Case Report

Dextromethorphan Abuse in Thai Adolescents: A Report of Two Cases and Review of Literature

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Introduction: Dextromethorphan is an opioid-derived, easily available cough remedy that, when used in large quantities, can have stimulatory effects which mimic that of amphetamine and other psychedelic drugs. Due to its easy availability, dextromethorphan is gaining widespread popularity as a recreational drug among Thai youths. Symptoms of overdose are directly related to its pharmacodynamic and pharmacokinetic properties. Dextromethorphan is metabolized by cytochrome p450 2D6, an isoenzyme that exhibit polymorphism in Asians. The drug is also a serotonin-reuptake inhibitor and has significant interactions with other drugs that exert their effects through the serotonin pathway such as the amphetamines, cocaine, and Lysergic Acid (LSD).

Case Report: We report here two cases of dextromethorphan overdose that presented to the Pediatric Toxicology Service at Siriraj Hospital, Bangkok, Thailand. Both cases presented with hyper-agitation, confusion, with signs of sympathomimetic overdose. Both patients were treated with supportive care and fully recovered within 24 hours without sequelae.

Conclusion: Although the acute toxicity of dextromethorphan is abated within 24 hours, its pharmacological properties still render it a dangerous drug to use alone or in combination with other drugs.

Keywords: Dextromethorphan abuse, Antitussis drugs, Recreational drugs


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Dextromethorphan is an antitussis drug which is an over-the-counter dissociative agent of increasing popularity as a drug abuse among younger adolescents[1,2]. In the United States, dramatic increase in the abuse of dextromethorphan has been observed recently. Data from the Toxic Exposure Surveillance System suggested abuse or misuse of the drug by adolescents between 13 and 19 has increased more than 300% over a 3-year period, with the abuse being slightly more prevalent in females in early adolescence. Because of its legality and over-the-counter status, it is considered by its users to be a harmless drug for experimentation[1-3].

In Thailand, dextromethorphan abuse has been noticed to be on the rise, with the first official report of dextromethorphan abuse being among the adolescents in Southern Thailand[4]. To date, there are no report in the Thai medical literature pertaining to the abuse, toxicity, and potential hazards of using this drug recreationally. We report here two cases of dextromethorphan toxicity in two teenage girls who tried this drug for experimentation. A brief review of the toxicokinetic and toxicodynamic of dextromethorphan and their pertinence on the drugs harmful effects is also reviewed.

Case Reports

Patient 1: A 12-year-old girl was brought to the emergency room due to alteration of consciousness. Her parents gave the history of using an over-the-counter antitussive drug, a small yellow coated tablet, for illicit purposes. Her habit changed from gradual to progressive increase in the dosage of drug use, and from occasional with a few tablets at a time to daily doses in order to gain the desired effect of euphoria and an increased sense of well-being. Six hours prior to...
hospitalization, the patient took 26 tablets of
dextromethorphan (Romilar). She reported of
feeling sleepy, with nausea and abdominal discomfort.
Her father noted that she became increasingly confused
and brought her to the emergency department (ED).

On physical examination in the ED, vital signs
were: blood pressure 117/70 mmHg, pulse 122 / min,
respiratory rate 20 / min and a temperature of 38.2°C.
The patient appeared drowsy with Glasgow coma scale
of 15 (E4V5M6). She was responsive and verbalized
with notably slow speech. Fundoscopic examination
was normal.

**Patient 2:** A 13-year-old girl was brought by her mother
after her ingesting 20 tablets of dextromethorphan 4
hours before arrival to the ED. The patient admitted to
using dextromethorphan once before and that she was
often asked to purchase the drug for her friends. On
physical examination, the vital signs were: blood
pressure 130/80 mmHg, pulse 112 / min, respiratory
rate 28 / min and a temperature of 36°C. The patient
appeared drowsy. Neurological examination was
normal except for slight confusion.

Laboratory tests, including complete blood
count, urine examination, urine pregnancy test, urine
toxicology screening and electrocardiogram were
negative on both patients. Both received intravascular
fluid during a brief observation period and were
discharged after their vital signs have normalized.
Psychiatric referral was made for the first patient who
was subsequently diagnosed with a coexisting major
depressive disorder. The second patient was followed
by the Adolescent Health Service and continued to do
well with family counseling and periodic follow ups.

**Discussion**

Dextromethorphan is a dextrorotatory isomer of
a codeine analog levorphanol. It exerts its antitussive
effect by binding to the opiate δ-receptor. Its high
selectivity and lack of other opioid effects make it a
safe medication for over-the-counter use(5).

It is metabolized by the body’s hepatic
cytochrome p450 isoenzyme 2D6 to dextrorphan which
can potentiate neuronal serotonin release, as well as
acting as an antagonist of the N-Methyl-D-Aspartate
receptor. Such blockage of the receptor mimics that
of phencyclidine (PCP) and may explain the typical
euphoria, hyperactivity and hallucination experienced
by this drug(6, 7).

Its metabolism by isoenzyme 2D6 may
explain differences in symptoms observed during the
acute period between our two patients. Only dextro-
phin, and not its precursor dextromethorphan, is
known to produce PCP-like symptoms in laboratory
animals. Since the CYP 2D6 isoenzyme exhibits
polymorphism in different individuals, fast metabo-
lizers of dextromethorphan may produce larger
quantities of its metabolite, and therefore are more
likely to experience the intense PCP-like effects such
as that seen in case #2(2, 3-11).

