Journal of Positive Psychology & Wellbeing
2022, Vol. 6, No. 4, 180 – 184
http://journalppw.com
ISSN 2587-0130

Drug Overdose in ADHD Patient, Roles of Pharmacist, Public Health Together with Social Worker in Prevention and Increase Awarness among Population

Saad Saud Alyazidi[1], Talal Oliyan Ali Alfahmi[2], Menwer Mohsen Mubarak Alfahmi[3], Rayan Ayyadhah Muta Alamri[4], Ahmed Mohammed Bin Khidhr Almathami[5], Abdulrahman Ahmed Abdulaziz Almhdawi[6], Abdulkarim Jamaan Albijali[7], Ali Dawood Mohammed Almahdawi[8], Abdulaziz Aqeel Jubayr Alyazidi[9], Mohammed Sughayyir Fari Alyazidi[9]

[1]Public health specialist, School Health, Jeddah first health cluster - Al laith general hospital
[2]Social Specialist Social Work Department, Jeddah First Health Cluster - Al Laith General Hospital
[3]Public health specialist at Makkah Al-Mukarramah Health Complex
[4]Public health, Northren borders health cluster AlJawhra Primary Health care center Environmental health
[5]Assistant Pharmacist Pharmacy, Jeddah First Health Cluster - Al Laith General Hospital
[6]Assesstant pharmacist, at Jeddah first health cluster, Al laith general hospital
[7]Specialist Public Health, Executive Public Health, Administration
[8]Assistant Pharmacist Pharmacy, Jeddah First Health Cluster - Al Laith General Hospital
[9]Public health specialist, Health surveillance center at king abdulaziz international airport jeddah

Abstract

ADHD is a contributing factor to substance misuse in adults. This risk is further heightened by the presence of other psychiatric illness. ADHD is linked to several traits of substance misuse, such as a quicker progression from substance abuse to dependence and a longer duration of substance abuse in people with ADHD compared to those without ADHD. This review specifically examines the processes of toxicity that occur following an overdose of drugs used to treat Attention-Deficit/Hyperactivity Disorder (ADHD), as well as the clinical symptoms that result from such overdoses, and the appropriate management strategies. The norepinephrine transporter (NET) and serotonin transporter are involved. Pharmacists collaborate with patients who have ADHD and addictions to enhance the effectiveness of drug treatment, minimize the use of multiple medications, and assist in the process of discontinuing prescription use. Pharmacists, public health professionals, and social service workers can provide their services regularly and consistently, without requiring an appointment, while ensuring patient confidentiality and privacy. Crucial roles in preventive and educating the population to enhance awareness.

Keywords: *norepinephrine transporter, Attention-Deficit/Hyperactivity Disorder, drug overdose.*

Introduction

It is estimated that roughly 4–9% of youngsters in the United States of America suffer from attention-deficit hyperactivity disorder (ADHD), while only 4% of adults are affected by this condition [1]. It is estimated that more than 2.7 million children in the United States are prescribed medication for attention-deficit/hyperactivity disorder (ADHD) each year [2]. However, it is not known how many adults are also using these prescriptions. Medication for attention-deficit/hyperactivity disorder (ADHD) has been prescribed to a greater proportion of people in recent years. Like the patterns that have been observed with poisoning from other pharmaceuticals, such as the ones that have been observed historically with cyclic antidepressants and more recently with opioids, the increased availability of prescription ADHD medications may help to explain, at least in part, the rise in the number of cases of abuse and overdoses that have been observed in adolescents who have been taking these medications [3]. In addition, it has been hypothesized that children who have attention-deficit/hyperactivity disorder are at a higher risk of being hospitalized due to the use of pharmaceuticals. On the other hand, in teens, the increased availability of ADHD medication has matched increases in reports of abuse and misuse of ADHD medications [4]. In younger children, these overdoses may be inadvertent events that occur as a result of exploratory activities. Taking everything into consideration, the conclusion is that both accidental and deliberate overdoses of ADHD medication are likely to continue to be frequently occurring. In the year 2010, poison centers in the United States recorded a total of 17,000 human exposures to ADHD drugs. Eighty percent of these exposures occurred in children under the age of 19 and twenty percent occurred in adults. It is reasonable to anticipate that the majority of these exposures have resulted in at least some adverse clinical outcomes [5]. There are thousands of exposures that are ascribed to deliberate abuse each year, including attempts at suicide and drug addiction [5]. This is despite the fact that the majority of these exposures are inadvertent due to the amount of pediatric exploratory ingestions.

