

DELIBERATE SELF-POISONING IN ADOLESCENTS: A 3-YEAR SINGLE CENTRE STUDY

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Adolescence represents a period during which a child undergoes significant changes often accompanied by risky behaviors such as intentional self-poisoning. This study aimed to identify the sociodemographic characteristics of adolescents, substance distribution and the impact of school success and nuclear family completeness on self-poisoning incidents. A retrospective study examined the records of 412 patients treated at the Institute for Child and Youth Health Care of Vojvodina over a three-year period. The average patients' age was 15.7 ± 1.8 years. The most commonly used substances were alcohol (67%), benzodiazepines (23.6%), and cannabis (5.8%). One-fifth of the subjects took at least two substances simultaneously with a higher frequency among female adolescents who experienced more frequent episodes of repeated self-poisoning. Half of the subjects (51%) lived in complete nuclear families, and a significant difference was found regarding alcohol consumption compared to other subjects. There is a significant difference in the consumption of benzodiazepines and alcohol concerning academic success. Alcohol and benzodiazepine medications were most commonly used for self-poisoning with a significant gender difference. Due to the widespread availability of benzodiazepine medications, they were the most frequently used drugs. Girls were at a higher risk of repeated self-poisoning. Adolescents living in complete nuclear families with excellent academic success more often consumed alcohol, while those from incomplete families with poor success more frequently consumed benzodiazepines.

Key words: deliberate self-poisoning, adolescence, puberty, alcohol, benzodiazepines

Originalni rad

doi:10.5633/amm.2025.0308

**NENAMERNA SAMOTROVANJA ADOLESCENATA: TROGODIŠNJE ISKUSTVO JEDNOG
ZDRAVSTVENOG CENTRA**

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Ključne reči: namerno samotrovanje, adolesencija, pubertet, alkohol, benzodiazepine

AMM Paper Accepted

Introduction

The World Health Organization (WHO) defines adolescents as individuals aged 10 to 19 years old (1). Adolescence represents the transition from childhood to adulthood, during which a child is expected to achieve maturity and functionality as an adult (2). During this period, there are changes in school relationships and social integration, resulting in less time spent with parents and more time with friends, increasing their autonomy (3). Adolescents undergo significant physical, mental and emotional changes during this period, which make them susceptible to risky behaviors, including deliberate self-poisoning. According to the WHO, deliberate self-poisoning is defined as an act with a non-fatal outcome in which an individual deliberately ingests a substance in doses exceeding therapeutic ones, resulting in harm to the body (4,5,6,7,8). The most common substances involved in poisoning are medications, alcohol and drugs, often stemming from conflicts in school and family (9). Adolescent self-poisoning has a low mortality rate but is often a predictive factor for mental health disorders. Acute poisonings are a significant cause of morbidity and mortality among adolescents, representing one of the most common urgent conditions (10,11,12,13,14). According to WHO data, acute poisonings result in over 45,000 deaths annually in individuals under 20 years old (15). Poisonings, along with injuries, are ranked third in the most common causes of hospitalization among adolescents in Vojvodina, after respiratory and digestive diseases. Acute poisoning accounts for 2.35% of hospital morbidity in children in Vojvodina, with a mortality rate of 0.19% (16). The objectives of this study were to determine the demographic characteristics of adolescents who committed intentional self-poisoning, to identify the most commonly consumed substances and reasons for self-poisoning, to determine incidence of repeated self-poisoning, as well as the role of school success in relation to the type of substance ingested and the role of family nuclear completeness.

