

FORENSIC MEDICAL ASPECTS OF OPIOID INTOXICATION IN SOFIA AND SOFIA REGION FOR THE PERIOD 2011-2014

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ABSTRACT

The use of opioids and other illicit drugs is a serious problem throughout the world. Opioid psychoactive substances are among the oldest known drugs. They are divided into two groups – opiates (morphine, codeine, etc.) and opioids (heroin, methadone, Fentanyl, etc.). Some of them are used for therapeutic purposes while others as recreational drugs. Materials and methods: For the period 2011-2014 in the Department of Forensic medicine and deontology, Sofia, 3859 autopsies of deceased with full forensic analysis were performed, including the gathering of preliminary data, internal and external forensic examination of the body and chemical analysis of blood, urine samples and internal organ parts. Results: Today, heroin is associated with the greatest share of morbidity and mortality due to drug abuse in the European Union and in Bulgaria as well. In 62 of the 156 examined cases death occurred as a result of acute intoxication with opioid drugs. In 15 cases as a result of the intoxication with opioids vomiting has occurred, with subsequent development of mechanical asphyxia from aspiration of gastric contents. Discussion: Namely administration of opioids is the leading cause of death among drug users. The most commonly used substance from this group is heroin, mainly in combination with other legal and illegal drugs, ethyl alcohol and impurities. These combinations are associated with a higher risk of death even if small amounts of the substances are used. The additional substances found in narcotic drugs hide unexpected and unpredictable, short-term and long-term effects on the body.

Key words: Opioids, combined intoxication, aspiration of food particles.

INTRODUCTION

Opioid psychoactive substances are among the oldest known drugs in the world, as the use of opium poppy predates recorded history. The main effects of opioids are associated with reduced perception and response to pain, as well as increased tolerance to it, and therefore are widely used for the management of acute and chronic pain in medical practice. In addition to the analgesic effect, they have others including decrease of nervousness and tension, inducing sedation, dizziness, nausea, vomiting, itching, constipation, respiratory depression and a sense of euphoria and supreme pleasure (due to stimulation of the center of remuneration in the brain) [6, 7]. This is the reason they are used not only for therapeutic purposes. Opium psychoactive substances are divided into two groups - opiates and opioids [8]. The first group includes morphine, codeine, thebaine, as they are derived directly from opium. The second group includes a semi-synthetic or synthetic substances structurally similar to opiates - heroin [11], oxycodone, fentanyl, buprenorphine, pethidine, tramadol, etc. Opioid dependence can develop with continued use, leading to a withdrawal syndrome when stopping.

MATERIALS AND METHODS

A full forensic analysis of deceased, subject of examination in the Department of Forensic Medicine and deontology, Sofia for the period 2011-2014 was performed – gathering of anamnestic

and criminal data from relatives and authorities of the investigation, overall external and internal examination of the body, chemical analysis of biological materials (blood, urine, internal organ parts) for the presence of alcohol, illicit drugs and other psychotropic substances.

RESULTS

In the Department of Forensic medicine and deontology, Sofia, 3859 autopsies of deceased in Sofia city and Sofia region were carried out for the period 2011-2014. In 156 of the cases the cause of death was associated with drug abuse. In 62 of these cases death occurred as a result of acute intoxication with opioid drugs, and in 15 cases because of the intoxication with these substances vomiting has occurred, with subsequent development of mechanical asphyxia from aspiration of gastric contents.

In 2011, sixteen cases of deceased due to intoxication with opioid substances were registered. In 7 of the cases the cause of death was associate with intoxication with pure heroin, in 4 of the cases – to a combination of heroin and methadone, in 3 of the cases - heroin with other substances (other groups of illicit drugs, ethyl alcohol or impurities), in 2 of the cases - methadone and ethyl alcohol and in another 2 cases - a combination of heroin, methadone and other substances (ethyl alcohol or impurities). The only recorded case of death due to mechanical asphyxia from aspiration of gastric contents was after taking pure heroin (Fig.1).

