Comparative study of fatal consequences of illicit and prescription drugs use/abuse in Bratislava and its vicinity

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SUMMARY
Using/abusing of illicit drugs as well as prescription drugs represents a serious health and social problem. The aim of the work is to present results of retrospective – prospective analysis of cases of illicit and prescription drugs related deaths in the period of years 2001 – 2017 in autopsy material of Bratislava forensic medicine workplaces. The criteria matched 302 cases – 1.9 % of all autopsies. There were 62 % of illicit drugs related deaths and 38 % of prescription drugs related deaths.

Keywords: fatal intoxication – illicit drug – prescription drug – autopsy – toxicological analysis – statistics

Porovnávacia štúdia smrteľných následkov užívania/zneužívania drog a psychofarmák v Bratislave a priľahlej oblasti

SÚHRN
Zneužívanie drog ako aj psychofarmák, dostupných len na lekársky predpis, je veľkým problémom nielen zdravotným a zdravotníckym ale aj celospoločenským. Cieľom práce bolo zistiť a porovnať výskyt prípadov smrteľných intoxikácií drogami a psychofarmakami v materiáli bratislavských súdnolekárskych pracovísk za obdobie rokov 2001 - 2017. Bolo zistených 302 prípadov smrteľných intoxikácií drogami (188 - 62 %) a psychofarmakami (114 - 38 %), čo predstavovalo 1,9 % prípadov z celkového počtu pitvaných prípadov. Najčastejšie zistenými látkami v prípadoch intoxikácií drogami boli opiáty a opioidy v 84 %, v prípadoch intoxikácií psychofarmakami benzodiazepíny v 57 %. Výrazná predominancia počtu úmrtí v Bratislavskom kraji a na území mesta Bratislava odráža skutočnosť, že na území hlavného mesta a v jeho okolí sa nachádza najväčšie množstvo užívateľov/zneužívateľov psychoaktívnych látok, ako aj problémových užívateľov drog. Výsledky analýzy poukazujú na vysoké riziko užívania/zneužívania benzodiazepínov, prípadne v kombinácii s etanolom a na potrebu zváženia indikácie liečby, prísnejšej regulácie preskripcie, prípadne náhrady novými, menej rizikovými skupinami liečiv predovšetkým u tých pacientov, kde je riziko samovraždy. Súčasné rezervy v dostupnosti anamnestických údajov pre potreby vyšetrovania prípadov úmrtí post mortem by mohlo v budúcnosti odstrániť prepojenie pitvajúcich lekárov na funkčný systém e-health.

Kľúčové slová: smrteľná intoxikácia – droga – psychofarmakum – pitva – toxikologická analýza – štatistika

Soud Lek 2019; 64(3): 35–38

Abuse of illicit drugs and psychoactive medications available only on prescription and used primarily for the purpose of treating mental illnesses, as well as other pathological conditions, is a major problem not only of medical and health aspect but also a society-wide one. Its most unfavourable consequence is the death of an individual. Monitoring of drug-related deaths is a good indicator of trends in their abuse (1). Drug-related mortality includes deaths that are directly caused by the pharmacological activity of one or more substances (drug-induced deaths) and deaths that are indirectly caused by use of drugs, often with other concurrent factors (e.g. trauma). The known causes of deaths include acute toxicity, traffic accidents, especially in combination with alcohol (2), violence, suicide also among the otherwise vulnerable people or chronic health problems due to repeated use (cardiovascular problems in cocaine users). While a large number of drug-related deaths occur among problem drug users, some are also found in other groups of users, such as in occasional drug users or users of prescription drugs. The number of drug-related deaths can be affected by factors such as prevalence and patterns of drug use (injection, polydrug use), the age and comorbidity of drug users and the availability of treatment and emergency services, as well as the quality of data collection and reporting (3). In recent years, the number of new illicit and also prescription drugs has been significantly increasing, which is also reflected in the treatment of psychiatric and neurological disorders. At the same time, the use of psychotropic medications also in non-psychiatric medical disciplines has been growing (4). Anxiolytics and antidepressant drugs are currently among the most commonly prescribed drugs. The adult population

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Received: April 23, 2018
Accepted: May 6, 2019

and seniors in developed industrialized countries increasingly take antidepressants (5). In our settings, the most common are benzodiazepine anxiolytics and hypnotics, which is reflected in their excessively high prescription (6). Prescription of psychotropic medications has been decontrolled so that some doctors prescribe medications upon the patient's request, often repeatedly regardless of the possibility of addiction, possible drug interactions (7) or other possible complications of treatment. Taking certain medications can lead to addiction or serve to manufacture illegal drugs. Uncontrolled prescription and dispensing and over-the counter drugs lead to an increase in the offer of psychotropic medications on the black market (8).

