

CASE REPORT**The Role of Attention Deficit Hyperactive Disorder in Developing Substance Use Disorder: A Case Report**

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Abstract

Objective: Individuals with ADHD are known to have more risk of developing substance use disorder (SUD). However the underlying mechanisms behind it are not straightforward. **Method:** We report a case of an adult with ADHD, who has a long standing history of polysubstance use, since the age of 10. He had multiple relapses, even after numerous efforts undertaken to keep him drug-free. **Result:** ADHD symptoms were not optimally treated during admission. He had preference towards opioid-based and amphetamine-type substances in order to attain euphoria. **Conclusion:** Taking into account the biological and psycho-social condition of this man, we discussed the role of ADHD from the perspective of dysfunctional rewards system and other possible factors in explaining his drug-craving behavior.

Keywords: Attention-deficit Hyperactive Disorder (ADHD), Substance Use Disorder (SUD), Adult

Introduction

Individuals with ADHD are known to have greater risk to develop substance use disorder as compared to non-ADHD individuals¹. About two-third of individuals with childhood ADHD will eventually, continue to manifest the illness in adulthood². In a recent longitudinal study, those who have persistent ADHD in adulthood have a greater likelihood to develop substance dependence as compared to childhood-limited ADHD and control groups³.

We report a case of a young man who was diagnosed with ADHD at the age of six and

subsequently involved with multiple drugs dependence. The role of ADHD in developing substance use disorder will be discussed.

Case Study

Mr CL is a 24 year-old gentleman and was diagnosed with ADHD at age 6. During this time, he was fidgety and was easily distracted in class. He was noisy and talkative too. He would be the first answering the questions, but often prematurely. His teachers noticed that he had difficulties to complete the school tasks within the period of time allocated. He was then seen by a psychiatrist and was

prescribed with methylphenidate at the age of 8. He was calmer afterwards but was not compliant to the dosage prescribed, as he claimed that it made him passive. His teachers however, noticed some improvements in him as he was calmer and well behaved in the classroom.

However at the age of 10, he had started to snort the prescribed methylphenidate, around 6 tablets per day. He often made up reasons like; he lost his medication, in order to have extra methylphenidate with him. He enjoyed the euphoric effect of it, at that time. At age 14, he started using marijuana and at the age of 16 he started a downhill battle with multiple drugs. He started using pethidine, tramadol, diazepam, amphetamine-type substances.

By age 18, he started using cocaine and by age 19, he used heroine and ketamine. His methods of intake ranged from ingesting tablets, inhaling fumes, snorting and injections. He had undergone numerous rehabilitations totaling up to eight, and the last program was 6 months prior to coming to our care. Most programs used therapeutic community model. At the aged of 24, he was admitted to our unit due to relapse, after graduating from the program. He was drug-free for six months before that however he reinstated tramadol and methamphetamines afterwards.

Delving into his drug-seeking problem, he said it was due to boredom and thus he took it deliberately but later on, he was unable to enjoy life without abusing drugs. He preferred opioid-based drugs rather than the amphetamine-type stimulants mainly due to their euphorigenic effect. At that time, he denied taking the substances in order to stay focus or to calm his mind. There was no evidence to suggest other psychiatric co-

morbidities like depression, previous conduct disorder or anti-social personality.

His mother described him as someone who lived a pleasure-seeking lifestyle. His father had features of ADHD but did not require any treatment while his mother exhibited some obsessive-compulsive personality disorder (OCPD) traits. Lately, he was stressed out, partly because of his mother's controlling behavior and due to the nature of his work. He admitted that he was easily frustrated and became impulsive to counter the negative feeling and thus inclined to abuse substances as an immediate means to numb his emotion.

Assessment made in the ward revealed that he fulfilled both the inattentive and hyperactive-impulsive criteria according to DSM 5. During discharge, he was placed on methadone and the latest dose was 80 mg per day. He was calm and well with the opioid replacement together with methylphenidate extended-release 20 mg. He was not able to tolerate atomoxetine. He is now looking forward to be reintegrated back into the society.