Materials and Methods

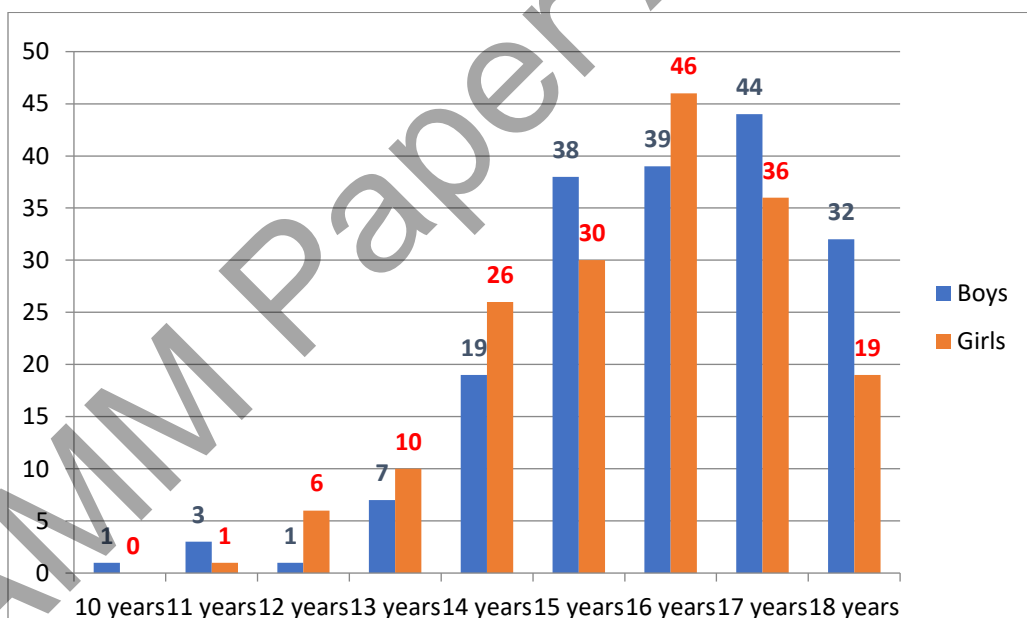
A retrospective study was conducted analyzing data from the medical records of 412 patients treated at the Institute for Child and Youth Health Care of Vojvodina from January 1st 2016 to January 1st 2019, aged 10 to 18 years and diagnosed with acute poisonings and self-poisonings. Out of 412 patients diagnosed with acute poisoning, 364 were identified as intentional self-poisoning cases. Data from patients' medical records, including physician reports, psychologist reports, medical history, laboratory results and other tests were used. Data on the number of patients admitted to the institute, demographic

data, laboratory and toxicological analysis results, anamnestic data on reasons for self-poisoning, suicidal intent, family nuclear completeness and school success were analyzed. Statistical analysis was performed using Microsoft Office Excel 2010, presenting data as means and percentages. The chi-square test and Student's t-test were used to determine statistical significance. The study was approved by the Ethics Committee of the Institute for Child and Youth Health Care of Vojvodina.

Results

Reviewing the medical records of 412 patients aged 10 to 18 years treated at the Institute for Child and Youth Health Care of Vojvodina from January 1st 2016 to January 1st 2019, which were diagnosed with acute poisoning and self-poisoning, 364 patients were found to have actively and intentionally committed self-poisoning. There were 184 male patients (50.55%) and 180 female patients (49.45%) with an average age of 15.75 years. The distribution of self-poisoning by gender and age is shown in Figure 1.

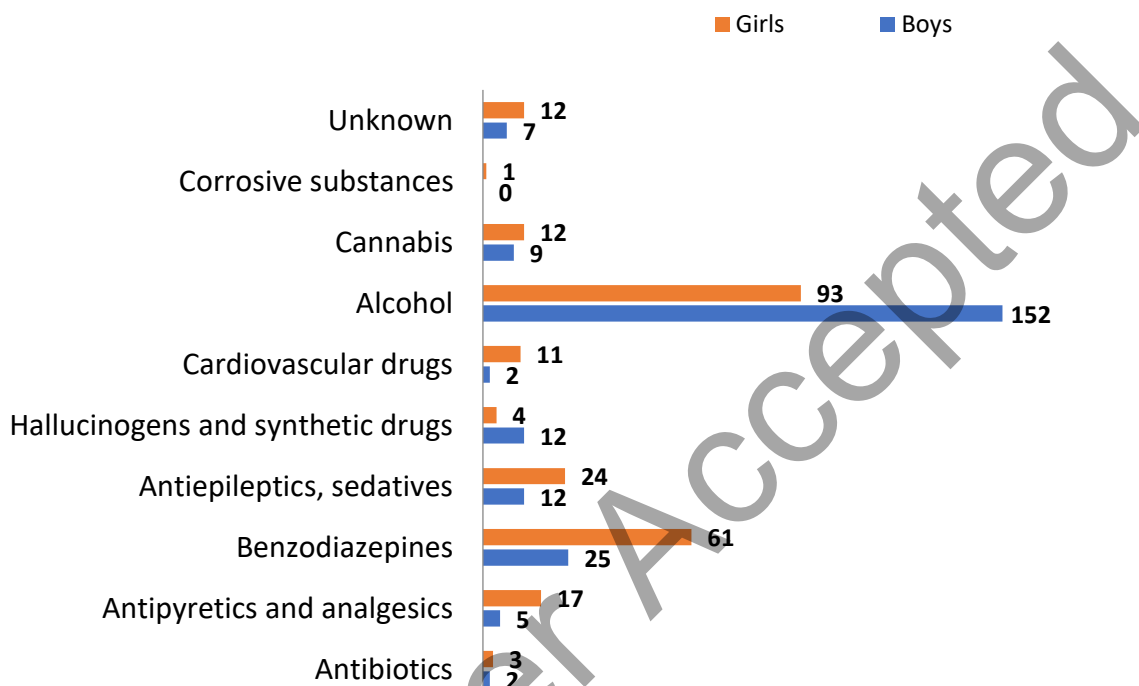
Figure 1. Distribution of self-poisoning by gender and age



