Dextromethorphan: A Covert Substance of Abuse and Cause of Serotonin Syndrome

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Dextromethorphan (DXM)

- The abuse of over-the-counter medications such as Nyquil, Coricidin, Robitussin, and dextromethorphan (DXM), referred to as "going pharming," is popular amongst children and adolescents
- Due to its efficacy and economic accessibility, dextromethorphan (DXM), an N-methyl-D-aspartate (NMDA) receptor antagonist, is widely used in most over-the-counter (OTC) cold medicines to relieve coughing
- The maximum recommended dose of DXM, also colloquially known as "red devils," "tripple C's", or "skittles", is about 120mg.[1] However, when taken in large quantities, also known as "robotripping," it can produce psychotic symptoms such as delusions and hallucinations.[2]
- DXM can also cause dissociative symptoms by blocking the NMDA receptor as well as life threatening conditions such as serotonin syndrome.[3]

DXM and Serotonin Syndrome

- The incidence of serotonin syndrome (SS) is thought to be on the rise due to the increasing use of serotonergic medications
- The association of these drugs to SS increases when OTC cough medicines with DXM is used concomitantly.[4, 5]
- Both DXM and it's metabolite dextrorphan can act as NMDA receptor antagonists as well as serotonin reuptake inhibitors.
- it is important to err on the side of caution when administering DXM to patients as it has been reported to cause adverse reactions such as serotonin syndrome (SS) when combined with other serotonergic agents such as SSRIs. Some SSRIs can affect the CYP2D6, the primary pathway of DXM metabolism
- Here we present what one of the first documented case where DXM acted as the primary causative agent for serotonin syndrome in the context of DXM abuse

Case

History: A 23-year-old male with history of alcohol use disorder and stimulant use disorder was admitted voluntarily to inpatient psychiatry for a suicide attempt via overdose on dextromethorphan and alcohol.

- Patient had indicated that he had taken approximately 800-1000mg of DXM and several shots of vodka.
- Patient had also taken one pill of buproprion XL 300mg and one pill of trazodone 100mg nightly, as prescribed.
- Patient had been using dextromethorphan to "get high" and reported having visual and auditory hallucinations when taking the medication.
- Several hours after initial admission, the patient reported involuntary jerking, diaphoresis, and subjective stiffness to hospital staff.

Exam:

- Vitals: Tachycardia, Hypertension, no significant increase work of breathing
- On MSE: fully oriented to self, time, place, and situation; however described "seeing the walls breathing"
- Neuro exam - myoclonic jerking of the torso, upper extremities, and lower extremities
  - 3+ hyperreflexia of the patellar, biceps and triceps reflex
  - 3 to 4 beats of clonus on bilateral ankles
  - bilateral mydriasis

Labs: CBC, CMP, UA largely unremarkable. UDS negative.

Therapeutic Interventions:

- Lorazepam 2mg was initially given for symptomatic management of suspected serotonin syndrome. This was repeated multiple times with little improvement in symptoms.
- However, patient then started to exhibited muscle spasms, abdominal cramps, flushing, visual hallucinations, and worsening myoclonic jerks
- Symptoms persisted, and cyproheptadine 12mg PO was administered. Symptoms initially subsided but later worsened, and an additional cyproheptadine 4mg was administered.
- Patient was transferred to the inpatient medical service

Outcome:

- Patient was transferred to the inpatient medical service where he was further treated with supportive measures for suspected serotonin syndrome. Patient was then transferred back to inpatient psychiatry when medically cleared.

Conclusion

- While there are several documented cases of DXM causing SS in combination with large doses of serotonergic agents such as SSRIs, this case appears to be the first in the literature where DXM acted as the primary causative agent for serotonin.
- Treatment is determined by the severity of the syndrome and includes discontinuation of serotonergic drugs, symptomatic care, and consistent monitoring.
- Physicians should include regular screening for abuse of OTC medications to address covert use disorders and help prevent life threatening conditions such as Serotonin Syndrome.

References

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