Discussion

The mechanisms underlying ADHD and substance use disorder are not fully understood¹. It is postulated that some of these adult patients abused substances as a form of self-medication i.e. attenuate mood, restlessness⁴. This relationship however is not straightforward.

In a study conducted by Wilens 2006, about 10% of ADHD patients treated with methylphenidate, escalated its dosage without authorization, as compared to non-ADHD who was also treated with the same drug⁵. Misuse of stimulant appeared to be related to its euphorigenic effect and to

heighten performance⁶. The question of why one develops substance use disorder while others may not, need further exploration.

Both genetic and environment factors, play roles in the development of substance abuse and ADHD (Figure 1)⁴.

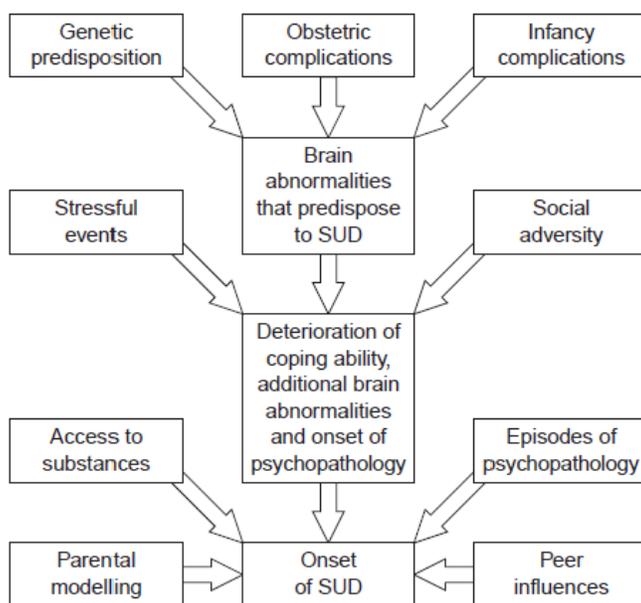


Figure 1. The postulated theories on the development of substance use disorders (SUD) among patients with attention-deficit hyperactive disorder (ADHD). Adapted from “Alcohol, drugs, and attention-deficit/ hyperactivity disorder: a model for the study of addictions in youth” by Wilens TE and Biederman J, 2006, *J Psychopharmacol*, 20(4) pp. 580-588. Adapted with permission.

There is an increasing amount of evidence suggesting that dysfunctional reward system plays a role in patient with ADHD. It is postulated that several dopamine receptor genes i.e. DRD2, DAT1 are abnormal in ADHD patients, resulting in insufficient dopamine activity in the brain reward center⁷. Low dopamine activity in the reward system in patients with ADHD will manifest as difficulty to engage with non-pleasurable or non-rewarding activities⁸. Eventually, this will lead to harmful behaviour namely drug-seeking behaviour⁷ which may increase the dopamine level. Indirectly, opiate increases dopamine in the brain reward region⁷ and hence somewhat

explains as why he preferred opioid-based drugs. Combining opioid-based and amphetamine-type substances will result in dopamine surge.

As what can be learned from this case, he was predisposed to ADHD due to the genetic factor. We could not find any evidence to suggest externalizing comorbidities which are the predictors for developing substance use disorder¹¹. He had been abusing substances as early as the age of 10, and admitted that the reason as why he abused substance at first was because he felt bored and longed for its euphoric effect. This kind of pleasure-seeking behavior was

also testified by his mother. ADHD in adolescent with “high novelty-seeking, low harm reduction and low reward dependence” have higher rates to develop substance use disorder⁴. The current stressors in his life and his impulsivity seem to be the perpetuating factors in maintaining his substance use. He would resort to take drugs every time he felt frustrated following negative life events or when things did not turn up as expected.

It would be intriguing to look into the role of opiate receptor, among the patients with ADHD, which may have a role in explaining his preponderance to abuse opiate-based drugs.

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