According to the chi-square test results, there is a statistically significant difference between boys' and girls' self-poisoning regarding the poisoning agent ($p < 0.01$). Boys/men more frequently used alcohol for self-poisoning, while girls/women used benzodiazepine, antipyretic and analgesic medications for

poisoning more often. Figure 2 shows the most commonly used substances for intentional self-poisoning and their distribution by gender.

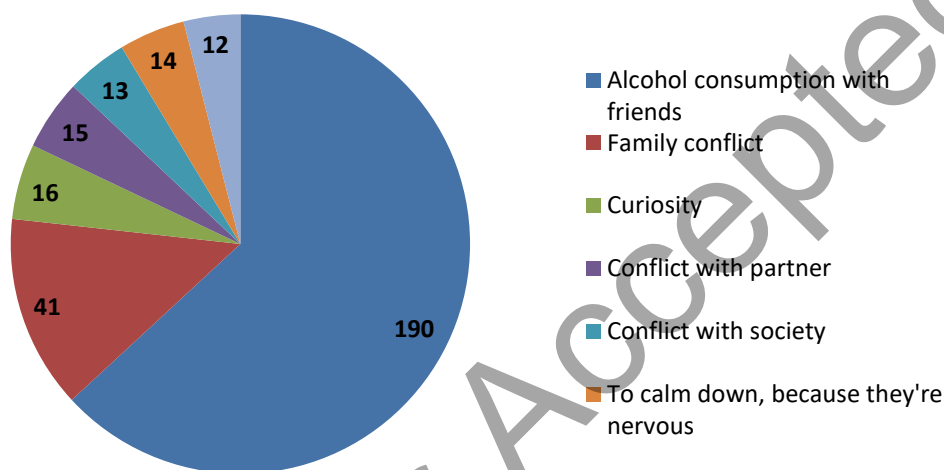
Figure 2. Gender distribution of self-poisoning by causes



Out of the total number of subjects (364), 79 subjects consumed more than one substance (21.4%), including 29 boys/men (36.71%) and 50 girls/women (63.29%). Adolescents most commonly combined benzodiazepines with other substances, 48 subjects in total (60.76%). The most often among those substances are antiepileptic, sedative and antiparkinsonian drugs, 15 subjects in total (31.25%) and alcohol, 13 subjects in total (27.08%). The second most frequent combination was alcohol with other substances, 30 subjects in total (37.97%), most usually in combination with benzodiazepines, 13 subjects in total (43.33%). Student's t-test results showed a statistically significant difference between the number of self-poisoning boys and girls regarding the number of ingested substances ($p < 0.05$). Girls consumed multiple substances simultaneously more often. Anamnestic data on previous self-poisoning attempts were obtained for 340 subjects (93.4%). Out of these, 295 subjects had data on their first self-poisoning attempt (86.76%), with 151 male subjects (51.19%) and 144 female subjects (48.8%). Student's t-test results showed no statistically significant difference in the frequency of first self-poisoning attempts between boys/men and girls/women. Using the chi-square test, a statistically

