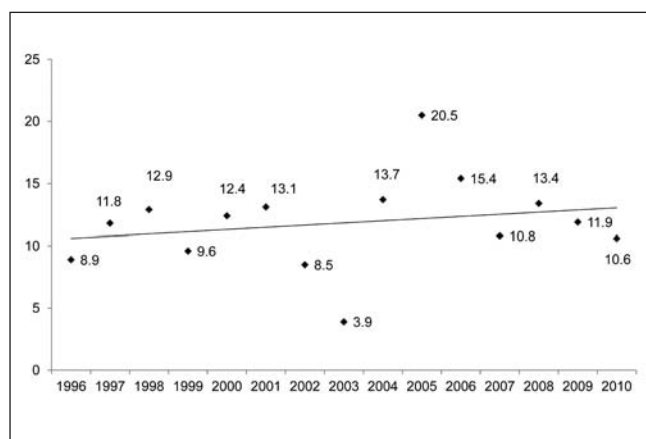


Fig. 1. Incidence rates of suicide per 100,000 population, 1996–2010.

of 8.8%, which is 3.5 times lower than in the oldest age group (Table 1). The difference in incidence of suicide by years of observation between different age groups is not statistically significant ($\chi^2=70,987$, $df=55$, $p=0.072$).

In terms of place of birth and migration, the analysis showed that the natives (54.0%) committed suicide more often than the immigrants (46.0%).

In relation to the place of residence, the results of this study revealed that most suicides, more than half of them, came from urban areas (52.0%), while almost each fourth suicide came from rural areas (27.2%). Every sixth suicide victim came from the suburbs (16.0%) and the rest of suicides were the users of social institutions (4.4%) and the users of collective accommodation (0.4%).

In terms of education level, the study showed that the highest number of suicides attained only primary school education (44.0%), followed by those with secondary school education attainment (40.4%), and then the illiterate (6.8%). About 6.4% of suicide patients were university graduates while for 2.4% of patients there were no data about education level. The statistical analysis showed that there is a highly statistically significant difference in education level between different age groups ($\chi^2=96,521$, $df=20$, $p<0.001$). The youngest age group of suicides most commonly completed high school education (72.7% in the 15–24 age group and 75.7% in the age group of 25–34 years). Within the oldest age group (65 and over), the most suicides had up to 8 years of primary school education (62.8%) or were illiterate (20.5%).

When it comes to employment, the results showed that majority of suicides were unemployed (67.6%). The employed subjects share was 31.6% of the total number of suicides. The ratio of unemployed and employed was thus 2.1:1. The statistical analy-

Table 1. Distribution of suicide according to age groups ($N=304$)

Age (years)	Percent	Number
15–24	8.8	27
25–34	14.8	45
35–44	11.8	36
45–54	20.7	63
55–64	12.5	38
65 and more	31.2	95

sis revealed that there is no statistically significant difference ($\chi^2=0.714$, $df=2$, $p=0.700$) among men and women in relation to employment. The percentage of the employed is approximately the same for both genders. However, the statistical analysis indicated that there was a statistically significant difference between age groups in terms of employment ($\chi^2=65,831$, $df=10$, $p<0.001$). The number of the employed was higher in the youngest age group (15–24) and it amounts to 86.4% while the share of the employed in the age group of 45–54 years equals 61.5%. In the oldest age group (65 and over), 96.2% of the suicides were unemployed (Table 1).

The most common categories of the suicides were: the employed (31.6%) and the retired (29.6%); followed by farmers (12.4%), housewives (7.6%), the unemployed (5.6%), and those with higher education (4.0%). Students were present in 2.4% and 2.0% were university students.

In terms of income of suicides, the study showed that most suicides had pensions as a source of income (31.2%) or personal income (28.8%). The dependents had a share of 23.6% and those with agriculture as a primary source of income represented 11.2% of the total number of suicides. The lower number of suicides used material assistance after a job loss (2.8%) or welfare (1.6%).

The study also investigated the family structure of suicides revealing that 28.8% of the observed suicides lived with a spouse and children and 18.4% only with spouses, 14.4% of the suicides lived with both parents and almost an equal number of them (14.0%) lived completely alone. In addition, the analysis revealed that 11.2% of the suicides lived only with children while 5.6% of them lived with one parent. The lower shares were determined for those who lived in social institutions 3.6%, those who lived with relatives (1.2%), users of mental institutions (0.8%), and those with contracts for life sustenance (0.8%). The data concerning this factor were not available for 1.2% of the suicides.

A marital status was also included in this study as one of the factors. The analysis showed that most of the suicides were married (47.6%). Based on the results of this study, in the total number of suicides the unmarried have a share of 24%, the widowed 18.8% and divorcees 6%. The lowest share was determined for those who were cohabiting and it equals 1.6%.

