Short Communication

Rationale Use of Methylphenidate

Ghulam Rasool Mashori

Attention Deficit Hyperactivity Disorder (ADHD) is most commonly diagnosed mental disorders in children and the treatment often involves prescribing stimulants, which are controlled substances, as well.

Diagnosis of ADHD in adult is dependent on it's' history and symptoms in childhood before seven years age. ADHD symptoms improve during adolescence or as age increases in many individuals, but the disorder can persist in adulthood in some cases. In USA, it is estimated that ADHD is diagnosed in 8% of children in ages of 417 and in 2.94.4% of adults.[1]

Methylphenidate (MPH) is a stimulant drug, nowadays is used to treat in ADHD children, was first introduced in 1939. It went through many changes till 1944. After going through different alterations and improvements, it was marketed as "*Ritalin*" in 1957 to treat depression, chronic fatigue and narcolepsy. The research continued and by the 1970s and early 1980s, the use of Ritalin to treat ADHD steadily increased in the United States. MPH which is considered as prescription stimulant, commonly used to treat ADHD was approved by the Food Drug Administration USA[2], for the children and adolescents.

MPH works by changing the amounts of certain natural substances in the brain. This drug works by increasing dopamine levels in the brain. The dopamine which is a brain neurotransmitter/ chemical is associated with pleasure, movement, and attention. The therapeutic effect of stimulants is achieved by slow and steady increase of dopamine, which is similar to the natural production of the chemical produced by the brain. The MPH prescribed dose starts at low, and increases gradually until a therapeutic effect is achieved. It works by increasing the activity combating fatigue, and improving attention.[3] MPH is not approved for children less than six years of age.[4]

When prescribed, the dose of MPH varies quite significantly from individual child to child, few children may respond to quite low doses, whereas other require the higher dose range. The dose, therefore, should be titrated to an optimal level that achieves therapeutic benefits and minimal side-effects. After diagnosis and confirmation of ADHD the benefits, risks and proper use of stimulants must be discussed with the parents before its use.[5] The dose of MPH ranges from 530 mg twice daily or up to 60 mg/day.[6]

MPH is also given for the treatment of narcolepsy, which is a chronic sleep disorder characterized by overwhelming daytime drowsiness and sudden needed for sleep. The drug is considered effective in increasing wakefulness, vigilance, and improves activities of daily life.[7]

Similarly, MPH may be used as an antidepressant for treatment-refractory major depressive disorder. It can also improve depression in several groups including stroke, cancer, and HIV-positive patients.[8] Beside, MPH has been investigated as a chemical replacement for the treatment of cocaine dependence.[9]

MPH is associated with insomnia, loss of appetite, stunted height, and irritability. If it is taken improperly, that can increase a person's heartbeat and blood pressure. This drug can cause cardiac arrhythmia (irregular heartbeat) and premature death. The other common side effects of MPH are nervousness, drowsiness,[10] abdominal pain, akathisia (restlessness), alopecia (loss of hair), angina, pupil dilation, stunted growth,

Correspondence to:
Prof. Ghulam Rasool Mashori
Professor of Pharmacology
PUMHS Nawabshah
Cell: 0313-5325765

tachycardia, xerostomia (dry mouth), etc.

The use of MPH should be avoided in people who have a vulnerability to schizophrenia or drug addiction. When it is given to individual's regular psychiatric monitoring (psychotic symptomatology) has been required and recommended.[11] It's withdrawal reactions can occur, therefore gradual tapering off of medication over a period of weeks or months is also required.

In long-term therapy MPH might cause drug dependence, schizophrenia and behavioral sensitization, similar to other stimulants.[12] It's use can cause psychotic symptoms i.e. hearing voices, visual hallucinations, anxiety, euphoria, paranoid delusions, confusion, and irritability.

The use of MPH intake with adrenergic agonist drugs should be avoided, because it increases the risk of liver toxicity.[13] Selective Serotonin Reuptake Inhibitors (SSRIs) when taken in conjunction with methylphenidate may cause hypertension, hypothermia and convulsions.[14]

It is contraindicated concomitantly with tricyclic antidepressants, such as monoamine oxidise inhibitors, (phenelzine), that may dangerously increase plasma concentrations, leading to potential toxic reactions (CVS effects). Methylphenidate should not be prescribed to patients who suffer from severe arrhythmia, hypertension or liver damage.

