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Suicides in the Region of Northern Slovakia: A Retrospective, Single-centre Autopsy Observational Study over a 10-year Period

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SUMMARY

Suicidal behavior is multifaceted and encompasses various factors. Among these, alcohol dependence and acute alcohol intoxication stand out as significant risk factors for suicide. The retrospective study aimed to record the development of suicide, also in connection with alcohol consumption, in the catchment area of the Department of Forensic Medicine and Pathological Anatomy of the Health Care Surveillance Authority in Martin, Slovak Republic, in the years 2009-2019.

Keywords: suicide – alcohol – suicidality – northern Slovakia – alcoholism

Samovraždy v regióne severného Slovenska: retrospektívna, monocentrická štúdia za obdobie 10 rokov

SÚHRN

Samovražda je celosvetovo označovaná za hlavnú príčinu predčasných úmrtí. Jedným z hlavných rizikových faktorov samovražedného správania je závislosť od alkoholu a akútna intoxikácia alkoholom. Predložená retrospektívna monocentrická štúdia zaznamenala vývoj samovražednosti v spádovom regióne pracoviska súdneho lekárstva a patologickej anatómie Úradu pre dohľad nad zdravotnou starostlivosťou v Martine v rokoch 2009 – 2019. Za uvedené obdobie bolo pitvaných celkovo 1100 samovrážd, z ktorých prevažovali muži v počte 957 jedincov (87%). Najvyššie zastúpenou vekovou skupinou bol produktívny vek (20 – 50 rokov) s počtom 493 osôb (45%). V súbore bolo zaznamenaných 487 prípadov s pozitívnym výsledkom koncentrácie alkoholu v krvi v čase smrti, pričom najviac bol zastúpený stupeň podnapitosti (146 osôb, 13%). U žien prevažovali negatívne výsledky vyšetrenia prítomnosti alkoholu v krvi v čase smrti. Chronické požívanie alkoholu bolo zaznamenané prevažne u mužov (39 údajov). Z psychiatrických ochorení dominovali diagnózy depresie (75 osôb) a schizofrénie (22 osôb). Samovražedný pokus v anamnéze bol zaznamenaný u 39 osôb s prevahou mužov (72%). Nevýrazne prevažovali samovraždy vykonané vo vidieckom prostredí (51%). Najvyšší počet samovrážd bol zaznamenaný v jarných mesiacoch, a to v počte 314, naopak najmenej v zime (231 osôb). Samovražda obesením jednoznačne dominovala (706 osôb), nasledovali strelné poranenia (130 osôb) a skok z výšky (98 osôb).

Kľúčové slová: samovražda – alkohol – samovražednosť – severné Slovensko – alkoholizmus

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Suicide represents a specific form of aggression, an attack directed towards oneself - auto-aggression, with the suppression of one of the strongest survival instincts - the instinct of self-preservation (1-3). In most cases, it is a coexistence of several negative risk factors.

Depending on the literature, men are 3- to 6-times more likely to commit an act of suicide, while suicide attempts are more frequent in women. The female gender has a greater tolerance for problems and more often uses the so-called "soft" methods (drug poisoning, self-cutting) (4). As individuals age, the proportion of suicide attempts tends to decrease, whereas the occurrence of completed acts increases. The age-suicide curve exhibits a bimodal pattern with two peaks. The first peak occurs at the age of 15 to 24. Motives for suicide are often in multifactorial nature, involving conflicts within the family, divorce of parents, failure at school, problems with peers, bullying, or unrequited love. The trigger for a suicidal act can be an immediate frustrating experience, such as a breakup with the first love. The second peak occurs in individuals over the age of 65 years when the range of completed suicides is up to 7 times higher compared to other age groups. The reason is long-term planning and the choice of "harder" methods with a minimal chance of failure. This phenomenon is frequently associated with psychiatric diagnoses such as depression, severe physical illness, deteriorating health conditions, and commonly, drug addiction, particularly alcohol dependency. The motive can be the loss of a life partner, loss of life security, or general exhaustion. Generally, isolation and living alone are associated with higher risk of suicide. Depending on the place of residence, the occurrence of suicides is described to be more frequent in areas with higher population density and countries with a high standard of living and economy. An individual's mental health plays a significant role in self-aggression risk, particularly in cases of current and/ or chronic mental disorder. Individuals diagnosed with depression, post-traumatic stress disorder, bipolar affective disorder, severe anxiety, psychosis, drug and alcohol addiction, and certain personality disorders, are more prone to engage in self-destructive