The goal of this paper was to determine and compare the incidence of fatal intoxications by illicit and prescription drugs in the material of Bratislava forensic medicine workplaces.

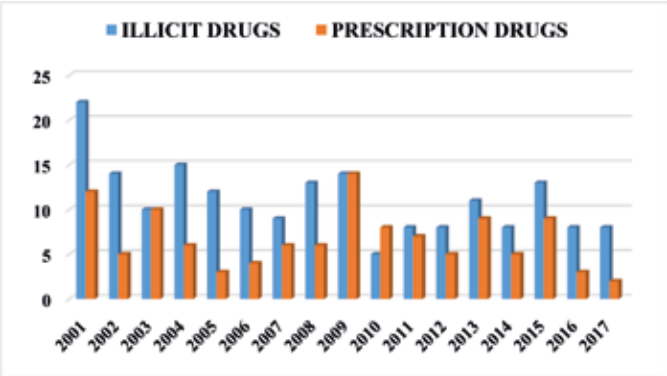
PATIENTS AND METHODS

There was performed a retrospectively prospective analysis of deaths associated with overdose of illicit and prescription drugs in the Bratislava and Trnava self-governing regions autopsied at the Institute of Forensic Medicine of the Faculty of Medicine Comenius University and the Department of Forensic Medicine of the Health Care Surveillance Authority in Bratislava for the period of 2001 – 2017. In all cases, an autopsy was performed by a standard method together with additional laboratory tests, including toxicological analysis of biological materials collected at the autopsy. In all cases, there were evaluated autopsy findings, results of additional laboratory tests, available police records, and available medical records and history data. The parameters monitored were gender, age, the incidence of cases according to particular months and years, the number of identified substances and their combination with ethanol consumption, place of death or finding a dead body, external cause of death and the incidence according to particular self-governing regions and their partitioning. Statistical analyses were performed using Statistical Package for the Social Sciences software. Graphical presentation of the results was performed using Microsoft Office Excel, 2016.

