



COVID-19 pandemic and addiction: a two-way impact – review reports

Pandemia COVID-19 a uzależnienia – wpływ dwukierunkowy. Przegląd doniesień

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■ Abstract

Introduction and Objective. The Covid-19 pandemic had a significant impact on our lives and health. At that time, people were looking for ways to reduce stress. One way to escape from problems turned out to be the use of harmful substances – cigarettes, alcohol, drugs or the Internet. Long-term use of these substances leads to addiction. However, the relationship between the Covid-19 pandemic and addiction is not unidirectional. The purpose of the following paper was to review reports on the bidirectional influence between pandemic Covid-19 and addiction.

Review methods. Search PubMed and Google Scholar databases using keywords and phrases: “Covid-19 pandemic”, “Covid-19 risk”, “Addiction”, “Substance-related disorders”, “Alcohol”, “Internet.” The review includes an analysis of full-text scientific publications in Polish and English available as of 2020. A systematic review of 18 scientific texts containing the most current data was conducted. The selection was guided by the diversity of scientific centers where the articles were written. An attempt was made to present a comprehensive state of knowledge while indicating areas that require further research.

Brief description of the state of knowledge. The time of increased stress that the Covid-19 pandemic proved to be has altered harmful substance use. Most publications point to an increase in addictions to alcohol, drugs or the Internet. Addictions to harmful substances by affecting many systems of the human body, especially the immune system, contribute to the increased risk of illness and severity of Covid-19.

Summary. Based on the sources reviewed, a bidirectional influence between pandemic Covid-19 and addictions is evident. However, large group studies are still needed to uncover the detailed mechanisms of the bidirectional influence between pandemic Covid-19 and addiction.

■ Key words

Internet, Addiction, Covid-19 pandemic, Alcohol, Substance-related disorders, Covid-19 risk

■ Streszczenie

Wprowadzenie i cel pracy. Pandemia COVID-19 wywarła znaczący wpływ na nasze życie i zdrowie. W tym czasie ludzie szukali sposobu na redukcję stresu. Jedną z dróg ucieczki od problemów okazało się używanie szkodliwych substancji – papierosów, alkoholu, narkotyków – lub kompulsywne korzystanie z Internetu. Długotrwałe wykorzystywanie tych środków prowadzi do uzależnienia. Zależność między pandemią COVID-19 a uzależnieniami nie jest jednak jednokierunkowa. Celem poniższej pracy był przegląd doniesień na temat dwukierunkowego wpływu – pandemii COVID-19 na uzależnienia oraz uzależnień na COVID-19.

Metody przeglądu. Przeszukiwanie bazy PubMed i Google Scholar z użyciem następujących słów i wyrażen kluczykowych: „pandemia COVID-19”, „ryzyko COVID-19”, „uzależnienia”, „substance-related disorders”, „alcohol”, „Internet”. Przegląd zawiera analizę pełnotekstowych publikacji naukowych w języku polskim i angielskim dostępnych od 2020 roku. Dokonano przeglądu systematycznego 18 tekstów naukowych zawierających najbardziej aktualne dane. Przy wyborze kierowano się różnorodnością ośrodków naukowych, w których powstały artykuły. Starano się przedstawić kompleksowo stan wiedzy z jednoczesnym wskazaniem obszarów, które wymagają kolejnych badań.

Opis stanu wiedzy. Czas wzmożonego stresu, jakim okazała się pandemia COVID-19, wpłynął na zmianę w zakresie używania szkodliwych substancji. Większość publikacji wskazuje na wzrost uzależnień od alkoholu, narkotyków czy Internetu. Uzależnienia od szkodliwych substancji czy od medium poprzez ich wpływ na wiele układów ludzkiego ciała, zwłaszcza na układ odpornościowy, przyczyniają się do wzrostu ryzyka zachorowania i ciężkiego przebiegu COVID-19.

Podsumowanie. Analiza źródeł pozwala dostrzec obustronną zależność między pandemią COVID-19 a uzależnieniami.

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Potrzebne jest jednak przeprowadzenie badań na dużych grupach, by odkryć szczegółowe mechanizmy tego dwukierunkowego wpływu.