In terms of suicide methods, the study revealed that the most common method was hanging (60.8%), followed by suicide by firearms (22.8%), jumping from height (6.8%), poisoning (3.2%), and drowning (2.8%). The difference in gender in terms of suicide method is not statistically significant ($\chi^2=13.068$, $df=8$, $p=0.110$). In both men and women, hanging was the most common method (66.7% and 58.2%, respectively). In men, the second most common method of suicide included the use of firearms

(26.5%), followed by a jump from height and poisoning (5.1%). In women, the second most common suicide method was jumping from height (13.6%), followed by suicide by firearms (9.1%) and suicide by poisoning (6.1%) (Table 2). The results showed that men were 2.8 times more likely to commit suicide by using firearms while women were 2.5 times more likely to jump from height. Based on the results obtained through this analysis age does not have any impact on suicide method ($\chi^2=53,079$, $df=40$, $p=0.081$).

In terms of suicide location, this analysis revealed that almost a half of suicides was committed at home (46.0%) or near home (closet, garden, barn, etc.) (23.2%), while suicides at hidden places were more rare (18.0%).

Based on the results, the differences between genders in respect to suicide location are not statistically significant ($p>0.05$). Men and women often committed suicide in their own home (45.9% and 46.3%) or close to home (21.0% and 31.5%). Men were 2.2 times more likely than women to commit suicide at hidden places. Women were more likely to commit suicide in public places (5.5% of women and 4.6% of men), and in social/health care facilities (7.4% of women and 6.1% of men).

On the other hand, the results showed that age has an impact on the choice of suicide location which is statistically significant ($\chi^2=54,414$, $df=30$, $p=0.004$). The elderly people were 1.4 times more likely to commit suicide at home or near home. Members of the youngest age group committed suicide in a hidden place 2.8 times more often than the oldest.

DISCUSSION

The WHO has been documenting data on suicide since 1950. Currently, the data are available for 105 countries, which is just a half of the total number of countries on the planet (4). Even though the comparisons of suicide prevalence rates across countries are difficult to make due to differences in nature, quality, and availability of reporting as well as in data collection and analysis processes, the WHO provides some comparative international data (14). Japan had the highest rate in the 1950s, Hungary was the top country for the next three decades, and Lithuania took over in the early 1990s holding the top place for another two decades. Analyses have shown that during the last 50 years, the wave of high suicide morality has shifted from Western to Eastern Europe and now it seems to be shifting to Asia (4). Lithuania has the highest suicide rate of 34.1 suicides per 100,000 inhabitants. Male suicide rates are the highest in post-communist countries such as Lithuania (51.4/100,000), Belarus (46.9/100,000), Kazakhstan

Table 2. *Methods of suicide in males and females*

Method of suicide		Males (%)	Number	Females (%)	Number
X60–69	Poisoning	5.1	12	6.1	4
X70	Hanging, strangulation and suffocation	58.2	140	66.7	44
X71	Submersion (drowning)	2.5	6	3	2
X72–77	Firearms and explosives	26.5	63	9.1	6
X78–79	Cutting and piercing instruments	2.1	5	1.5	1
X80	Jumping from high place	5.1	12	13.6	9

(40.8/100,000), and the Russian Federation (39.5/100,000), while female suicide rates are the highest in Asian countries such as China (14.8/100,000), Korea (14.1/100,000), and Japan (13.1/100,000) (6). Male-female rate ratio is the highest in Puerto Rico (6.6), Slovakia (6.6) and Poland (6.4), while it is the lowest in China (0.9). China is the only country where the rate for females is higher than for males. Cultural factors and regional differences in socioeconomic status play an important role. The countries which contribute most to the number of suicides on the global level are China, India, Russia, USA, Japan, and South Korea (4). According to Vijayakumar more than half of suicides (54%) in the world occur in China and India (15).

From 1953–2008, 66,700 people committed suicide in Serbia. The average rate was 1,200 completed suicides per year. The number of suicides in Serbia has a significant tendency to increase. Serbia has uneven regional suicide rates. On average, suicide rates have been 2–3 times higher in Vojvodina than in Central Serbia during the last fifty years. The suicide rate exceeded 30 suicides per population of 100,000 during certain years. The lowest suicide rates in Serbia have been recorded in the south regions where the majority of citizens are Albanian, i.e. Muslims (16).

During the reported fifteen-year period, suicides in men were more common (78.4%) than in women (21.6%), with the male to female suicide ratio of 3.6:1. Gender is one of the most frequently examined factors for suicide. Numerous studies have shown that men have a consistently higher rate of suicide completion, while women have a higher rate of attempts (2, 17). Women attempt suicide three times more often than men but men complete suicide four times more often than women (12, 18). The differences in male to female ratio are often attributed to the fact that men use more lethal suicide methods, are more aggressive in their attempts and generally express stronger intent to die. Women more often attempt suicide to express and demonstrate their pain or as a gesture of “calling for help”. Men, on the other hand, may postpone suicide until helplessness and despair become unbearable (19). Furthermore, while females have greater resources to defend themselves from psychological trauma, problems such as unemployment, retirement, and diseases have greater psychological impact on males (20).