There is a wide variety of medications that are utilized for the treatment of attention-deficit/hyperactivity disorder (ADHD). However, these medications can be loosely classified into two categories: stimulants, which include amphetamine, methylphenidate, and modafinil; and non-stimulants, which include atomoxetine, guanfacine, and clonidine [6]. In this review, the mechanisms of toxicity that occur after an overdose with ADHD drugs, the clinical effects that result from an overdose, and the roles that pharmacists, public health professionals, and social workers have in preventing and raising awareness among the general population are the primary topics of discussion.

Review:

Pharmacokinetics of ADHD medications:

Amphetamines are efficiently absorbed by all methods of administration. These substances can be easily and quickly absorbed when taken orally, and the presence of food does not cause any significant delay [7]. Maximum plasma concentrations are reached within 2-3 hours following oral ingestion of immediate-release formulations, and within 30 minutes after intravenous or intramuscular injection. Amphetamines have a high affinity for fat, which allows them to easily pass across the barrier that separates the bloodstream from the brain. These substances are classified as weak bases, having a pKa (logarithmic acid dissociation constant) value of around 9.9. Amphetamines have a volume of distribution of 3-5 L/kg, which means they are disseminated throughout all tissues in the body. In the cerebrospinal fluid (CSF), their levels are around 80% of the levels found in the plasma when the drug is at a steady state. Additionally, amphetamines can build up in tissues or substances that have a lower pH than blood. Amphetamines are removed from the body through the liver and kidneys, with about 30% of the amphetamines being expelled without any changes. The excretion of unmodified amphetamine is greatly affected by the acidity of urine. When the urine pH is 6.6, around 70% of the amphetamine is excreted intact, but in urine with a pH more than 6.7, the excretion rate ranges from 17% to 43%. The renal elimination has an impact on the plasma half-life, which can range from 7 to 14 hours for urine pH levels below 6.6, and up to 34 hours for urine pH levels greater than 6.7 [7].

Lisdexamphetamine is a prodrug that is quickly taken in by the body and is broken down by red blood cells to release the active form of dextroamphetamine. The process of cleavage results in the production of dextroamphetamine and l-lysine. Lisdexamfetamine does not undergo hepatic metabolism via the cytochrome P450 (CYP) pathway [8]. The highest levels of lisdexamphetamine and dextroamphetamine in the bloodstream are reached at 1 hour and 3.5 hours, respectively, after taking them orally. Lisdex-amphetamine is almost untraceable in the bloodstream after 8 hours, and around 2% of a given dose is excreted in the urine without undergoing any changes. The plasma elimination half-life is shorter than 1 hour [8].

Mechanism of Toxicity:

The primary cause of toxicity of amphetamines is an excessive amount of dopamine, norepinephrine, and serotonin outside of the cells. The primary clinical presentation is a sym- pathomimetic syndrome mediated by alpha- and beta-adrenoreceptors, characterized by mental symptoms and hyperthermia caused by an excess of dopamine and serotonin [9].

Amphetamine and dextroamphetamine are taken up by the cellular monoamine transporter, particularly the dopamine transporter (DAT), and to a lesser extent the norepinephrine (NET) and serotonin transporter. The neurons aggressively uptake them through the cellular monoamine transporter, displacing the stored monoamines and encouraging the release of monoamines in the brain in the opposite direction. Amphetamines induce a reversal of the uptake transporter-mediated flow, leading to the release of monoamines. Amphetamines increase the concentration of synaptic neurotransmitters by blocking the absorption of monoamines through direct competition with the transporter and by stimulating the transporter to work in reverse. The toxicity of lisdexamphetamine is contingent upon the timing of the liberation of dextroamphetamine.