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behavior. An essential data in the medical history is a suicide attempt in the past or the occurrence of suicidal behavior in the family. In the cases involving drug addiction and alcohol addiction, when suspecting suicide, it is necessary to evaluate whether there was no overdose and failure to estimate an adequate dose. In addition to mental illnesses, somatic illnesses such as cancer, epilepsy, and multiple sclerosis are also involved in altering the perspective on the issue of death. Serious physical illness explains 11-51% of suicides (3,5). The availability of potentially lethal suicide methods is also cited as a possible explanation for the higher incidence of suicide in certain occupations. Examples include the availability of weapons for police officers and members of the armed forces, as well as the availability of medication for health workers and veterinarians (6). Other factors that can contribute to an increased risk of suicide include racial affiliation (higher incidence of suicide among Caucasians), religious affiliation (with higher rates among Protestants compared to Jews or Catholics), or certain personality characteristics, such as reduced frustration tolerance, impulsive tendencies, or extreme narcissistic vulnerability (3,5). This retrospective study describes the development of suicidal behavior in the period of 2009-2019, comparing it with facts about suicides from the available literature.

MATERIAL AND METHODS

Material:

A set of completed suicide cases from autopsy material from the Health Care Surveillance Authority's archive in Martin, Slovak Republic, for the period 2009 – 2019.

Method:

1. **phase:** selection of suitable cases of completed suicides with clear suicidal intent. For each case, the medical history and available information were fully evaluated. Unclear, questionable cases like unexplained cases with the possibility of an unfortunate accident (a fall from height, a train accident), and cases with incomplete documentation were excluded from the study.
2. **phase:** recording the obtained data in a summary table, which contained parameters such as positive blood alcohol concentration at the time of death, excessive alcohol consumption, gender, age, psychiatric anamnesis, suicide attempt in the past, permanent residence (urban or rural areas), month and year period of the act, and suicide method.
3. **phase:** the statistical results were compared with the results of national statistical research, foreign research, and confirmed or contradicted generally valid claims about suicide.