The dominance of men in executed suicide and women in attempted suicide varies from country to country, ranging from 4.7:1 to 1.4:1. However, there has been an increasing trend of female suicide lately which has been recorded in many countries. Many authors have tried to explain such tendency in females by emphasizing the recent changes in distribution of social roles between genders. Taking the roles that were previously reserved for men only, women are more exposed to sources of stress which were previously affecting men (16).

The majority of suicide victims belong to the age group of 65 years (31.2%). This is consistent with the results obtained in the previous studies (20), which have stated that the factors causing the elderly to commit suicide are related to physical diseases, being bereft of one's spouse, lack of income, and decrease in social activities – all of which are common in old age. Generally, the incidence of suicide increases with age (12). People who are 65 years old or more constitute a demographic group with the highest risk of completed suicide in most countries that report on suicide to the World Health Organization (21). Suicide also affects adolescents and young adults. It is the third leading cause

of death among youth aged 15–24 years (10.3 per 100,000 people) following unintentional injuries and homicide (12, 17). Although suicide rates have traditionally been the highest among elderly males, suicide rates among young people have been increasing to such an extent that they are now the third group with the highest risk in all countries (22).

In relation to the marital status, this analysis has shown that with both genders almost every other suicide was married and a quarter of them were not. These findings differ from what previous studies have concluded concerning the marital status of suicides. They have found that unmarried, divorced or single people are more prone to commit suicide (12, 22).

The majority of people of both genders who were included in this study had secondary school education and were unemployed. Such findings confirm the results obtained for Denmark where the majority of suicides are retired or unemployed (23).

This study must emphasize the fact that the majority of people who committed suicide during the given period were people from urban areas. Qin claims that people who live in more urban areas are at a higher risk of suicide than their counterparts in less urban areas. Urban living reduces suicide risk significantly among men, especially young men, but increases the risk among women, especially women aged 24–35 or > 65 (23).

The difference between countries in methods of committing suicide may reflect the differences in socioeconomic factors, firearms legislation and availability of lethal means, rather than differences in the nature of suicidal behaviour (10). The most frequent suicide method in both gender groups was hanging like in many other countries. The European Alliance Against Depression (EAAD) project, an international partnership of 16 European countries (England and Scotland, Belgium, Estonia, Finland, Germany, Hungary, Iceland, Italy, Luxembourg, the Netherlands, Portugal, Scotland, Slovenia, Spain, and Switzerland), has found hanging as the most frequent means of suicide (49.5%), followed by poisoning by drugs (12.7%), jumping from height (9.5%), firearms (7.6%), poisoning by other means (5.1%), jumping or lying before moving object (5.0%), and drowning (4.2%). In fact, 54.3% of males and 35.6% of females included in this study committed suicide by hanging. As hanging is universally available, it makes sense that it is the most common suicide method in many countries worldwide (24). Comparative study about methods of suicide between Japan and the United States has revealed that Japan has a very high proportion of hanging (70.4% for males and 60% for females); this proportion is much lower (18.2% for males and 16.2% for females) in the United States (25). Gender differences may play an important role. Indeed, men more often rely on more violent and highly lethal methods with consequences that are irreversible, and this fact has been hypothesized as the cause of higher rates of completed suicides in males than in females (26). According to the EAAD data, men have a statistically significantly higher risk of using firearms and hanging, and a lower risk of poisoning by drugs, drowning and jumping, as compared to women. Females more often use poisoning by drugs than males (24). Methods of suicide may also vary across the world regions and cultures. According to the data obtained from the World Health Organization (WHO) mortality database, poisoning by pesticide is common in many Asian countries and in Latin America; poisoning by drugs is common in Finland, Norway and in the United Kingdom. Hanging is the preferred

method of suicide in Eastern Europe, firearm suicide in the US and jumping from a high place in cities and urban societies such as Hong Kong, China. Strategies which aim at limiting the access to means used in suicide have proven to be effective and thus they should be an important part of a suicide prevention strategy (27).

In the general population, studies have found a relationship between traumatic events and suicidal behaviour across developed and developing countries (28).

Many studies have identified risk factors associated with suicide. Mann et al. state that suicide prevention is possible because up to 83% of suicides have had contact with a primary care physician within a year before their death and up to 66% within a month (8).

CONCLUSION

It is clear that suicide prevention does not only require interventions from health sector; it calls for an innovative, comprehensive multi-sectoral approach, including both health and non-health sectors, e.g. education, labour, police, justice, religion, law, politics, the media, and the WHO. Primary prevention programmes designed to enhance social connections and a sense of belonging to a community could potentially decrease suicide risk, especially among men. In order to prevent suicide, it is essential to collect and analyze all information concerning suicide victims.

Conflict of Interests

None declared

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