

HYPERSEXUALITY ASSOCIATED WITH MODAFINIL USE

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INTRODUCTION

Modafinil is an agent used in narcolepsy and excessive daytime sleepiness (Adler et al. 2003). The mechanism of action of modafinil is still unknown, however, it appears to interact with dopaminergic, noradrenergic, glutamatergic, GABAergic, serotonergic, orexinergic, and histaminergic pathways (Minzenberg et al. 2008). Modafinil increases brain dopamine levels by blocking the dopamine transporter (Volkow et al. 2009). In addition to narcolepsy, modafinil has been shown to be effective in diseases such as unipolar and bipolar depression, attention deficit and hyperactivity disorder, schizophrenia, obstructive sleep apnea, and multiple sclerosis. Especially studies conducted on patients diagnosed with ADHD show that it seems to provide an improvement in cognitive areas such as attention and planning (Turner et al. 2004). The recommended dose range is 200-400mg/day.

The adverse effects of modafinil include headache, irritability, anxiety, psychosis, nausea and suicidal ideation (Whitmore et al. 2006). Despite its low addiction potential, there are publications suggesting that it is addictive. Here we will share a case of hypersexuality associated with modafinil use.

CASE REPORT

A 24-year-old single male patient with a bachelor's degree is currently unemployed and preparing for exams. The patient has complaints of unhappiness, malaise, lack of taste for life, attention deficit, increased appetite, daytime sleepiness and sexual reluctance, which started due to not being employed for about two years. The patient was diagnosed with major depressive disorder with these complaints. The patient had previously used escitalopram fluoxetine and venlafaxine but did not benefit. The patient was also started on methylphenidate for attention deficit because he was studying for an exam but could not tolerate it. Then he started to use sertraline 200 mg and modafinil 200 mg, from which he did not benefit from sertraline

as well. He's only been on modafinil for the last 2 months. When he presented to our clinic, he was only on modafinil 400 mg/day. The patient's complaint at presentation to our clinic was increased sexual drive after the modafinil dose adjustment from 200 mg to 400 mg. The patient, suffering from sexual reluctance and inability to orgasm for the last two years, had increased sexual desire, dissatisfaction despite masturbation 6 times a day, incapability to study for exams due to these reasons, and deterioration in functionality in life after 400 mg/day modafinil dose adjustment. SCID-2 compatible with DSM was used in the diagnosis part. Young mania scale (YMRS) was applied (YMRS<5). The patient did not have psychotic or manic symptoms (depressed mood, no increase in energy, no increase in speech, normal sleep and appetite, no increase in self-confidence) in the mental status examination. Routine blood tests, biochemistry, hormone levels, and vital signs were regular. The physical examination was in good condition. Detailed history analysis revealed no such complaints in the past and showed no recent head trauma and any associated impulsivity, obsessive compulsive behavior, substance abuse, hyperorality, cognitive decline, and aphrodisiac use.

Due to ongoing major depressive disorder and concentration problems, we started bupropion 150 mg/day and discontinued modafinil treatment. After 2 weeks he called for a follow-up. At the follow-up, sexual desire and urges returned to standard, and there was a decrease in depressive complaints. On subsequent follow-up visits, we achieved remission with bupropion 300mg/day treatment.

DISCUSSION

In a patient with major depressive disorder with sexual reluctance, hypersexuality developed as a result of increasing the dose of modafinil to 400 mg/day, and sexual desire and drive decreased as the dose decreased again, suggesting that modafinil causes hypersexuality at high doses in this case. Two cases of modafinil-related hypersexuality have been reported in the literature (Bulut

et al. 2015; Swapnajeet et al. 2016). The case published by Swapnajeet et al. is a case of hypersexuality resulting from increasing the dose of modafinil to 1000mg/day in a patient diagnosed with bipolar disorder (Swapnajeet et al. 2016). Unlike our case, hypersexuality, in this case, may be due to the underlying excess sexual desire related to the manic phase of bipolar disorder. Our patient was a patient with major depressive disorder with complaints of sexual anorexia. The case published by Bulut et al. is a case of hypersexuality developing upon initiation of 200 mg/day modafinil in a patient diagnosed with narcolepsy (Bulut et al. 2015). In this case, hypersexuality developed with a lower dose of modafinil and this adverse effect disappeared after the modafinil dose was reduced to 50mg/day. In our case, the development of higher doses may be the reason for the diagnosis of depression. In addition to hypersexuality, there are cases of spontaneous orgasm (Uca&Altaş 2014) and spontaneous ejaculation (Aras 2021) associated with modafinil use.

Hypersexuality has typically been reported in Kluver Bucy syndrome. We excluded this diagnosis from

our patient because of the absence of hypersomnia, hyper-morality, and hyperphagia. Hypersexuality is also seen in head traumas, brain operations, frontal and temporal lobe lesions, dementia, stroke, Huntington's disease, Tourette's disease, dopaminergic agents, cocaine, and amphetamine (Kaplan & Krueger 2010) The pathophysiology of modafinil-induced hypersexuality is unclear. The relationship between addiction and hypersexuality is known (Uca&Altaş 2014). Hypersexuality is a hyperdopaminergic state (Swapnajeet et al. 2016). Modafinil-induced increase in dopamine in the mesolimbic pathway may explain the development of hypersexuality in our case.

CONCLUSION

In conclusion, clinicians should carefully increase the dose considering modafinil-induced hypersexuality may develop. Furthermore, it can be offered as an adjunctive treatment in favorable patients presenting sexual anorexia.

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