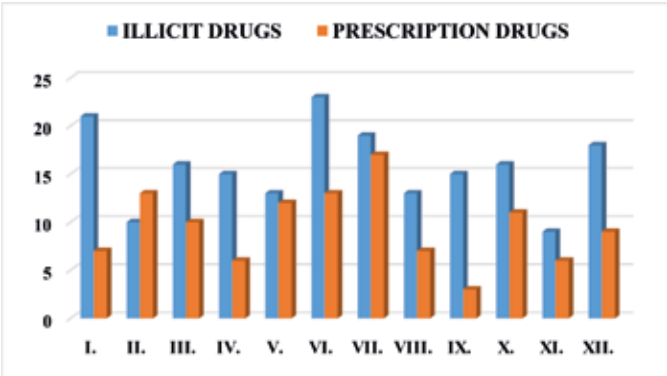
RESULTS

In the reporting period 2001 – 2017 at the Institute of Forensic Medicine of the Faculty of Medicine Comenius University and the Department of Forensic Medicine of the Health Care Surveillance Authority in Bratislava, there were performed a total of 15,737 autopsies from the catchment area of Bratislava and Trnava self-governing regions, which account for a population of about 1,200 thousand citizens, i.e. more than one-fifth of the population of the Slovak Republic. Of the autopsied cases, there were found 302 cases of fatal intoxication, of which by illicit drugs 188 (62 %) cases and prescription drugs 114 (38 %) cases, accounting for 1.9 % of cases of the total number of autopsies. The incidence of cases in particular years in cases of illicit drug overdose ranged between 5 (3 %) in 2010 and 22 (12 %) in 2001, in cases of prescription drugs overdose it ranged between 2 (2 %) in 2017 and 14 (12 %) in 2009. Comparison of the number of cases in a particular year is shown in Graph 1. When evaluating the incidence of deaths in particular months within a year in the group of illicit drugs overdose, there was found the lowest incidence in November – 9 (5 %) cases, the highest incidence was in June – 23 (12 %); in the group of prescription drugs overdose there was found the lowest incidence in September – 3 (3 %) cases, the highest incidence of deaths was in July – 17 (15 %) (Graph 2). Distribution of the cohort according to the gender was as follows: in the group of illicit drugs related deaths (from now on referred to as "Group A") were 85 % of males and 15 % of females. In the group of prescription drugs related deaths (from now on referred to as "Group B") were 59 % of males and 41 % of females. In Group A were most cases in the age group from 30 to 34 years – 42 (22 %). Overall, at the age under 34 years, there were 66 % of cases. In Group B were most cases in the age group from 40 to 44 years – 16 (14 %). Overall, at the age over 35 years, there were 81 % of cases (Graph 3). The total number of foreign substances identified by qualitative and quantitative toxicological-chemical analysis greatly exceeded the number of cases. In Group A in 188 cases there were identified 367 substances; in Group B in 114 cases there were identified 229 substances, accounting for on average two substances per case in both groups. Except for cases in which only a single substance was identified, the substances were found in double, triple up to quadruple combinations. In Group A, double combination of substances was detected in 42 % and a combination of more substances in a total of 66 % of cases. In Group B, double combination was detected in 50 % and a combination of more substances in a total of 73 % of cases (Graph 4). The most commonly identified key substances in Group A were opiates and opioids in 79 % and overall in combination with other substances they were found in 84 %, of which heroin in 37 % of cases and methadone in 20 % of cases. A combination with ethanol was found in 37 % of cases, a combination of opiates with ethanol was 15 % of cases, a combination with benzodiazepines was observed in 37 % of cases, in 35 % it was a combination of opiates and benzodiazepines. The most commonly identified

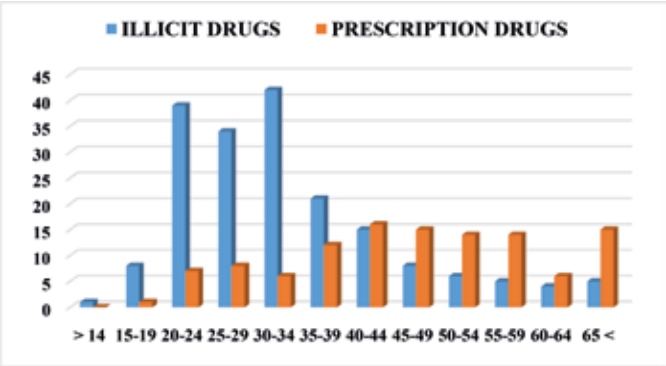
Graph 1. The number of cases of fatal intoxications by illicit and prescription drugs in particular years.



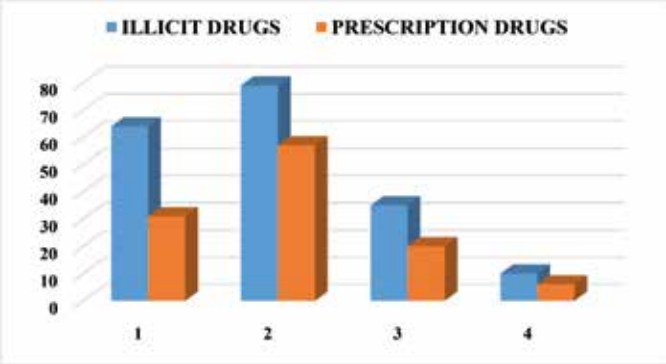
Graph 2. The number of cases of fatal intoxications by illicit and prescription drugs in particular months.



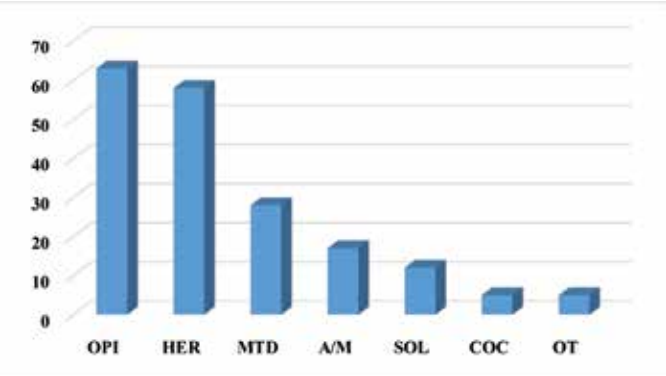
Graph 3. Distribution of cases of fatal intoxications by illicit and prescription drugs according to age categories.



