

## Suicide Attempt with Methylphenidate: A Case Report

**Banu Karakus Yilmaz, Oguzhan Zengin, Hatice Dogan, Suleyman Yildirim, Nusin Yalimol, Yasemin Celik**  
Department of Emergency Medicine, Sisli Hamidiye Etfal Research and Training Hospital, Istanbul, Turkey

### \*Corresponding author

Banu Karakus Yilmaz

Email: [banukarakus@yahoo.com](mailto:banukarakus@yahoo.com)

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**Abstract:** We aimed to present a young patient who uses MPH for suicide. A 17-year-old girl was presented to our emergency department about 5 h after ingestion of methyl phenidate, fluoxetine and sertraline. There was sinus tachycardia and focal seizure. And other physical examination and vital signs were normal. Naso gastric decompression and activated charcoal were applied. The serum concentrations of MPH, fluoxetine and sertraline were 65.84ng/mL, 138.65ng/mL, and 96.85ng/mL. Patient was followed up for 36h and discharged from emergency department without any complication. Supportive therapy, nasogastric decompression and activated charcoal can provide recovery without sequelae.

**Keywords:** Methylphenidate, seizure, suicide, toxicology

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### INTRODUCTION

Acting as a central nervous system stimulant, methylphenidate (MPH) is the most commonly used drug to treat attention deficit hyperactivity disorder (ADHD). MPH increases dopamine and noradrenalin in synapses and extracellular spaces of dopaminergic neurons in the central nervous system (CNS) [1].

In MPH HCl prospectus; for children and adolescents new to methylphenidate, there commended starting dosage is 18 mg once daily. Dosage may be increased by 18 mg/day at weekly intervals and should not exceed 54 mg/day in children and 72 mg/day in adolescents. For adult patients new to methyl phenidate, there commended starting dose is 18 or 36 mg/day. Dosage may be increased by 18 mg/day at weekly intervals and should not exceed 72 mg/day for adults [2].

As the use of MPH for the treatment of ADHD in children and adolescents is increasing, the risk of unintentional overdoses and intentional overdoses caused by abuse, misuse or suicide attempts is increasing as well. Diagnosis and management of attention deficit hyperactivity disorder (ADHD) in children, young people and adults were issued in September 2008 and last modified in March 2013[3].

However, evidence of the frequency, risks, reasons, and outcomes of MPH overdoses is limited [4]. In USA it is shown that in children, single exposures up to 80-mg MPH are well tolerated [5]. Information about the effects of extremely high doses of MPH in humans is not sufficient. In this case we present a 17-year-old girl who had a suicide attempt by the ingestion of 30

tablets of 36-mg methylphenidate (Concerta®), 20 tablets of 20-mg fluoxetine (Prozac®) and 10 tablets of 50-mg Sertraline (Lustral®).