Instances of amphetamine overdoses have been reported since the drug became available and continue to be frequent. The main clinical condition exhibits notable neurological and cardiovascular symptoms, while other problems can affect the renal, musculoskeletal, pulmonary, and gastrointestinal systems. In cases of overdose, the patient may exhibit symptoms such as dilated pupils (mydriasis), shaking or trembling (tremor), restlessness or irritability (agitation), exaggerated reflexes (hyperreflexia), aggressive or confrontational behavior (combative behavior), mental confusion, hallucinations, a state of extreme confusion and disorientation (delirium), feelings of unease or fear (anxiety), irrational suspicions or mistrust (paranoia), abnormal movements (movement disorders), and sudden, uncontrolled muscle contractions (seizures). Seizures can occasionally escalate to status epilepticus. Coma can arise as a result of post-ictal condition, depletion of intrinsic catecholamines, ischemic stroke, or intracerebral hemorrhage [11]. Hyperthermia can manifest with or without seizures. Rhabdomyolysis can develop as a consequence of seizures caused by amphetamine use, which increases the risk of kidney failure. Significant cardiovascular symptoms of an overdose include increased heart rate, high blood pressure, and abnormal heart rhythms. Rare side effects may include aortic dissection, vasospasm, cerebral vasculitis, leading to intracerebral hemorrhage and myocardial infarction [12].

Individuals diagnosed with attention deficit hyperactivity disorder (ADHD) may encounter a range of unfavorable consequences, and they have an increased likelihood of having offspring with ADHD as a result of the hereditary aspects of the condition [12]. The co-occurrence of various neuropsychiatric illnesses in individuals with ADHD may be attributed to a hereditary connection. Moreover, a recent meta-analysis revealed that many characteristics associated with parents, such as maternal polycystic ovarian syndrome, were discovered to elevate the likelihood of ADHD in their children. In addition, the progression of ADHD symptoms was influenced by the stress experienced by parents, which in turn was influenced by negative childhood experiences. This effect was most pronounced in families with low levels of resilience [12].

ADHD has a persistent effect on patients' social and functional capabilities and increases their susceptibility to developing other coexisting conditions. Individuals who are adults and have ADHD experience a greater frequency of being unemployed and changing jobs frequently. Additionally, they are more inclined to having attempted various professions before discovering one that is suitable for them [13]. Furthermore, adults who continue to experience symptoms of ADHD and have not received pharmaceutical treatment are more susceptible to developing drug and substance dependence.

Pharmacists, due to their frequent encounters with patients, are often the first healthcare professionals to come across ADHD patients in their practice, especially in community settings [13]. Pharmacists are seeing a growing number of patients with neuropsychiatric disorders. With adequate training, they feel more assured in taking action to enhance the quality of care provided to these patients. Pharmacists should provide reassurance to patients of different ages who have worries about their prescribed ADHD medications, explaining the important role of pharmacotherapy in managing their condition. Pharmacists have been linked to enhanced quality of care in the clinical treatment of individuals with ADHD [14].

Psychoeducation, a parent-training program that focuses on ADHD and gives knowledge, support, and coping skills to the patient and their family, is recommended as the initial intervention, especially for children under the age of five [14]. A randomized control research conducted by Daley et al. with a sample size of 57 children found that parenting programs led to enhancements in parenting efficacy and child social performance. Disseminating information on ADHD is crucial for promoting knowledge and comprehension of the disorder, therefore helping to combat the stigma associated with ADHD patients. Parents who are knowledgeable of ADHD are more inclined to acknowledge and comply with their child's treatment [15]. Furthermore, the integration of components from the theory of planned behaviors demonstrated that psychoeducation had a beneficial effect on parents' understanding of ADHD and enhanced their intention to comply with prescribed medication [16]. In order to achieve more favorable results in clinical treatment, research has demonstrated that pharmacists have the ability to implement and create psychoeducational initiatives aimed at enhancing medication adherence among patients with mental disorders in primary care settings [16].

Conclusion:

Pharmacists have the ultimate responsibility of collaborating with other healthcare providers, such as those in the public health sector and social service, to provide comprehensive education and support for ADHD. They are also responsible for selecting the most suitable treatment, optimizing the medication regimen, and creating a plan for monitoring the patient's progress. The inclusion of pharmacists in the management of ADHD has been linked to improved clinical outcomes, enhanced quality of life, and increased likelihood of a cost-effective treatment strategy. While they have the ability to fulfill these duties, it is crucial that they remain up-to-date on the latest revisions to the clinical standards and recommendations for ADHD.

Reference

[1] Raaj S., Navanathan S., Tharmaselan M., Lally J. Mental Disorders in Malaysia: An Increase in Lifetime Prevalence. BJPsych Int. 2021;18:97–99. doi: 10.1192/bji.2021.4.