Graph 4. The number of identified substances in particular cases of fatal intoxications by illicit and prescription drugs.

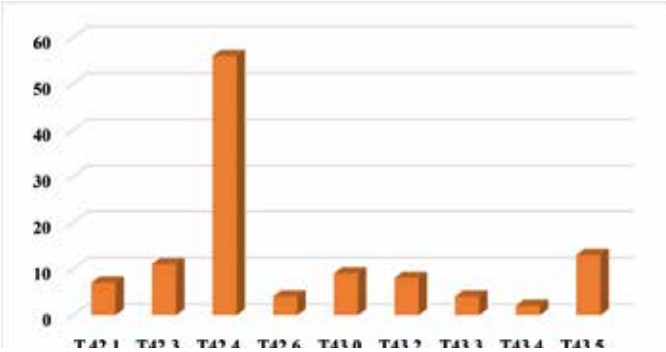


Graph 5. Distribution of cases of fatal intoxications by illicit drugs according to substances detected



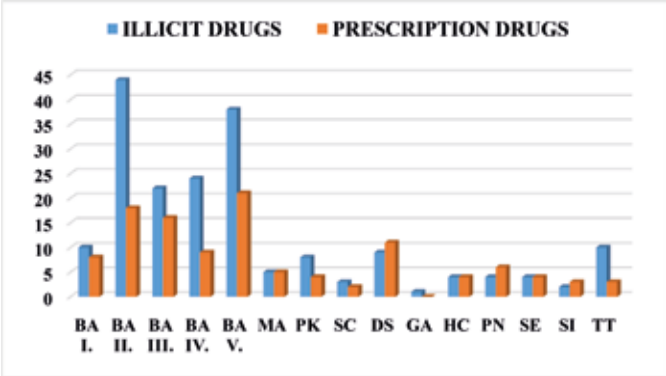
Explanatory notes:
OPI – opiates and opioids; **HER** – heroin; **MTD** – methadone;
A/M – amphetamines/methamphetamines, **SOL** – solvents, **COC** – cocaine;
OT – other

Graph 6. Distribution of cases of fatal intoxications by prescription drugs according to substances detected.



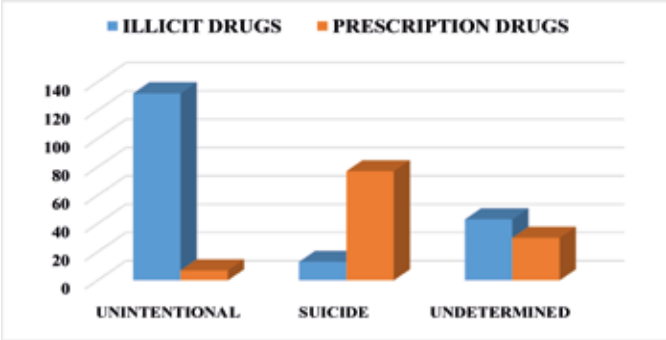
Explanatory notes: ICD-10 codes – International Classification of diseases - 10 codes, **T42.4** - benzodiazepines

Graph 7. Distribution of cases of fatal intoxications by illicit and prescription drugs according to districts of Bratislava and Trnava self-governing regions.



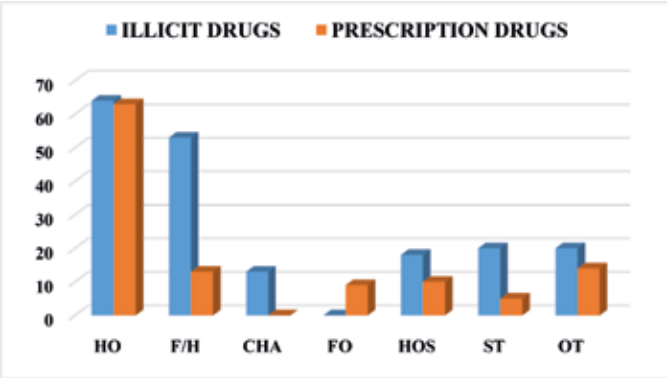
Explanatory notes: **BA I.–V.** – districts of Bratislava, **MA** – Malacky,
PK – Pezinok, **SC** – Senec – **Bratislava region**;
DS – Dunajská Streda, **GA** – Galanta, **HC** – Hlohovec, **PN** – Piešťany,
SE – Senica, **SI** – Skalica, **TT** – Trmava – **Trnava region**