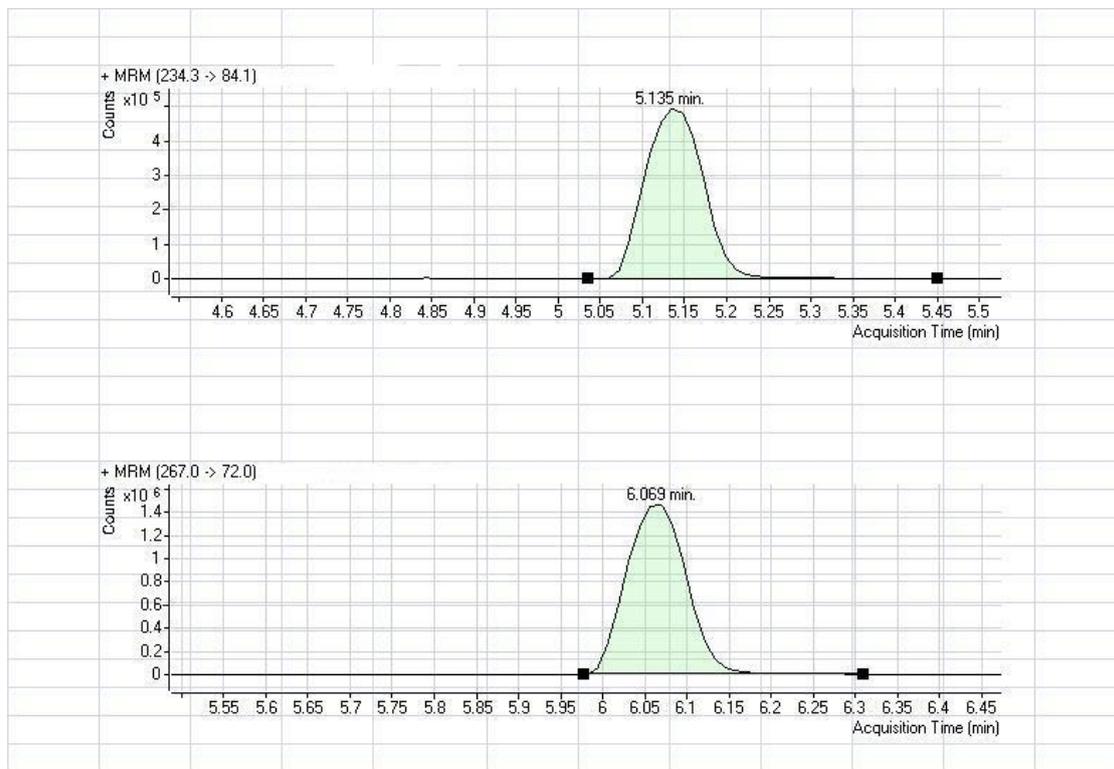
### CASE REPORT

A 17 year-old girl presented to our emergency department (ED) about 5hours after her ingestion of 30 tablets of 36-mg methylphenidate(Concerta®), 20 tablets of 20-mg fluoxetine (Prozac®)and 10 tablets of 50-mg Sertraline (Lustral®). Her history revealed that these drugs were given for ADHD two months ago, and she took them only for ten days but then she gave up. After admission to the hospital, vital signs showed tachycardia of 120 beats/minute, blood pressure of 130/80 mmHg, slightly elevated body temperature and oxygen saturation of 98% and GCS 15. At electrocardiogram, there was sinus tachycardia. Her physical and neurologic examination was normal except focal neurologic seizures on right hand. Gastric decompression was done with (the use of) 2000 cc 0.9% NaCl and after that50 gram charcoal was given by nasogastric way for treatment. Diazepam 5 mg was used for focal neurologic seizure. Psychiatric consultation revealed depressed mood and normal insight. National intoxication center informed us about the side effects and it did not recommend intensive care admission at that time. Laboratory results showed normal values for blood cells, hepatic renal and coagulation parameters and reduced PCO2 in blood gas analysis.