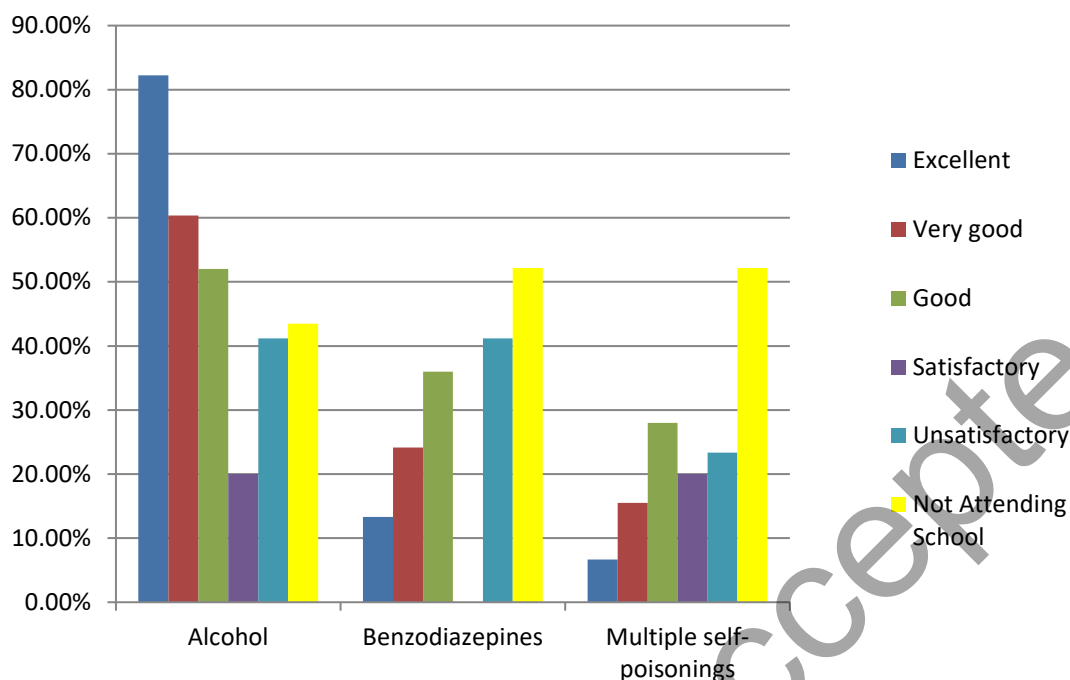
significant difference was found by gender regarding repeated self-poisoning attempts, with girls/women having more repeated self-poisoning attempts than boys/men ($p<0.05$). Data on the reasons for self-poisoning were obtained for 304 subjects and are presented in Figure 3.

Figure 3. Distribution of self-poisoning according to the intent of self-poisoning



Anamnestic data on family structure were obtained for 122 subjects (33.52%). Out of these, 63 subjects confirmed living in a complete nuclear family (51.64%), while 59 subjects lived in incomplete nuclear family (48.36%). According to the T-test results, there is a statistically significant difference between adolescents living in complete nuclear families and those living in incomplete nuclear families in terms of alcohol consumption ($p<0.05$) and benzodiazepine consumption ($p<0.05$), with patients from complete families more frequently having alcohol poisoning and those from incomplete families more frequently having benzodiazepine poisoning. Data on school success were found for 173 subjects (47.53%). Out of these, 45 were excellent students (26.01%), 58 were very good (33.53%), 25 were good (14.45%), 5 were sufficient (2.89%), 17 were insufficient (9.83%), and 23 adolescents dropped out of school (13.29%). The relationship between consumed substances and school success is shown in Graph 4.

Figure 4. Distribution of substance use leading to self-poisoning in relation to school success



Chi-square test results showed a statistically significant difference ($p < 0.05$) in benzodiazepine and alcohol consumption according to school success. Students achieving excellent and very good grades more frequently consumed alcohol for self-poisoning purposes, while students with insufficient grades or those who dropped out of school more frequently consumed benzodiazepines.

Discussion

There was no statistically significant difference between boys and girls who committed self-poisoning, although according to literature (17,18,19,20), girls more frequently attempt self-poisoning. In this study, the majority of adolescents were 16 and 17 years old. Le Valliant (20) found that the children diagnosed with intentional self-poisoning were most often aged 10 to 14 years. The results of this study may differ from Le Valliant's results because his study included individuals under 10 years old. The results of this study are consistent with the results of Nistor, Zakharov and Navratil (9,21,22). The most commonly used substances leading to self-poisoning were alcohol, benzodiazepines, antipyretics, analgesics and drugs from the antiepileptic, sedative and antiparkinsonian groups. Similar results were obtained by other authors (9,14). The most common cause of self-poisoning in adolescence was alcohol, with boys more frequently being consumers, consistent with other authors' results (9,14). The most common drugs used for self-poisoning were benzodiazepines. This differs from other authors' results