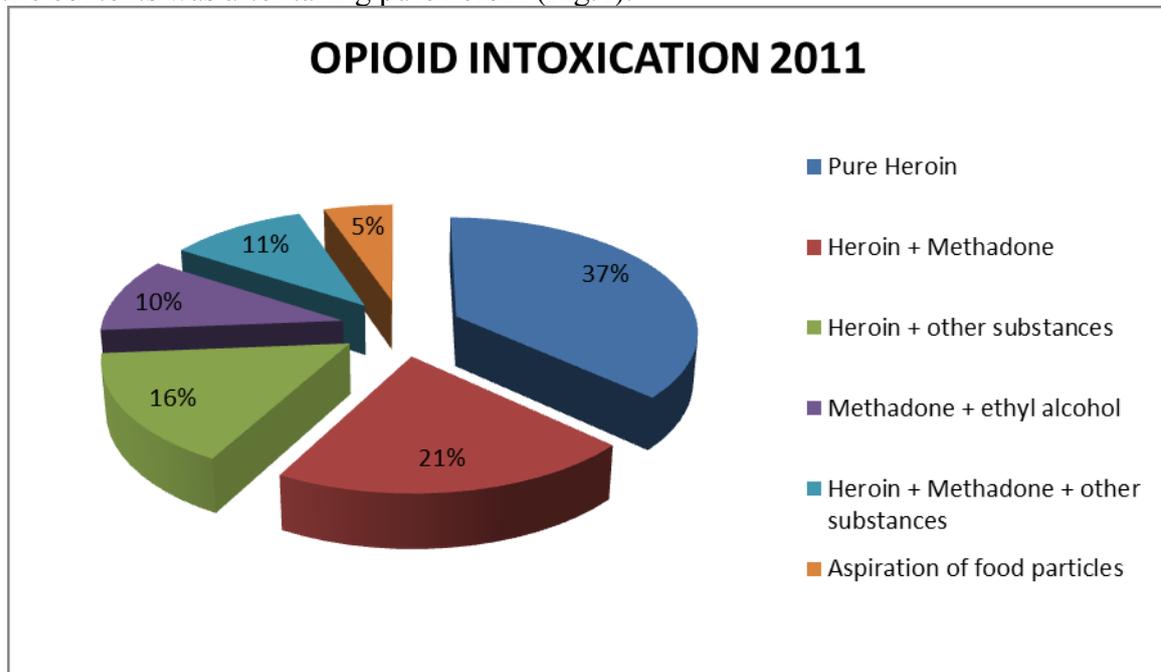


Fig. 1: Opioid intoxication for 2011

Twelve cases of intoxication with opioid drugs were registered in the Department of Forensic Medicine and deontology, Sofia in 2012. Two cases relate to acute poisoning with pure heroin, in two cases the death was due to combination of heroin and methadone, in 6 cases – combination of heroin and other substances (other groups of illicit drugs, ethyl alcohol, impurities), in one case – combination of heroin, methadone and impurities, and we registered one case of intoxication with fentanyl and midazolam. The recorded cases of intoxication with subsequent aspiration of gastric contents were three: two cases after taking pure heroin and one - after heroin with impurities (Fig.2).