RESULTS

During the period from 2009 to 2019, a total of 1,100 deceased with suicidal manner of death from the relevant catchment area were autopsied at the Institute of Forensic Medicine and Medical Expertise and Health Care Surveillance Authority in Martin, Slovak Republic. On average, 100 autopsies were performed each year on individuals who committed suicide. The majority of cases involved men, with 957 individuals (87%). Women accounted for 143 cases (13%). The lowest represented age group was the pre-productive age range (10 – 20 years) comprising 36 cases (3%), followed by the productive age range (20 – 50 years) with a number of 493 cases (45%) and the most represented age group was the post-productive age (50 years and above) with 571 cases (52%). Regarding alcohol blood concentration, out of 1055 individuals evaluated, a total of 568 cases (52%) had negative blood alcohol concentrations. In 45 suicides (4%), the blood alcohol test was not performed due to a longer stay in a hospital facility or the advanced degree of decomposition (e. g. skeletal remains). The level of intoxication was recorded in 146 individuals (13%), with 69 individuals (6%) exhibiting a light degree of intoxication, 102 individuals (9%) displaying a moderate degree of intoxication, 123 individuals (11%) presenting a severe degree of intoxication, and 47 individuals (5%) having blood alcohol concentrations corresponding for alcohol poisoning levels. A comparison revealed that the presence of a negative finding of the alcohol blood concentration at the time of death in women prevailed over the cases in which suicidal women were influenced by the consumption of alcoholic beverages. The exception presents the year 2019, where positive blood alcohol concentration results at the time of death dominated in women in a ratio of 5:4. In the available medical records we focused on the presence of mental illness and psychiatric diseases. Depression was diagnosed in a total of 75 individuals, and schizophrenia in 22 individuals. Furthermore, other psychiatric illnesses were documented in the medical history, namely manic-depressive syndrome, psychoactive substance dependence syndrome, psycho-affective disorder, anxiety disorder, transsexual disorder, organic psycho-syndrome, anorexia nervosa, and unspecified psychiatric illnesses, in a total number of 36 individuals. A total of 544 completed suicides (49%) were recorded in urban areas, while 556 completed suicides (51%) occurred in rural areas. The highest number of completed suicides occurred during the spring months (March-May), with a total of 314 cases. The spring months were followed by the summer period (June-August) with 301 suicides, the autumn period (September-November) with a number of 254 suicides, and the fewest suicides were committed in the winter months (December-February), with the number of 231 suicides. From the available anamnestic data, chronic alcohol consumption was documented in 39 individuals, out of which only 2 were women. In the autopsy reports of suicides for 2009-2019, there were 39 records of previous unsuccessful suicide attempts. Among the cases with a previous history of an incomplete act, 28 individuals (72%) were males, and 11 cases (28%) involved females. The most prevalent suicide method was hanging, which accounted for 706 cases (64%), followed by fatal gunshot wounds in the number of 130 records (12%) and the third most common way of ending life was jumping from a height in the number of 98 cases (9%). The combined form of suicide was registered in 18 cases (2%).

DISCUSSION

Suicide is a multifactorial process of intentionally ending one's own life. The location of the research was the dominant area of northern Slovakia, which offered an opportunity to investigate differences in the behavior of the population compared to the average Slovak population.

In the study file, a total of 1,100 autopsy protocols of individuals who died by suicide, with proven suicidal behavior, were analyzed. The highest number of suicides, reaching 117 individuals, was recorded in the year 2013. On the contrary, the lowest number of completed suicides was recorded in 2019, where the number did not exceed the limit of 78 individuals. Compared to the graph of the National Center for Health Information (Graph 1) (7), the development of the curve of the number of suicides in the territory of entire Slovakia is almost identical.

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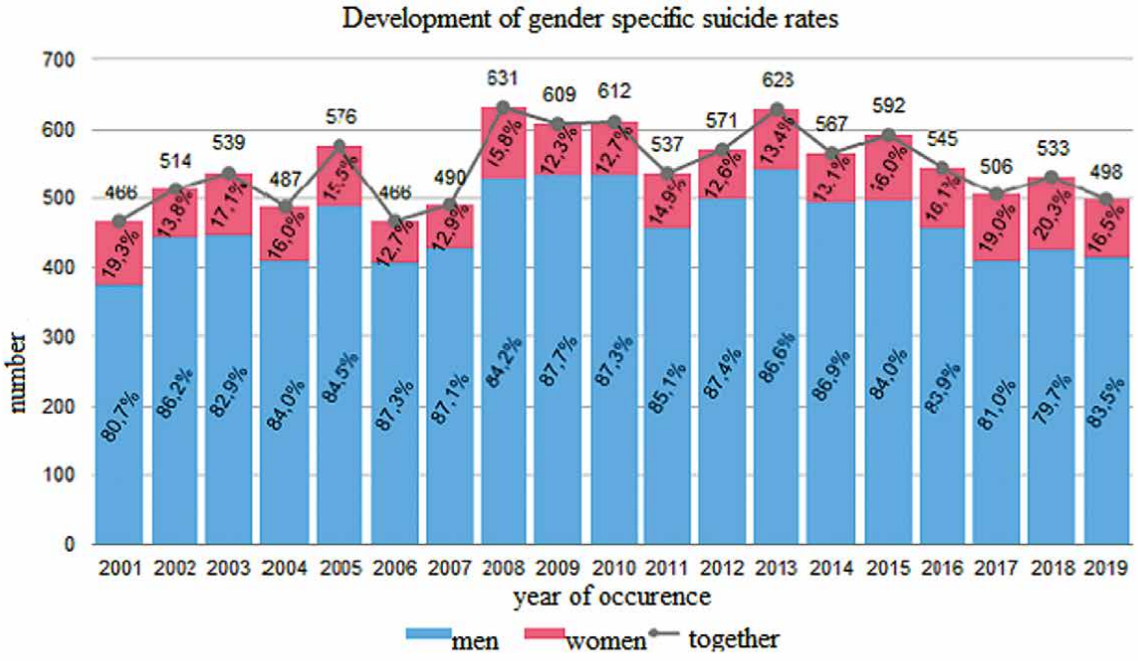