where acetaminophen was most commonly used for poisoning. However, in this study, analgesics and antipyretics were third in frequency (9,20). This could be explained by the fact that benzodiazepines are much more commonly prescribed and abused in Serbia than in Western countries, making them more accessible to adolescents (21). Zakharov and Navratil (22) found that 30% of subjects consumed more than one substance, with more girls doing so than boys. Results are consistent with the results of this study, in which a statistically significant difference in favor of girls was observed. The majority of subjects (86%) had their first self-poisoning attempt as other authors concluded (22,23). This study found a statistically significant difference between boys and girls who self-poisoned multiple times, with results indicating that girls more frequently had repeated self-poisoning attempts. In a Canadian study, the percentage of adolescents re-exposed to self-poisoning over a five-year observation period was around 16% (11). Boys more frequently consume alcohol during adolescence and intoxication most often results from alcohol consumption (9,14,24). Conflicts within the family as well as partners and conflicts within society were more often triggers for self-poisoning in girls (67.5%) than in boys (32.5%), consistent with Nistor's research (9). This could be explained by the fact that girls are more empathetic during adolescence than boys (25). Family structure and relationships within it are significant factors in developing self-harm ideation among children (26). Divorce, poor economic and social relationships within the family, as well as living with only one parent, also represent risk factors for developing self-harm ideation (27). The results show a statistically significant difference between adolescents living in complete nuclear families and those living in incomplete nuclear families in terms of alcohol and benzodiazepines consumption. Adolescents from complete nuclear families more frequently had alcohol poisoning as a cause of self-poisoning, while those from incomplete families more frequently consumed benzodiazepines for self-poisoning. There is a statistically significant difference in benzodiazepine and alcohol consumption according to school success. Students achieving excellent and very good grades more frequently poisoned themselves with alcohol, while students with insufficient grades or those who dropped out of school more frequently consumed benzodiazepines. In his study, Blair (27) demonstrated that students who achieve very good and excellent results in school have a lower tendency towards risky and delinquent behavior compared to poor-performing students, but alcohol use is equal among them. However, the use of psychoactive substances is slightly more common among adolescents with poorer school performance.

Conclusion

Based on the study results and objectives, the following conclusions can be drawn. The average age of adolescents who committed self-poisoning was 16 years. Alcohol was the most common substance consumed for self-poisoning, more often among boys/men than girls/women, while benzodiazepines were the most commonly consumed pharmacologically active substances, more often among girls/women than boys/men. Girls/women statistically significantly more frequently used multiple substances simultaneously for self-poisoning. The most common reason for self-poisoning was "enjoyment" of alcohol in social settings, more often among boys/men than girls/women, while the most common reasons for self-poisoning among girls/women were "family conflict" and "social conflict." The results showed that girls/women more frequently had repeated episodes of self-poisoning compared to boys/men. Adolescents from complete nuclear families more frequently consumed alcohol for self-poisoning, while those from incomplete nuclear families more frequently consumed benzodiazepines for self-poisoning. There is a statistically significant difference in benzodiazepine and alcohol consumption according to school success, whereas students achieving excellent and very good grades more frequently poisoned themselves with alcohol, while students with insufficient grades or those who dropped out of school more frequently consumed benzodiazepines.

References:

1. Sawyer SM, Azzopardi PS, Wickremarathne D, Patton GC. The age of adolescence. *Lancet Child Adolesc Health* 2018;2:223-8.
2. Jovanović Privrodski J. *Pedijatrija*. Novi Sad:Futura;2015.p.639-67.
3. Casey BJ, Jones RM, Hare TA. The adolescent brain. *Ann N Y Acad Sci* 2008;1124:111-26.
4. Jaworska N, MacQueen G. Adolescence as a unique developmental period. *J Psychiatry Neurosci* 2015;40(5):291–3.
5. Taylor SJ, Barker LA, Heavey L. The typical developmental trajectory of social and executive functions in late adolescence and early adulthood. *Dev Psychol* 2013;1253-65.
6. Kelley AG, Schochet T, Landry CF. Risk taking and novelty seeking in adolescence introduction to part I. *Ann N Y Acad Sci* 2004;1021:27–32.
7. Madge N, Hewitt A, Hawton K, De Wilde EJ, Corcoran P, Fekete S, et al. Deliberate self-harm within an international community sample of young people: comparative findings international community sample of young people: comparative findings from the child and adolescent self-harm in Europe (CASE) study. *J Child Psychol Psychiatry* 2008;49:667–777.
8. Kapur N, Cooper J, Hiroeh U, May C, Appleby L, House A. Emergency department management and outcome for self-poisoning: a cohort study. *Gen Hosp Psychiatry* 2004;26:36–41.
9. Nistor N, Jitareanu C, Frasinariu OE. Epidemiologic profile and triggering factors of voluntary poisoning in teenagers. *Medicine (Baltimore)* 2017;96(5):e5831.