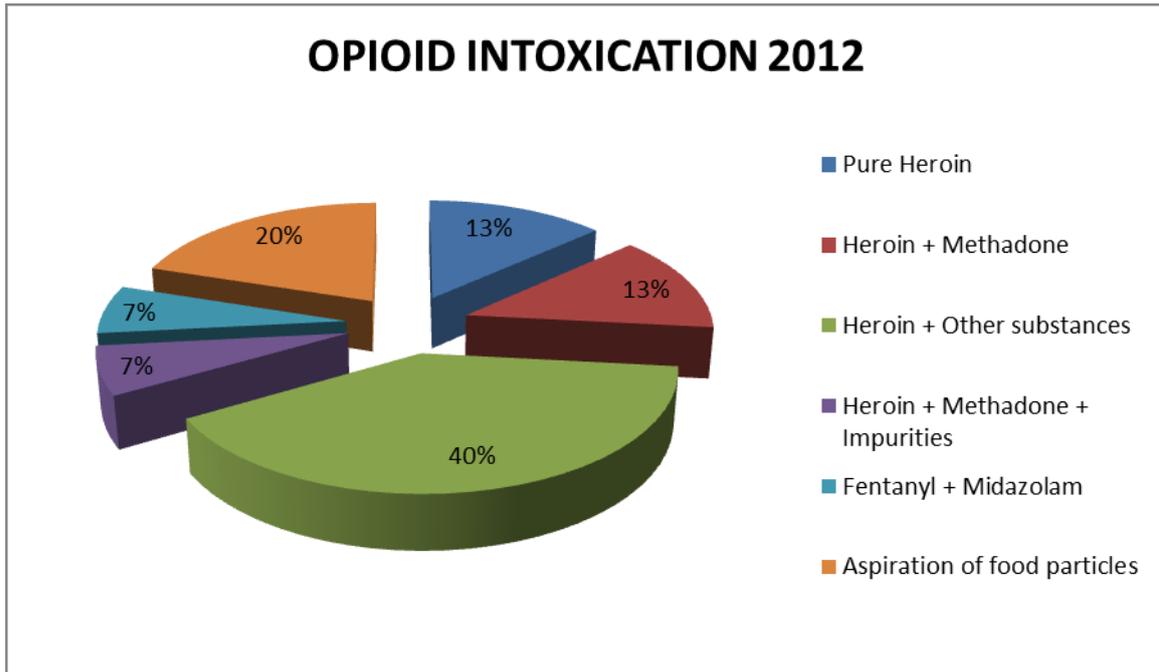


Fig. 2: Opioid intoxication for 2012

In 2013 in 16 cases investigated by us the cause of death was intoxication with opioid drugs. In 3 of them the intoxication was with pure heroin, in one case - a combination of heroin and methadone, in 8 cases - combined intoxication with heroin and other substances (other groups of illicit drugs, ethyl alcohol and / or impurities), in 4 cases - combined intoxication with heroin, methadone and other substances (ethyl alcohol, other groups of illicit drugs, impurities). The same year 10 cases of intoxication with opioid drugs and subsequent vomiting with aspiration of gastric contents were registered. Of those, in 2 cases mechanical asphyxia occurred after administration of pure heroin, in 2 cases - of pure methadone, in 2 cases - of heroin with impurities, in 3 cases - of combination of methadone and other substances (other groups of recreational drugs, ethyl alcohol, impurities) and one case after a combined intake of heroin, methadone and diazepam (Fig.3).

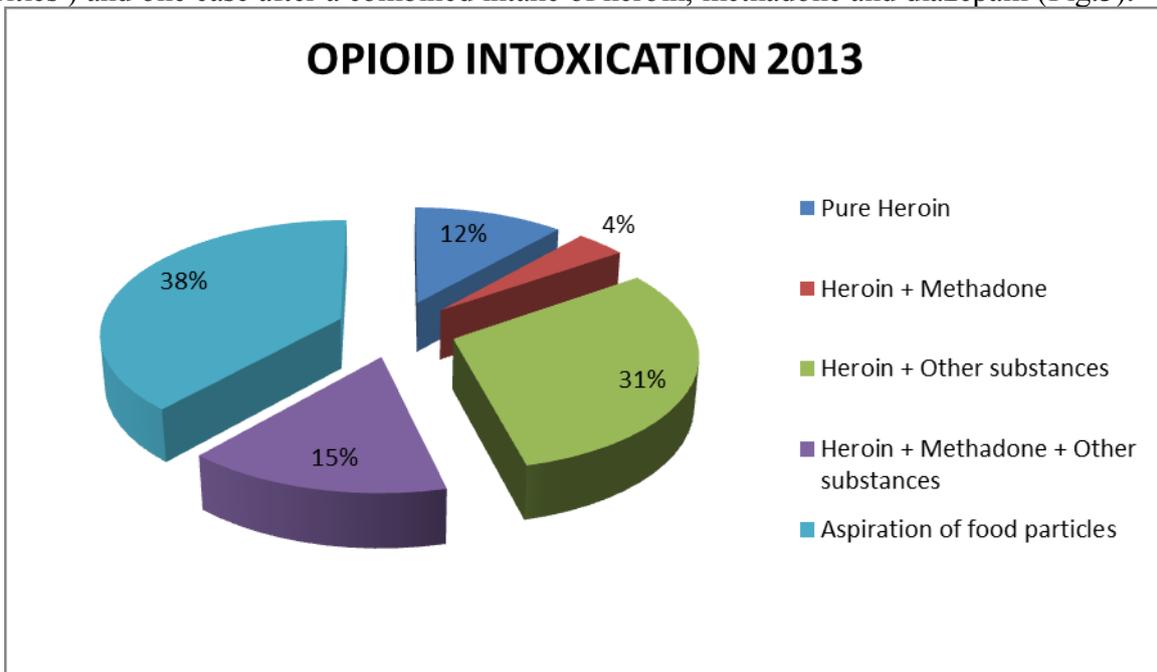


Fig.3: Opioid intoxication for 2013.