Graph 8. Distribution of cases of fatal intoxications by illicit and prescription drugs according to the external cause of death.



key substances in Group B were benzodiazepines in 46 %, totally in combination with other substances occurring in 57 % of cases. A combination with ethanol was found in 39 % of cases, while in 70 % it was a combination with benzodiazepines. The occurrence of particular substances in both groups of cases is shown in Graphs 5 and 6. The majority of cases in both groups was found in the Bratislava region 82 % and 73 %, respectively. Most deaths in Group A – 23 % were in the District of Bratislava II, in Group B in the District of Bratislava V – 18 %. In the Trnava region, there were most cases in Group A in Trnava District – 5 % and in Group B in the District of Dunajska Streda – 10 % of all detected cases. Distribution of cases according to particular districts in both regions is shown in Graph 7. According to the external cause of death in Group A, most cases were evaluated as accidental overdose – 70 %; in Group B there suicides up to 67 % of cases (Graph 8). The deaths occurred in both groups predominantly in the interior in 79 % and 75 % of cases, respectively; most often at home in 34 % and 55 % of cases, respectively. In hospital settings, deaths occurred in 10 % and 9 % of cases, respectively (Graph 9). History data on the use/abuse of drugs were not available in 45 % and 59 % of cases, respectively. In Group B there were 39 people (34 % of cases) undergoing psychiatric treatment, of which 24 (62 %) committed suicide. In Group A in 47 % of cases were problem drug users.

Graph 9. Distribution of cases of fatal intoxications by illicit and prescription drugs according to the place of death.



Explanatory notes: **HO** – at home, **F/H** – flat/house, **CHA** – chalet, **FO** – forest, **HOS** – hospital, **ST** – street, **OT** – other

DISCUSSION AND CONCLUSION

The subject of the analysis was autopsied cases of death associated with the use/abuse of illicit and prescription drugs from the archives of Bratislava forensic workplaces of the Institute of Forensic Medicine of the Faculty of Medicine Comenius University and Department of Forensic Medicine of the Health Care Surveillance Authority for a period of 17 years from 2001 to 2017. The results of the analysis showed that the proportion of deaths associated with the use/abuse of psychoactive substances accounted for 1.9 % of all cases autopsied. This number is relatively small compared to the total number of autopsied cases or the number of all deaths. However, this does not mean that it is unnecessary to continue to pay attention to addressing the issues associated with the use/abuse of psychoactive substances in the region and the country. The issue of drug addiction in Europe began to rise sharply in the years 1984 – 1985 (9). In Slovakia, this problem aggravated a few years later after the political coup in 1989, when Slovakia opened to the world and thus the world of drugs (10). Similarly, with the high prevalence of psychiatric disorders and their chronic course, it is possible to expect that the consumption of psychotropic medications will continue to grow (11,12). In developed countries, their consumption has an increasing trend (13) although epidemiological studies point to the fact that only a minority of patients with psychiatric disorders is medically treated (14). The number of drug-related deaths occurring in the Bratislava and Trnava regions accounts for, on a long-term basis, about 43 % of all drug-related deaths reported in Slovakia. The study results do not allow to establish a long-term trend in the development of the number of deaths. They showed only a slight downward trend in the occurrence of fatal consequences of use/abuse of psychoactive substances in both groups studied in the Bratislava and Trnava regions in recent years. The significant predominance of deaths in the Bratislava region and the city of Bratislava reflects the fact that in the capital city and its surroundings, there is the largest number of users/abusers of psychoactive substances as well as problem drug users. The results of the analysis indicate a high risk of the use/abuse of benzodiazepines perhaps even in combination with ethanol. This calls for the consideration of the treatment indication, tighter prescribing regulation or replacement with new, less risky classes of drugs for patients, especially in those where there is the risk of suicide (15-17). The current reserves in the availability of history data for investigation purposes of deaths post mortem might be removed in the future by the communication between physicians performing autopsies and a functional e-health system.

CONFLICT OF INTEREST

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

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