[2] Wakefield J.C. DSM-5: An Overview of Changes and Controversies. Clin. Soc. Work J. 2013;41:139–154.

[3] Laria J.C., Delgado-Gómez D., Peñuelas-Calvo I., Baca-García E., Lillo R.E. Accurate Prediction of Children's ADHD Severity Using Family Burden Information: A Neural Lasso Approach. Front. Comput. Neurosci. 2021;15:54. doi: 10.3389/fncom.2021.674028.

[4] Bogari N.M., Al-Allaf F.A., Aljohani A., Taher M.M., Qutub N.A., Alhelfawi S., Alobaidi A., Alqudah D.M., Banni H., Dairi G., et al. The Co-Existence of ADHD With Autism in Saudi Children: An Analysis Using Next-Generation DNA Sequencing. Front. Genet. 2020;11:548559. doi: 10.3389/fgene.2020.548559.

[5] Abu-Zaid A., Bhagavathula A.S., Rahmani J., Alyoubi R.A., Alomar O., Baradwan S., Alkhamis W.H., Khalifa M., Alshahrani M.S., Khadawardi K., et al. Maternal Polycystic Ovary Syndrome and the Potential Risk of Attention-Deficit/Hyperactivity Disorder and Autism Spectrum Disorder in the Offspring: A Systematic Review and Meta-Analysis. Eur. J. Contracept. Reprod. Health Care. 2022;27:253–260.

[6] Rubio-Valera M, Chen TF, O'Reilly CL. New roles for pharmacists in community mental health care: a narrative review. Int J Environ Res Public Health. 2014;11:10967–10990. doi: 10.3390/ijerph111010967.

[7] Eades CE, Ferguson JS, O'Carroll RE. Public health in community pharmacy: a systematic review of pharmacist and consumer views. BMC Public Health.

2011;11:582. doi: 10.1186/1471-2458-11-582.
[8] Laurant M, Harmsen M, Wollersheim H, Grol R, Faber M, Sibbald B. The impact of nonphysician clinicians: do they improve the quality and cost-effectiveness of health care services? Med Care Res Rev. 2009;66:36S–89S. doi: 10.1177/1077558709346277.
[9] Finley PR, Crismon ML, Rush AJ. Evaluating the impact of pharmacists in mental health: a systematic review. Pharmacotherapy. 2003;23:1634–1644. doi: 10.1592/phco.23.15.1634.31952.
[10] Bell S, McLachlan AJ, Aslani P, Whitehead P, Chen TF. Community pharmacy services to optimise the use of medications for mental illness: a systematic review. Aust New Zealand Health Policy. 2005;2:29. doi: 10.1186/1743-8462-2-29.
[11] Anonymous . Changing Directions, Changing Lives: the Mental Health Strategy for Canada. Calgary: Mental Health Commission of Canada; 2012.
[12] Kirby MJL, Keon WJ. The Standing Senate Committee on Social Affairs, Science and Technology. Out of the shadows at last: highlights and recommendations. Ottawa: Senate of Canada; 2006.
[13] Wazaify M, Shields E, Hughes CM, McElnay JC. Societal perspectives on over-the-counter (OTC) medicines. Fam Pract. 2005;22:170–176. doi: 10.1093/fampra/cmh723.
[14] Murphy AL, Martin-Misener R, Kutcher SP, O’Reilly C, Chen TF, Gardner DM. From personal crisis care to convenience shopping: an interpretive description of the experiences of people with mental illness in community pharmacies. BMC Health Serv Res. 2016;16:569. doi: 10.1186/s12913-016-1817-4.
[15] Murphy AL, Phelan H, Haslam S, Martin-Misener R, Martin-Misener R, Kutcher S, Gardner DM. Community pharmacists’ experiences in mental illness and addictions care: a qualitative study. Subst Abuse Treat Prev Policy. 2016;11:6. doi: 10.1186/s13011-016-0050-9.
[16] Freeman C, Cottrell WN, Kyle G, Williams I, Nissen L. Integrating a pharmacist into the general practice environment: opinions of pharmacist’s, general practitioner’s, health care consumer’s, and practice manager’s. BMC Health Serv Res. 2012;12:229. doi: 10.1186/1472-6963-12-229.