Słowa kluczowe

Internet, alkohol, uzależnienia, pandemia COVID-19, ryzyko COVID-19, zaburzenia związane z substancjami

INTRODUCTION AND OBJECTIVE

11 March 2020 is a date forever etched in world history; the date when the World Health Organization announced that the Covid-19 virus had become a pandemic. All countries worldwide introduced more or less stringent restrictions and sanitary measures to stop the spread of the new Sars-Cov-2 virus, which had a variety of effects in all areas of life. The Covid-19 pandemic left its mark not only on the physical health, but also on the mental health and emotional balance of many people. Forced isolation, stress and new living conditions altered behaviour and habits. Often, the loss of jobs, lack of economic means to live, and fear for the financial future of many families also contributed [1].

The isolation that was forced upon many people by the pandemic may have had a negative impact, making them lonely and withdrawn from social life. In such stressful situations, many people look to themselves for classes and activities to help them de-stress and get through that difficult time. Unfortunately, many of these activities can have a disturbing and long-lasting impact. It turns out that a way of surviving stressful times is through various types of addictions, such as the use of alcohol or illegal substances, which provide a brief relaxing effect, but bring harm in the long term [2].

Another problem of the pandemic period has become Internet addiction. To show the scale of the phenomenon of the prevalence of access to this medium, it is worth citing data from March 2020, which states that the Internet was used by some 4.57 billion people worldwide. Worryingly, the coexistence of 'pathological' Internet use with other mental disorders, such as addiction to illicit psychoactive substances or co-occurrence with attention-deficit / hyperactivity disorder or mood disorders, has also been observed [3].

Interestingly, however, the link between the Covid-19 pandemic and addictions is not unidirectional. Addictions, by affecting a person's immunity and thus the overall health of the body, are also linked to an increased risk of viral and bacterial infections. This mainly concerns addiction to alcohol and illegal substances [4]. People addicted to alcohol have an increased risk of acute lung damage and severe Sars-Cov-2 virus infection. The number of scientific reports regarding the correlation of opioid use and the risk of infection and severity of Covid-19 is limited and requires further observation. However, it is known that adverse effects of opioids include respiratory distress and kidney damage, and these complications may worsen the prognosis of patients with Covid-19. In contrast, many scientific publications support the fact that cigarette smoking affects the respiratory system by increasing the expression of receptors for angiotensin-converting enzyme-2 (ACE2). This correlation has a major impact on the risk of infection and severe Covid-19 [5]. Due to the difference in biochemical structure between the virus particles of SARS-CoV (which causes severe acute respiratory distress syndrome) and SARS-CoV-2 (which causes Covid-19), the latter shows a stronger interaction with the ACE2 receptor. This receptor is localized

in large numbers in the lower airways, which explains why patients who smoke cigarettes are predisposed to develop severe complications, such as acute respiratory distress syndrome (ARDS) [4].

Due to the fact that the Covid-19 spanned the globe and affected people of all classes, causing consequences for health, as well as financial, economic and individual consequences, the risk of contracting the disease and the severity of its course, depended on many independent factors, including exposure to harmful substances. The purpose of this article is to review recent literature to determine a bi-directional relationship between Covid-19 and addiction.

STATE OF KNOWLEDGE

Alcohol. Alcohol abusers have an increased risk of severe Covid-19, including acute lung damage and the development of respiratory failure. They also have an increased risk of superinfection with bacterial infections, which significantly worsens the prognosis. The biochemical mechanisms that cause alcohol-related lung damage are complex. Nitric oxide (NO) produced during alcohol metabolism already at the level of the upper airways, can impair the function of the ciliary epithelium, thereby weakening the ability to eliminate pathogens. In addition, alcohol can affect the immune system by impairing the ability of macrophages in the alveoli to phagocytose [5].