In 2014 we did 16 autopsies of deceased, where the cause of death was intoxication with opioid substances, of which in 2 cases the death occurred after administration of pure heroin, in 8 cases after taking heroin and other substances (ethyl alcohol, other groups of illicit drugs, impurities), in 3 cases the death was related to administration of methadone and other substances (ethyl alcohol, other opioids - fentanyl) and in 3 cases - of heroin, methadone and other substances (impurities, other groups of illicit drugs and alcohol). Only one case of intoxication with subsequent vomiting and aspiration of gastric content was observed after combined intake of heroin and amphetamine (Fig.4).

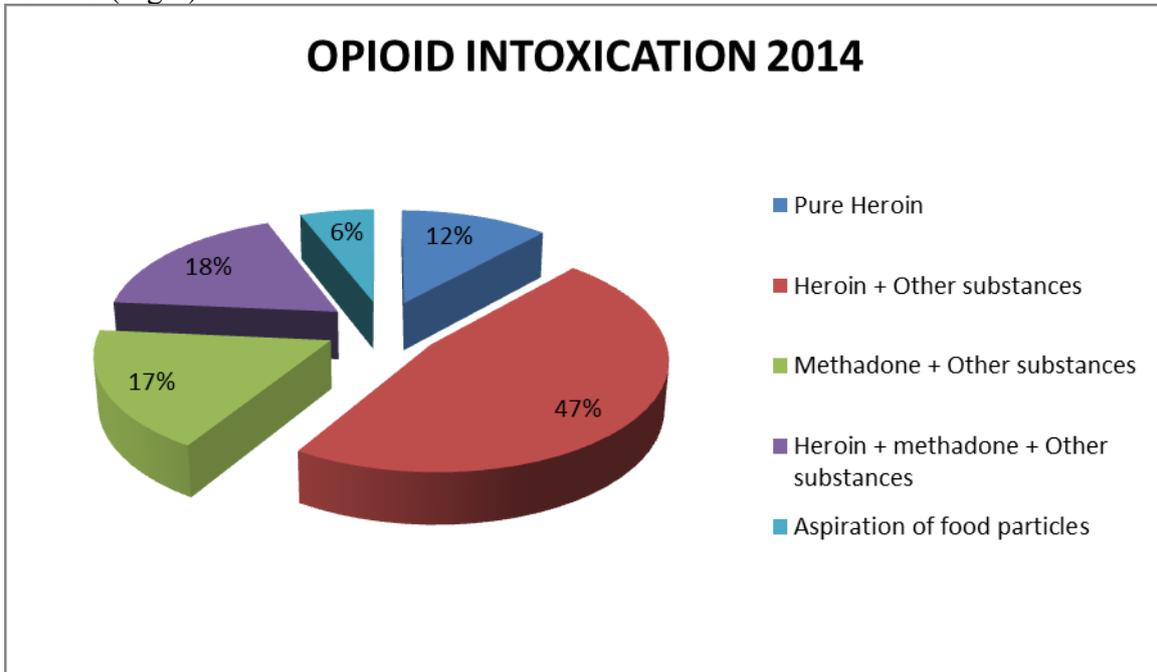


Fig. 4: Opioid intoxication for 2014

In cases of combined acute intoxication with opioids and other illicit drugs the chemical analysis has demonstrated the presence of metabolites of cocaine, marijuana, amphetamines and methamphetamines. Impurities added to such drugs are represented by diazepam, spasmalgon, Ibuprofen, Paracetamol, Rohypnol, caffeine, Rivotril, amitriptyline, mirtazapine, tramadol, oxycodone, codeine and others.

DISCUSSION

The road from the bar of opium to street heroin is long [1, 2, 3, 6]. Pure heroin is a white powder with a bitter taste. The one sold on the street contains different amounts of the substance and depending on impurities is off-white to dark brown in color. This is achieved by passing through 5-6 descending steps from the underground laboratories to the street users. With each passing from hand to hand heroin increases its price, but is diluted with other substances and ultimately what is sold to drug addicts is a mixture with unknown and unpredictable effects [1, 2, 3, 5]. Impurities found in street heroin doses include sugar, chalk, coffee, powdered milk, detergent and drugs such as Ibuprofen, aspirin, benzodiazepines, antidepressants and others, and in some cases quinine and strychnine. The main diluent in the US and Europe is mannitol or sorbitol, but in countries such as Bulgaria powdered-sugar, coffee or even talc are most often used [5]. Adding to street drugs substances with a bitter taste (quinine, analgin, etc.) is done in order to deceive the buyer - so the thing they sell acquires taste as strong heroin. All these known and unknown additives make street heroin a mixture with unpredictable force and effects.