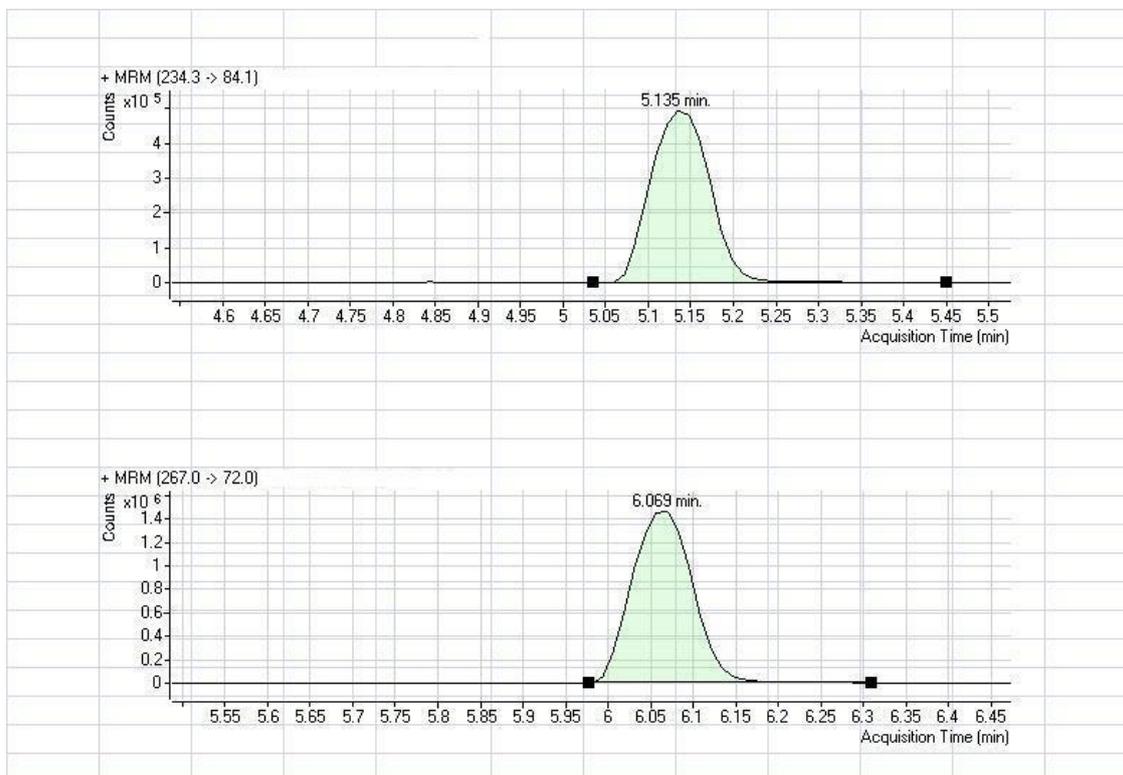
Six hours after the ingestion of the tablets, first blood sample for MPH was placed in EDTA tube and kept at +4 °C in the refrigerator overnight. The sample was transported to the laboratory for measurement the

next day. Second blood sample was taken at 17<sup>th</sup> hour and immediately cooled at ice and sent to the laboratory. Blood samples were analysed with the Agilent 6410 Triple Quad system. The serum concentrations of MPH, Fluoxetine and Sertraline were

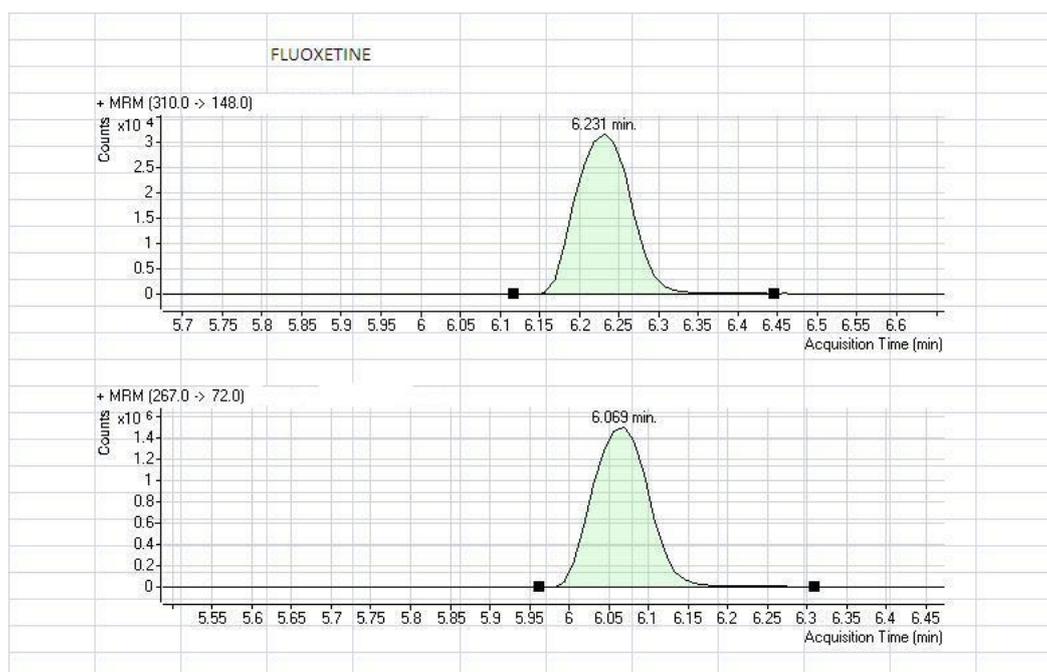
65.84 ng/mL, 138.65 ng/mL, 96.85 ng/mL and 8.73 ng/mL, 9.01 ng/mL, 57.86 ng/mL respectively (Figure 1-2-3). The patient was followed up for 36h and discharged from emergency department without any complication.