Graph 1. Development of gender specific suicide rates the number of suicides by gender in the territory of the Slovak Republic (7).

In the studied sample, there was significant dominance of men (87 %). Women, on the other hand, represented 13 % of the total cases. Compared to the above-mentioned Graph 1, the development of suicidality and its association with gender in our study group is almost analogous. The predominance of men in the studied group confirms the fact that men have a higher propensity to commit suicide than women (3,5).

The highest number of suicides occurred in the post-productive age, which represented 52%. This age group represents the second peak of the bimodal curve of suicidality in relation to age. These are mostly deaths of people older than 65 years when the range of suicides is up to 7 times higher. The reason for the successful completion of a suicidal act is long-term planning, thorough preparation, and the use of "harder" methods (3,5).

The file included 133 individuals (12 % of the entire file) whose psychiatric diagnosis was mentioned in the documentation, namely depression (75 individuals), schizophrenia (22 individuals), and other psychiatric illnesses were recorded in 36 persons, such as manic-depressive syndrome, psychoactive substance addiction syndrome, psycho-affective disorder, anxiety disorder, transsexual disorder, organic psycho-syndrome, anorexia nervosa, and further unspecified mental illnesses. The above-mentioned diseases constitute serious risk factors for the emergence of suicidal behavior and loss of the "will to live" (3,5). The low percentage representation of individuals suffering from a psychiatric illness may be attributed to insufficient interviewing and obtaining information about the deceased during the inspection of the location where the body was discovered.

A suicide attempt in the past was recorded in 39 persons, while men predominated - 28 individuals (72 %), and there were 11 women, which represented 28%. Despite the prevailing information in the literature indicating a higher number of suicide attempts among women (3,5), there has been a notable shift in Slovakia since 2006, with men now representing the majority (7).

The tendency to commit suicide was almost the same, both in urban areas (49 %) and in the countryside (51 %). Despite the perception that living in a rural or small-town setting is believed to provide a protective effect against suicidal behavior (3,5,8), our research findings indicate a slight predominance of suicides in rural areas within the studied group. This discrepancy can be attributed to the predominance of rural dwellings in the catchment area, the region of the workplace where the research was conducted. Another plausible factor could be the dearth of employment opportunities and the high unemployment rate in the peripheral northern regions of Slovakia.

The occurrence of suicidal activity shows an upward trend during the spring (314 cases) and summer months (301 cases), whereas a decrease is observed during the colder autumn (254 cases) and winter months (231 cases). This pattern was also evident within our studied group, aligning with the findings reported in the literature (3,5).

The most common recorded method of voluntary termination of life was hanging. It accounted for 706 cases, constituting 64 % of the entire study group. Gunshot wounds followed with 130 cases, followed by jumping from a height (98 cases), collision with a train (69 cases), cutting injuries (39 cases), and poisoning by drugs and psychoactive substances (36 cases). Other methods are listed in Tab. 1. Hanging is not only the most prevalent method of suicide in Slovakia but also across the entirety of Europe (9), which is also supported by our studied sample of suicides. However, the second most common form, namely fatal gunshot wound, presents an interesting finding. This method of suicide is rather widespread in the United States of America, where the ownership and accessibility of this type of weapon are easier (5). Considering the data obtained regarding the second most common method of suicide in our catchment region, it opens up the possibility for further discussion regarding the quantity and availability of firearms, as well as the prevalence of legal and illegal firearm ownership.