10. Mergl R, Koburger N, Heinrichs K, Szekely A, Toth MD, Coyne J, et al. What are reasons for the large gender differences in the lethality of suicidal acts? An epidemiological analysis in four European countries. *PLoS One* 2015;10:e0129062.
11. Finkelstein Y, Macdonald EM, Hollands S, Hutson JR, Sivilotti ML, Mamdani MM, et al. Long-term outcomes following self-poisoning in adolescents: a population-based cohort study. *Lancet Psychiatry* 2015;532–9.
12. Lovergrove MC, Mathew J, Hampp C, Governale L, Wysowski DK, Budnitz DS. Emergency hospitalizations for unsupervised prescription medication ingestions by young children. *Pediatrics* 2014;134(4):1009-16.
13. Even KM, Armsby CC, Bateman ST. Poisonings requiring admission to the pediatric intensive care unit: a 5-year review. *Clinical Toxicology* 2014;52(5):519-24.
14. Azaba SMS, Hirshon JM, Hayes BD, El-Setouhy M, Smith GS, Sakr ML, et al. Epidemiology of acute poisoning in children presenting to the poisoning treatment center at Ain Shams University in Cairo, Egypt, 2009–2013. *Clinical Toxicology* 2016;54(1):20–6.
15. Peden M, Oyegbite K, Ozanne-Smith J. World Report on Child Injury Prevention. World Health Organization 2008; [cited 2015 Jul 8]. Available from: <https://www.who.int/publications/i/item/9789241563574>.
16. Rončević N, Popadić-Gaćesa J, Grujić V, Arsić M, Peričin I. Bolnicki morbiditet i mortalitet adolescenata u Vojvodini. *Med Preg* 2009;62:137-41.
17. Lewinsohn PM, Rohde P, Seeley JR, Baldwin CL. Gender differences in suicide attempts from adolescence to young adulthood. *J Am Acad Child Adolesc Psychiatry* 2001;40:427–34.

18. Hawton K, Witt KG, Taylor STL, Arensman E, Gunnell D, Hazzel P. Interventions for selfharm in children and adolescents. *Cochrane Database Syst Rev* 2015;12.
19. Sabiha S, Carman KB, MD, Dinleyici EC. Acute Poisoning in Children; Data of a Pediatric Emergency Unit. *Iran J Pediatr* 2011;21:479-84.
20. Le Vaillant J, Pellerin L, Brouard J, Nimal-Cuvillon D. Intoxications medicamenteuses volontaires chez 58 adolescents: etude prospective sur l'impact somatique et les complications biologiques. *Arch Pediatr* 2016;23:461-7.
21. Samardžić J, Zeković J, Stevanović A, Jančić J, Dimitrijević I. (Zlo)upotreba i adiktivni potencijal benzodiazepina: Analiza potrošnje u Srbiji u periodu 2014-2016. *Engrami* 2018;40(2):73-85.
22. Zakharov S, Navratil T, Pelcova D. Suicide attempts by deliberate self-poisoning in children and adolescents. *Psychiatry Res* 2013;210(1):302-7.
23. Katić, K, Stojadinović A, Mijatović V, Grujić M. Acute poisoning in children and adolescents hospitalized at the Institute of child and youth health care of Vojvodina between 2015-2017. *Med Pregl* 2019;72(7-8):209-15.
24. Eaton DK, Kann S, Kinchen S, Shanklin S, Flint KH, Hawkins J, et al. Youth risk behavior surveillance report—United States. *MMWR Surveill Summ* 2012;61(4):1-162.
25. Mestre MV, Samper P, Frias MD, Tur AM. Are Women More Empathetic than Men? A Longitudinal Study in Adolescence. *Span J Psychol* 2009;12(1):76-83.
26. Brent D, Mann J. Familial factors in adolescent suicidal behaviour. In: King R, Apter A, eds. *Suicide in Children and Adolescents*. Cambridge: Cambridge University Press 2006.p.86-117.

27. Sampson LB. Adolescent Risk-Taking Behaviors and School Performance: Distinguishing the Experiences of Boys and Girls. *Int J Criminol Sociol* 2017;6:146-158.

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