The Covid-19 pandemic can be regarded as an extremely stressful period in the life of modern society. In such difficult circumstances people often try to compensate by indulging in activities that quickly help in coping with stress. A short-term and illusory solution to problems is the consumption of alcohol, which, if indulged in for a long time, can be associated with negative consequences. Sanitary measures that were applied during the Covid-19 crisis contributed to an increase in the risk of alcohol drinking [2]. However, based on a review by Rose A. Schmidt et al., it can be concluded that the pattern of alcohol drinking changed not only according to the upward trend. Depending on the population group studied, both increases and decreases in alcohol consumption were observed during the pandemic. Factors, such as the time of consumption of alcoholic beverages also changed with an increase in drinking alcohol before 5 p.m. reported [6]. Based on the analyzed data, it can be concluded that the change in the frequency and amount of alcohol consumed affected both men and women.

Increased alcohol consumption was also considered as a form of self-harm resulting from the sudden change in daily life, fear of losing financial resources, and stress caused by isolation and the need to maintain social distance.

Countries where the sale and purchase of alcohol was banned during the lockdown (e.g., South Africa) saw a sharp increase in theft and illegal trade in alcohol products. With the introduction of the above restrictions, a decrease in alcohol consumption was expected. As a consequence, however, the development of substitute addictions was observed to replace

the hindered access to alcohol. In this case, most often one substance (alcohol) was replaced by another psychoactive substance, such as amphetamines, heroin and cocaine. The intake of harmful substances was also compensated for by the development of compulsive behaviour, such as compulsive viewing of pornography.

Another dangerous phenomenon was the home production of alcohol, which could lead to the creation of dangerous, lethal alcohols [7].

Drugs. Along with alcohol, drugs are among the most common dangerous addictions and are the cause of substance use disorders (SUDs) for many people. Substance Use Disorder (SUD) is a problem associated with opioid and was probably one of the most discussed during the Covid-19 pandemic. SUD is a disorder that affects the brain and behaviour and long-term physical health. People with SUD often have cardiovascular problems and impaired immunity. They neglect health-promoting behaviours, have poorer access to medical care, and often have unstable housing situations [8]. They struggle with HIV, viral hepatitis, anxiety and mood disorders more often than the general population [9]. All of these factors place them at high risk of contracting and developing severe Covid-19, leading to increased mortality in this patient group [8].

Forced isolation during the Covid-19 pandemic, among other things, may also have further contributed to the increased mortality in this group. Self-administration of the drug may have increased the risk of overdose and decreased the likelihood of naloxone administration. Medical care also may not have been as effective as before due to an overburdened health care system, a many times increase in patients and overworked medical staff. Forced isolation, closed borders in many countries and cancelled flights are just some of the factors that have contributed to lower drug availability. This has resulted in higher prices for consumers on the black market and the sale of more contaminated substances. Meanwhile, reduced availability and increased costs have led to an increased interest in alternative, more readily available substances, such as codeine, ephedrine or loperamide, described as 'methadone for the poor', being openly available

Another drug-related risk may have been the misinterpretation of symptoms that can occur during Covid-19 infection and which can be mistaken for symptoms of opioid withdrawal syndrome. These include chills, goosebumps, increased body temperature, sneezing, and diarrhea. Such behaviours could lead to self-medication at home, resulting in the development of a severe course of infection and complications [10].

As Shekhar S. et al. indicate that compulsive substance-taking behaviour is a gateway to the rapid spread of Sars-Cov-2 infections and the development of pandemics. By this is meant the gathering of addicts to take substances together and sharing used needles [10].

Analyzing the available scientific reports, one can see a change in the number of drug users. Chodkiewicz et al. reported an increase in use in 1.4% and a decrease in 1.1% of the sample [11]. According to Taylor et al. 31% of their sample among the Polish population reported an increase in substance use, with these individuals already using drugs before the pandemic [12]. According to statistics from Czeisler et al, 13.3% of people surveyed in the US had started

or increased their substance use as a means of coping with a stressful situation. However, this group of researchers did not report the percentage of people who reduced their drug intake [13]. In conclusion, the use of drugs as a stress reliever and a means of helping people survive difficult experiences, which may include the Covid-19 pandemic, needs further statistical analysis. This is an important aspect because psychoactive substances may be a trigger for suicidal thoughts, although no evidence has been given so far of an increase in suicides during the pandemic [6].