One of the main goals of this research was to evaluate the presence of alcohol in the blood at the time of death of individual. The degree of intoxication Under 0.99 ‰ was recorded in 146 individuals (13 %), with a light degree of intoxication in 69 individuals (6 %), a moderate degree in 102 individuals (9 %), a heavy degree of intoxication in 123 individuals (11 %), and the concentration of alcohol in blood corresponding for alcohol poisoning levels were detected in 47 individuals (5 %).

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Tab. 1. Suicide methods sorted by the most common forms.

Hanging	706
Gunshot injury	130
Fall from height	98
Train accident	69
Cut injury	39
Drug intoxication	36
Gas poisoning	7
Stab injury	4
Drowning	3
Disinfection poisoning	2
Suffocation in a non-breathable environment	2
Acid poisoning	1
Burning	1
Explosive mechanism	1
Electrocution	1

The obtained results reveal that the most prevalent concentrations of alcohol in the blood at the time of death fall within the range of 0.50-0.99 ‰ and severe intoxication (2.00-2.99 ‰). The level of intoxication can correspond to the imaginary "boost of courage" to complete the deed, on the contrary, a severe degree of alcoholic influence is a state when a person cannot recognize other options for solving the problem, leading them to resort to suicide to end their situation. However, in the examined group, negative results indicating the presence of alcohol in the blood at the time of death were more prevalent, accounting for 568 cases, which represents 52 % of the total. Similarly, in Slovakia in 2019, the percentage of suicides without the presence of alcohol in the blood was higher, amounting to 61.6 % (7). In the recorded period of 2009-2019, there has been a decrease in the presence of positive blood alcohol concentration results in cases of suicide since 2012. For women, negative results prevailed over positive ones, except for 2019, when the ratio was 4:5, indicating a higher proportion of cases where alcohol was present in women´s suicide cases at the time of death.

Chronic alcohol consumption was recorded in 39 cases, with the majority (37 cases) being men, while chronic alcoholism was described in only two women. This finding may suggest that excessive alcohol consumption among women remains a taboo topic, with family members intentionally concealing information about the deceased on purpose. Additionally, it may reflect the persistent trend of higher alcohol consumption among men (10).

We consider the limitations of the research to be insufficient documentation and anamnestic data obtained by examining doctors. The reason may be the reluctance of the survivors to talk about such a sensitive topic as the suicide of a loved one, but also often the reluctance and lack of experience of the examining doctors in asking more personal questions about the deceased´s past. Addressing these limitations could assist forensic doctors in obtaining a more comprehensive understanding of the overall context surrounding the suicidal act. The failure of the so-called "psychological autopsy" is visible within the results of the study and was significantly noticeable during the processing of individual data. The information available in the archived files of individuals was often limited or absent, which hindered the thorough examination of relevant factors.

CONCLUSION

The study aimed to describe the development of suicidal behavior over a period of more than ten years – from 2009 to 2019. Evaluation of the positive blood alcohol concentration at the time of death, distribution according to the degree of alcohol influence, and, according to the available anamnestic data, ascertaining the presence of alcohol abuse in the past was one of the main goals of the research. Additionally, the results of other parameters such as age, sex, method of suicide, suicide attempt in the past, seasonality, permanent residence, and coincidence of psychiatric illness were compared with facts from the available literature with subsequent confirmation, respectively by refuting the occurrence in the monitored region of northern Slovakia. The development of a more than ten-year suicide curve offers valuable insights not only for medical examiners but also for psychiatrists and public health professionals.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

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