Today, heroin is associated with the greatest share of morbidity and mortality [10] due to drug abuse in the European Union and in Bulgaria. Its use leads to rapid mental and physical dependence (heroin addicts). One way to administer heroin is by injection [4, 5, 11] (the powder is mixed with water, citric acid is added and the mixture is heated to a clear solution, which afterwards is filtrated trough filtration barrier in a syringe), and the other is by smoking, mixed with tobacco or marijuana, or by inhalation of its vapors called "chasing the dragon" [5, 9, 12]. Highest psychoactive effects are achieved by intravenous administration, but it is the most dangerous way – it can lead to paralysis of the respiratory center and quick subsequent death. Furthermore, due to the use of shared needles people using heroin are at greater risk of contracting incurable or refractory to treatment disease.

The analysis of the results showed that in Sofia city and Sofia region death due to intoxication with opioids is due mostly to the combined use of heroin and other substances - 40% of the cases, followed by intoxications with pure heroin - 23%, combined poisoning with heroin, methadone and other substances - 16%, of the combination just of heroin and methadone - 11%, combination of methadone and other substances - 8% and 2% of the cases are due to fentanyl toxicity (Fig.5).

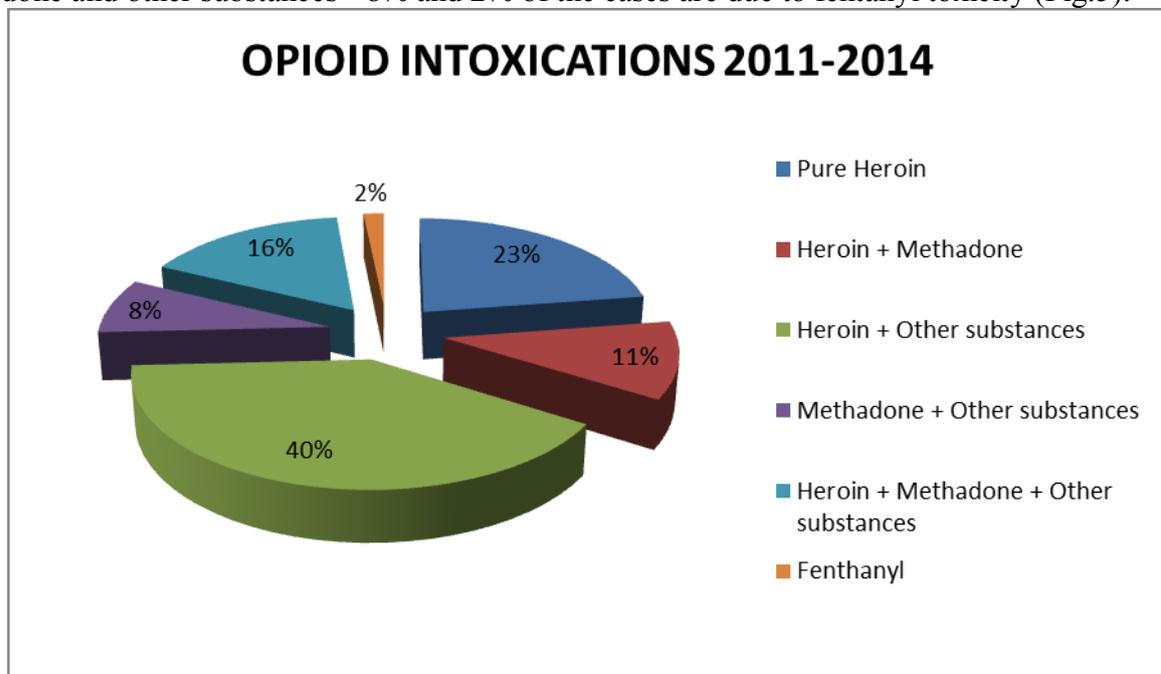


Fig. 5: Opioid intoxication – summarized for the period 2011-2014

The analysis of the data in the cases of intoxication with subsequent vomiting and aspiration of gastric contents showed: 33% of the cases death occurs after intake of pure heroin, in 27% - after taking heroin and other substances, in 20% - after taking methadone and other substances, in 13% - after administration of pure methadone, in 7% of the cases - after combined use of heroin, methadone and other substances (Fig.6).