Internet. During times of forced social isolation, the Internet has become an easily accessible, attractive form of leisure activity. In addition to being able to watch movies and play computer games, it has become an even more popular communicator. In the absence of being able to leave home and meet in real life, thanks to the Internet we could see and hear loved ones, which was an undeniable positive aspect. However, using the Internet too often and spending a lot of time this way can lead to addiction. Interestingly, the possibility of Internet addiction coexisting with other psychiatric disorders, such as attention deficit/hyperactivity disorder, depression or other addictions, has been observed [3]. Based on Laura Marciano et al.'s review of the analysis of scientific sources, it can be concluded that most studies prove a link between Internet use and Internet addiction and malaise. However, there are forms of Internet activity that have not caused deterioration of users' mental condition. This is, for example, one-to-one instant messaging contact, which resulted in the alleviation of stress complaints and reduced the severity of feelings of loneliness [14].

According to an analysis by Daniel L. King, one U.S. telecommunications service provider reported a 75% increase in online gaming activity during the introduction of mandatory home isolation. This kind of leisure activity was intended to offset the negative effects of living in isolation. Thanks to the virtual friendships made through online gaming, the Internet user was able to experience less stress associated with loneliness. According to scientific reports, online gaming is less harmful than other behaviors and activities that could be used to reduce stress, such as the use of psychoactive substances or compulsive overeating. However, opinions on online gaming cannot be generalized, as in some cases it can be harmful to mental and physical health. This is especially true for minors. Addiction to computer games can lead to deepening self-isolation, negatively affect sleep and limit physical activity [15].

Addiction as a risk factor for Covid-19 disease. According to the WHO's official position, cigarette smokers are at higher risk of severe Covid-19 compared to non-smokers. Cigarette smoking negatively affects many organ systems. One of the most commonly discussed is the effect on the respiratory system. Cigarette smoking increases the expression of angiotensin-converting enzyme-2 (ACE2), which is found in large amounts in the respiratory tract. Sars-Cov-2 virus has a high affinity for receptors for ACE2 [5]. Thus, by increasing the number of these proteins, we simultaneously increase the number of gateways through which the virus can enter our bodies. In 2020, Han et al. conducted a study on rats that were exposed to tobacco smoke. They found that over time of smoke exposure, the animals developed chronic pulmonary hypertension accompanied by increased

levels of angiotensin II in the lungs [16]. To date, it has not been clarified why cigarette smoking is an independent risk factor for the incidence and severity of Covid-19. However, numerous analyses indicate an increased incidence of complications such as acute respiratory distress syndrome and bacterial superinfection of pneumonia. Analyzing the reports of Vardavas et al. who reviewed 5 clinical studies, it can be concluded that smoking is likely to be associated with the risk of severe course and occurrence of serious complications of Covid-19 [17]. Recently, the beneficial effect of nicotine on the course of Sars-Cov-2 virus infection has begun to be discussed. This has happened through the publication of several clinical studies on small study groups, which suggest a protective effect of nicotine on the course of Covid-19.

Through its immunomodulatory properties, nicotine would be expected to calm the cytokine storm, thereby having the effect of reducing the severity of inflammation. This hypothesis requires further detailed research and should not be replicated without reliable results first being obtained to avoid the dissemination of false and harmful information [8]. There are also too few scientific reports that can objectively assess the impact of e-cigarette smoking on Covid-19. Based on a study by Vanderbruggen et al. on the trend of alcohol consumption and cigarette smoking during Covid-19, the following conclusions can be drawn – an increase in alcohol consumption and cigarette smoking during lockdown was confirmed compared to the time before the pandemic and the introduction of social restrictions. A total of 3,632 people participated in this large survey. Drugs, according to those surveyed, were chosen more often because of loneliness, reduced social contacts and disruption of the previous daily rhythm. Consumption was said to serve as a reward after hard work and was associated with the younger age of those who turned to alcohol or cigarettes. Yusuf S. Althobaiti et al. also point out interesting reports on Covid-19 mortality in people additionally burdened by nicotine. It appears that smoking may be a factor that doubles the risk of mortality among male smokers, compared to women. However, this hypothesis also requires further research, as it is unclear whether the results were influenced by the fact that men smoke cigarettes more often than women [5].