Special precaution is recommended in individuals with epilepsy or with uncontrolled epilepsy due to the potential for methylphenidate to lower the seizure threshold.[15]

Special Consideration

We must consider that, in West MPH is a drug of abuse when it is used by a person who does not have ADHD. Ritalin falls in the same family as of cocaine.[9] It has a longer duration of action. It is made with a chemical amphetamine, whereas Ritalin is also made with methylphenidate. Amphetamines and cocaine are psychostimulants, which affect mood. In people who do not have ADHD, when used stimulants like MPH can produce euphoria, and addiction. Evidence revealed its use in youths is a significant public health concern, ranking as second most frequently used class of drug in youths after marijuana.[16]

In fact it can be hard to balance your desire to do well academically with your desire to have a busy social life and experience, all that college have to offer. Sleep is an unwelcome guest; stimulants like Ritalin can buy a few extra hours in your day, by good way.

In the West and USA, "College students use it to stay awake when reading for an exam". The use of MPH/ Ritalin as drug of abuse is increasing worldwide. Therefore, Ritalin is hitting the streets of college campuses under the names of "Vitamin R". College students are using this drug to improve concentration, so they can study longer, boost their alertness during major tests, and to help stay up all night. Although selling and buying of this drug is illegal without prescription in the West, but anyone can find it on almost all of the campuses of Colleges and Universities.

Importantly, one has to avoid as use to abuse to addiction. In this region (Asia) of the world the use this drug is also increasing, day today. Therefore there is a need for keeping watch on the use of stimulant drugs. Hence expertise of Clinical Pharmacists must be utilized as a need of the time, to avoid misuse of MPH.

References

1. Kessler RC, Adler L, Barkley R, et al. The prevalence and correlations of adult ADHD in the United States: results from the National Co-morbidity Survey Replication. Am J Psychiatry 2006;163:716-23.
2. Markowitz JS, Logan BK, Diamond F, Patrick KS. Detection of the novel metabolite ethylphenidate after methylphenidate overdose with alcohol coingestion. J Clin Psychopharma 1999;19(4):362-6.
3. Steele M, Weiss M, Swanson J, Wang J, Prinzo RS, Binder CE. A randomized, controlled effectiveness trial of OROS-methylphenidate compared to usual care with immediate-release methylphenidate in attention deficit-

-hyperactivity disorder (PDF). Can J Clin Pharmacol 2006;13(1):e50-62.

4. Vitiello B. Psychopharmacology for young children: clinical needs and research opportunities. Pediatrics 2001;108(4):983-9.
5. Morgan AM. Use of stimulant medications in children. Am Fam Phys 1988;38(4):197-202.
6. Kidd PM. Attention deficit/hyperactivity disorder (ADHD) in children: rationale for its integrative managemen. Altern Med Rev 2000;5(5):402-28.
7. Cox DJ, Davis M, Makami AY, et al. Long acting methylphenidate reduces collision rates of young adult drivers with attention-deficit/ hyperactivity disorder. J Clin Psychopharacol 2012;32(2):225-30.
8. Rozans M, Dreisbach A, Lertora JJ, Kahn MJ. Palliative uses of methylphenidate in patients with cancer: a review. J Clin Oncol 2002;20(1):33-59.
9. Gorelick DA, Gardner EL, Xi ZX. Agents in development for the management of cocaine abuse. Drugs 2004;64(14):1547-73.
10. Yilmaz AE, Domnez A, Qrun E, et al. Methylphenidate- induced acute orofacial and extremity dyskinesia. J Child Neurol July 12, 2012. doi: 10.1177/0883073812449905
11. King S, Griffin S, Hodges Z, et al. A systematic review and economic model of the effectiveness and cost-effectiveness of methylphenidate, dexamfetamine and atomoxetine for the treatment of attention deficit hyperactivity disorder in children and adolescents. Health Technol Assess 2006;10(23):iiiiv,xiii146.
12. Minutes of the FDA Pediatric Advisory Committee, March 22, 2006. Available at www.fda.gov/ohrms/dockets/ac/oc06.htm
13. Leith NJ, Barrett RJ. Self-stimulation and amphetamine: tolerance to d and l isomers and cross tolerance to cocaine and methylphenidate. Psychopharma (Berl) 1981;74(1): 23-8.
14. Smucker WD, Hedayat M. Evaluation and treatment of ADHD. Am Fam Physician 2001;64(5):817-29.
15. Rosenfeld AA. Depression and psychotic regression following prolonged methylphenidate use and withdrawal: case report. Am J Psychiatry 1979;136(2):22-68.
16. Viana AG, Tren L, Tull MT, et al. Non-medical use of prescription drugs among Mississippi youth: Constitutional, Psychological, and family factors. Addict Behav 2012;37(12):1382-8.