**Fig-1: Graphic of Methyphenidate measurement**



**Fig-2: Graphic of Sertraline measurement**



**Fig-3: Graphic of Fluoxetine measurement**

## DISCUSSION

MPH, a piperidine-derived CNS stimulant, is widely used for the management of ADHD. According to the NHS National Institute for Health and Clinical Excellence 2013 guidelines for treatment of adult ADHD, MPH starting dose is 18 or 36 mg/day and dosage may be increased by 18 mg/day at weekly intervals and should not exceed 72 mg/day for adults. Diagnosis and management of attention deficit hyperactivity disorder (ADHD) in children, young people and adults were issued in September 2008 and last modified in March 2013[3].

Side effects of MPH include nervousness, headache, insomnia, anorexia, and tachycardia which increases linearly with dose. Clinical manifestations of a drug overdose include agitation, hallucination, psychosis, lethargy, seizures, tachycardia, dysrhythmias, hypertension and hyperthermia[6]. Our patient ingested multiple drug but on admission to the emergency department, there were only sinus tachycardia and focal neurological seizures at physical findings. In follow up at ED no problems developed.

In USA it is shown that in children, single exposures up to 80-mg MPH are well tolerated [5]. In literature, a 14 year old girl (1134 mg) [7] and 13-year old boy (1350 mg) [8] have been reported. These patients ingested mega dose MPH for suicide attempt but discharged with good clinical outcome like our patient. In these patients good outcome couldn't be explained well. Our patient ingested 1080 mg MPH, 400 mg Fluoxetine and 500 mg Sertraline but had no signs of cardiac toxicity, hallucinations, agitations and hypertension. Certainly we couldn't explain the good clinical outcome of the patient but our close follow-up

and treatment that used gastric lavage and charcoal at 5<sup>th</sup> hour after ingestion may be the explanation. Because Concerta® utilizes the osmotic controlled release delivery system (OROS™) dosage form to deliver MPH at a controlled rate. The tablet contains an osmotically active trilayer core that is surrounded by a semi permeable membrane and a coating of immediate-release drug. This system permits 22% immediate-release (approximately over the first 4 h), with the remainder released between 4 and 12 h after administration [9]. Probably, our patient was admitted to the ED about 5 h after the ingestion of drugs and treated effectively.

Measurements of the two blood samples were performed in the Agilent 6410 Triple Quad system. This technique (LC-MS/MS) still trails analytical technique that allows the quantitative determination at an advanced level. The result is the gold standard for quality and verification is not required. Therapeutic range and alarm level for MPH are 13-22 ng/mL and 44 ng/mL, for fluoxetine is 120-500 ng/mL and 1000 ng/mL, and for Sertraline is 10-150 ng/mL and 300 ng/mL respectively [10]. And at our patient blood samples, MPH and Sertraline levels are measured over alarm level. But at 17 th hour blood samples drug levels decreased to therapeutic range and patient discharged from ED.

Literaturereviewfailedtoidentifyanycontrolled studiesdescribingmanagement of methylphenidate poisoning, and supportive care is the conventional approach. To control agitation, anxiety and psychosis, the cautious use of benzodiazepines and barbiturates has been described. First-line therapy for the control of seizures involves the use of benzodiazepines, followed

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by barbiturates. And we treated the focal seizure with benzodiazepines [11].

Despite to toxic exposure, our patient resulted with a good clinical outcome and full recovery. Careful observation of possible side effects and administration of charcoal were the only treatment. Managing potential side effects by proper supportive care and following patients by reducing drug absorption while accelerating elimination will be sufficient. This case suggests that patients intoxicated with high-dose, long-acting MPH can recover without sequelae when managed properly.

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