More than 8 billion people inhabit the entire globe, of whom an estimated 2.4 billion people worldwide consume alcohol. Based on estimates alone, alcohol is consumed by about 30% of all people around the world, with men consuming alcohol more than 1.5 times more often than women. Since the beginning of the Covid-19 pandemic, there has been a marked increase in the consumption of alcoholic beverages, which are one of the readily available means of influencing the human brain and perception of the world. Thus, alcohol is thought to serve to offset stress, which during Covid-19 results, among other things, from increased feelings of loneliness, forced isolation and can lead to more frequent depressive states. Based on a study by Testino et al., it is known that a correlation exists between the risk of contracting viral infections and dose-dependent alcohol consumption. People with alcohol use disorders are more likely to suffer from viral and bacterial infections. Among alcohol users, 30–40% also struggle with hepatitis C (Hepatitis C) or human immunodeficiency virus (HIV) infection. These individuals are also burdened with a more severe course of these infections [4].

As mentioned earlier, people infected with HIV and/or hepatitis C are more likely to be among those suffering from drug addiction. Lifestyle, joint opioid use and staying in groups increase the risk of Covid-19 in this group, and changes in the immune system increase the risk of severe infection [10]. Studies show that chronic alcohol consumption negatively affects our immunity acting at different levels. The activity of NK (Natural Killer) cells is significantly altered. Among other things, ethanol affects the binding between NK cells and the cell's target, the production of certain cytokines, and a decrease in cytolytic activity. All these effects affect the body's weaker defence against infection. Alcohol consumption also reduces the number of T lymphocytes and inhibits their activation; there is also a reduced production of B lymphocytes. Alcohol has a pro-inflammatory effect in the body, while simultaneously inhibiting the production of anti-inflammatory proteins [4].

Drugs as opioid derivatives affect the dopaminergic system, inducing feelings of euphoria and relaxation. The danger of their use in the context of Sars-Cov-2 infection relates to the possibility of respiratory distress in patients taking methadone replacement therapy. Patients hospitalized with Covid-19 are more likely to have impaired renal function. This risk may be further increased by the accumulation of self-administered opioids in the body. Elderly patients, who have physiologically reduced renal and hepatic function and, in addition, a higher risk of dehydration, are particularly vulnerable to these complications.

SUMMARY

More than three years have passed since the start of the biggest pandemic of the 21st century so far, and its effects have affected each one of us. The aim of the above scientific review was to explore the bi-directional impact between the Covid-19 pandemic and addiction. The changes in daily life that were forced by the spreading pandemic also significantly affected human behaviour and habits. This stressful time undoubtedly increased the risk of using harmful substances or using the Internet dangerously. All these activities were intended to serve as a stress-relieving element and a relieve sense of alienation. However, due to long-term use, this often led to falling into addiction or returning to it after many years. However, based on the scientific reports analyzed, it can be concluded that addictions also affected the risk of disease and the course of Covid-19. This mainly concerns the impact of harmful substances that, by weakening the immune system and promoting the production of inflammatory cytokines in the body, increase the risk of disease and the severity of infection. However, the impact of addictive substances was not limited to affecting the immune system. By promoting specific patterns of social behaviour, the use of psychoactive substances – alcohol and drugs – also increased the risk of disease. Consumption of substances in groups, risky behaviour, injecting drugs with a single needle and syringe increases the risk of transferring various viral diseases, including Covid-19. More research and scientific studies are needed to investigate the detailed impact of various harmful substances on the risk of Covid-19 infection.

Arguably, the negative effects of the pandemic will continue to be seen in the form of increased addiction, and in the distant future often coexisting with other mental health problems.

In this situation, doctors and other health care professionals have a particularly important role to play, and they should educate patients about various options for dealing with stress. It seems that many patients do not realize the consequences of consuming harmful substances or compulsive use of the Internet before they become addicted. Perhaps if they had prior knowledge of the harmful effects and negative impact on many spheres of life, they would not reach for another glass or cigarette. This is much more comfortable situation today than at the beginning of the pandemic, because more is known about the course of the infection, treatment options and, above all, vaccines have been developed that save the health and lives of many people. However, this must not cause us to completely disregard Covid-19 and its risks.

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