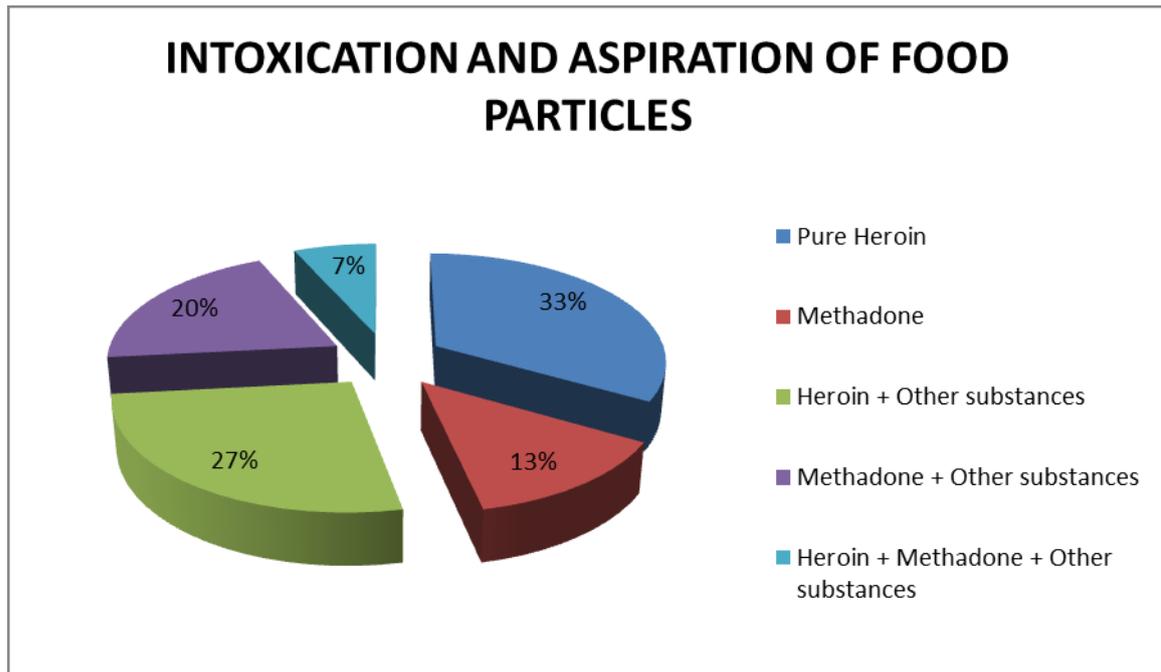


Fig. 6: Intoxication with opioids with subsequent aspiration of food particles

In cases of intoxication with pure opioid substances like heroin and methadone death occurs as a result of severe circulatory and metabolic disorders in the central nervous system, with subsequent severe swelling of the brain and depression (paralysis) of the vital brain centers of the respiratory and cardiovascular systems.

The literature describes various combinations of opioids and other illicit drugs and medications. In the cases we studied we found the following most common combinations.

In some cases, heroin is used in combination with cocaine, which is referred by the term "Speedball", when injected or "Moonrocks" – when smoking together [9, 12]. Cocaine acts as a stimulant, while heroin suppresses the nervous system. Co-administration provides an intense rush of euphoria that combines both effects of the drugs without their negative effects, such as anxiety and sedation. The effects of cocaine last longer compared to those of heroin, so if someone takes a new dose of heroin to compensate for the missing effect of cocaine, the result is fatal - severe respiratory depression. Similar risk to life exists in combinations of opioids with other stimulants such as amphetamines and methamphetamines.

Heroin/methadone is combined also with diazepam. This medicament from the group of the benzodiazepines could enhance the euphoric effect of the opioid, which increases the risk for developing addiction more quickly, and in some individuals, results in reducing the symptoms of withdrawal. The combination of heroin/methadone and diazepam leads to suppression of the respiratory center as a result of potentiation and overlay the effects of opiate and benzodiazepine derivatives, with the development of acute respiratory and circulatory failure and rapid death.

Opioids are combined also with ethyl alcohol. Alcohol acts on the central nervous system by inhibiting its function. The risk of the concomitant use of opioids and alcohol comes from the fact that both delay the functions of the central nervous system, which regulates heart rate and breathing. When blood flow and oxygen to the brain is impaired, it is associated with brain damage and impairment in the regulation of these basic life functions.

CONCLUSIONS

The use of opioids and other illicit drugs is a serious problem throughout the world with the nature of "epidemic". Namely administration of opioids is the leading cause of death among drug users. Our research showed that the most commonly used substance from this group is heroin, mainly in combination with other illicit drugs, ethyl alcohol and remedies. These combinations are associated with a higher risk of death even if small amounts of the substances are used. The additional substances found in drugs hide unexpected and unpredictable, short-term and long-term effects on the body.

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