

## Inhaled Steroid–Induced Mania in an Adolescent Girl: A Case Report

**To the Editor:** Beclomethasone is a synthetic, halogenated glucocorticoid with anti-inflammatory and vasoconstrictive effects. Its inhaled form is used for the treatment of asthma, allergic and nonallergic rhinitis, and viral croup.<sup>1</sup> It accomplishes this by inhibiting leukocyte infiltration and suppressing the humoral immune response. The mechanism of the anti-inflammatory properties of corticosteroids is believed to involve phospholipase A<sub>2</sub> inhibitory proteins and lipocortins, which regulate the biosynthesis of inflammatory mediators such as prostaglandins and leukotrienes.<sup>2</sup> Excretion of beclomethasone is mainly fecal, and, generally, the drug is well tolerated. The risk of adrenal suppression is more associated with the usage of systemic steroids.<sup>3</sup>

Psychiatric symptoms associated with corticosteroid therapy include mood swings, mania, hypomania, and depression.<sup>4</sup> Mania and hypomania are more common than depression.<sup>4</sup> The association of adverse psychological side effects with the use of oral and systemic steroids has been well documented in both the adult and the pediatric populations.<sup>4–13</sup> To our knowledge, there are at least 6 case reports published in which the isolated use of inhaled corticosteroids (beclomethasone dipropionate and budesonide) led to the development of psychiatric symptoms in the pediatric population.<sup>12,14–19</sup> In most cases, symptoms occurred in the first week, and the most commonly reported symptoms are insomnia, aggressiveness, uninhibited behavior, mania, irritability, and increased energy.<sup>12,14–19</sup> In most cases, the symptoms resolved after discontinuation of the drug, switching to another drug, or decreasing the dosage.<sup>12,14–19</sup>

**Case report.** Ms A, a 16-year-old white girl with no significant past psychiatric history, presented to an outpatient psychiatric clinic in 2010 with acute mania. The patient had grandiosity (“God gave me the mission to save the world”), flight of ideas, impulsivity (self-mutilating behavior), racing thoughts, pressured speech, decreased need for sleep, and high energy. On mental status examination, she reported a euphoric mood and described delusions of grandiosity. She denied experiencing any hallucinations. She had pressured speech and her affect was mood-congruent.

The symptoms began 1 week prior to presentation, immediately after she was prescribed a beclomethasone inhaler 42 µg 1–2 inhalations each nostril twice daily to treat her worsening asthma. She was not taking any other prescription or over-the-counter medications. There was no history of oppositional defiant disorder, attention-deficit/hyperactivity disorder (ADHD), or thought or mood disorders. There were no reports of recreational drug or alcohol use. No health problems were reported except recent history of asthma. She had no known drug allergy. There was no known family history of mood disorder. Findings of her routine laboratory examinations, including complete blood cell count with differentials, comprehensive metabolic profile, and thyroid function, liver function, and kidney function tests, were within normal limits. After consultation with her pediatrician, the beclomethasone was discontinued and her manic symptoms resolved within 48 hours. She did not require mood stabilizer treatment or psychiatric hospitalization.

The mechanism of the psychiatric side effects of corticosteroids remains unclear. Some studies suggest that the steroids increase dopamine concentration in the brain.<sup>20,21</sup> The therapeutic efficacy of treatment with a dopamine antagonist in patients with corticosteroid-induced mania suggests that dopamine metabolism plays a significant role in production of psychiatric symptoms.<sup>20,21</sup> Studies show that steroid-induced psychiatric symptoms occur more commonly in females and are dose-dependent.<sup>8</sup> Higher doses and systemic use tend to elicit more side effects, and these side effects can occur during any stage of treatment, including withdrawal.<sup>4–12</sup> Sometimes, mood-stabilizing drugs such as lithium or antipsychotic medications such as risperidone can be used as treatment or prophylaxis of these symptoms.<sup>4,9–12</sup>

This case report suggests a temporal association between the use of inhaled corticosteroids and development of manic symptoms. The inhaled route has been used more widely and has generally been considered safe in the management of asthma in the pediatric population. However, caution is warranted as mood symptoms may develop as a result of this treatment.

Inhaled corticosteroid-induced mood symptoms are not an uncommon condition, but they remain underdiagnosed and undertreated. Therefore, the physician should routinely inquire about mood symptoms in patients taking any form of steroid.

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