In general, acute overdose of dextrome-
throphan causes nausea, vomiting, hyperexcitability,
restlessness, hallucination, dizziness, drowsiness,
lethargy, slurred speech, mydriasis, euphoria, tachy-
cardia, hypertension and urinary retention. The classi-
cal opioid effects such as respiratory depression and
miosis are not commonly seen(6, 9). Intense psychosis
and various kinds of hallucination, such as auditory,
tactile, or visual, have been reported. Management
of dextromethorphan overdose is mainly supportive.
Gastric decontamination with gastric lavage should be
given if patient presents within 60 minutes of inges-
tion and activated charcoal should be administered
within 4 hours of ingestion. Naloxone therapy has been
shown to be effective when used in children and for
the specific indications of hyperexcitability, altered
mental status or respiratory depression(5, 9, 12-14).

There are other less obvious toxicities from
dextromethorphan abuse. Its concomitant use with
other drugs of abuse can pose significant risk for
serious drug interaction. When used with other drugs
with serotoninergic effects such as the amphetamines,
cocaine, or psychiatric drugs such as monoamine
oxidase inhibitor (MAOI) or serotonin-reuptake
inhibitors (SSRI), toxicity in the form of serotonin
syndrome can ensue. In the United States, available
preparations of dextromethorphan are always mixed
with other cough and cold ingredients such as
chlorpheniramine or pseudoephedrine. When such a
preparation is ingested for drug abuse, anticholinergic
poisoning with tachycardia, dilated pupils, dry
mucous membranes, agitation, QRS widening,
sedation, coma and seizure can result. In addition,
bromide content of dextromethorphan preparations
can cause bromide toxicity, manifested by falsely
elevated chloride on serum electrolyte panel and an
apparent negative anion gap. Chronic bromism targets
the central nervous system, gastrointestinal tract
and skin. Luckily, periodic recreational use of dextromethorphan is unlikely to result in such toxicity (2, 6, 7, 9, 12, 15).

**Conclusion**

Recreational drug use and experimentation is a well recognized phenomenon in adolescents. Convenient availability of dextromethorphan, over the counter, renders the drug to become a substance abused by adolescents. As health care providers, being hypervigilant on unusual drug-seeking habits among adolescents is as important as informing teachers and parents to recognize the signs and symptoms of drug experimentation and abuse in their teenagers.

**References**

การใช้ยา DEXTROMETHORPHAN เป็นสารเสพติดในวัยรุ่นไทย: รายงานผู้ป่วย 2 ราย และ บทคัดย่อ

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บทนำ: Dextromethorphan เป็น_FINEM ในอนุพันธุ์ที่สกัดมาจากกลิ่นซึ่งใช้เป็นยากระкорอาหาร หรือยาในภูมิม้าร้า มีผลกระทบต่อระบบประสาทหลักอย่างลุ่มนวลและเพาะดนิ้ว และยาเสพติดกลุ่มนี้ที่ทำให้เกิดความหลงแผน เมื่อจากยา Dextromethorphan เป็นยาที่มีผลได้มาก ดังนั้นจึงถูกใช้อย่างแพร่หลายเพื่อใช้เป็นยาให้ความสงบในวัยรุ่นไทย อาการของอาการได้รับยาเกินขนาดส่งผลต่อกับคุณสมบัติทางด้านแก่เข้ารับยาเสพติด และเกิดผลกระทบจากยา Dextromethorphan ถูกทำให้เกิดเปลี่ยนแปลงในช่วงการพักผ่อน莓octochrome P450 2D6 ซึ่งเป็นไซโคลเจนโคที่แสดงออกได้หลังจากได้รับยาเม็ด ยาชนิดยา Serotonin - reuptake inhibitor และมีปริมาณพื้นที่อย่างชัดเจนกับยาตัวขึ้น ที่ออกฤทธิ์ทาง Serotonin pathway เช่น แอมเฟตามีน, โคเคน และ LSD

รายงานผู้ป่วย: รายงานผู้ป่วย 2 รายที่ได้รับยา Dextromethorphan เกิดเข้ามาที่การรักษาที่ศูนย์พิชัย โรงพยาบาลศิริราช ผู้ป่วยทั้ง 2 รายมีคุณภาพการกระทำร่างกาย สั้นลง ร่วมกับอาการของระบบประสาทคลอโมมีติ (Sympathomimetic overdose) ทั้งสองรายได้รับการรักษาตามอาการและอาการพัฒนาใน 24 ชั่วโมง ได้มีผลใน ผลประโยชน์ต่างๆ

สรุป: ถึงแม้ว่าพิษจะยังเป็นปัญหาของ Dextromethorphan จะแสดงใน 24 ชั่วโมง แต่คุณสมบัติทางด้านแก่เข้ารับยาแสดงให้เห็นว่า Dextromethorphan เป็นยาที่ฮิตในการใช้เพื่อเสพติดไม่ว่าจะใช้ยาที่ตัวต่ำหรือร่วมกับยาตัวขึ้น