ABSTRACT. Objective. To determine whether caffeine ingestion was temporally correlated with tics in 2 healthy children.

Methods. Two first-degree cousins were observed over a period of ~3 years, and the presence and absence of tics was recorded and correlated with consumption of or abstinence from caffeinated foods or beverages.

Results. Appearance and disappearance of tics were closely and clearly temporally correlated with ingestion and elimination of caffeine in the cousins’ diets.


ABBREVIATION. CNS, central nervous system.

Tics, a complex neurobehavioral disorder,1 manifest themselves as intermittent, transiently suppressible involuntary movements affecting 4% to 24% of all children2 and 1% to 6% of the US population.3 Although the pathophysiology of tics and Tourette syndrome, of which they are a prominent manifestation, is not understood, these disorders can be treated successfully with dopamine receptor blocking drugs, a-2 adrenergic receptor antagonists, or GABA receptor agonists.4 Review of the pertinent literature yielded little in terms of drugs or compounds that may exacerbate or precipitate tics; methylphenidate5–7 and cocaine8 have been identified as capable of precipitating or worsening tics in humans.

We describe two cases in which appearance and disappearance of tics were correlated temporally with consumption and discontinuation of caffeinated beverages and foods and that raise the possibility that this widely consumed central nervous system (CNS) stimulant may worsen or trigger the appearance of tics in susceptible children.

CASE REPORT

Case 1

A 13-year-old white boy with normal development, IQ, and physical/neurologic examination results began having daily tics at age 7, characterized by intermittent, multiple involuntary contractions of facial and neck muscles. Tics were transiently suppressible by conscious effort, increased during periods of stress, and absent during sleep. There were no vocal or phonic tics or other manifestations of Tourette’s syndrome. These movements had been present for some time but reached a disturbing level during treatment with an antiallergy medication containing pseudoephedrine. The tics improved but did not disappear after this drug was discontinued. One of us (R.E.D.) observed that the intensity of the tics corresponded with consumption of caffeinated beverages (two to four daily) and multiple servings of chocolate. After discussion with the parents, caffeine was excluded completely from his diet for 6 months, during which time the child was free of tics. At the end of this period, caffeine was reintroduced in his diet in smaller amounts (three to seven soft drinks per week) and the tics recurred. The persistence of tics paralleled access to caffeine; 1 to 2 weeks after restricting caffeine completely for the second time, the tics disappeared. The child remained asymptomatic off caffeine for >2 years. Recent reexposure to smaller amounts of caffeine (three to five soft drinks per week) again corresponded to the reappearance of tics. There are no other manifestations of Tourette’s syndrome, and the boy continues to develop normally.

Case 2

An 11-year-old white boy, a first-degree cousin of the child described in case 1, was noticed since age 6 to frequently and without purpose contract facial and neck muscles in a repetitive and somewhat stereotyped manner. These movements were present on numerous occasions on a daily basis, and increased in frequency if the child was anxious. He did not have phonic tics or any other manifestations of Tourette’s syndrome. Development and physical/neurologic examinations including IQ were normal. Given that this child consumed two to four caffeinated beverages and large amounts of chocolate every day and that tics disappeared in his cousin after caffeine restriction, the same recommendation was made to this child’s parents. Caffeine was excluded completely from his diet, and ~2 weeks later the child was without tics for the first time since onset 2 years earlier. Several months later, the tics recurred even though there was no apparent caffeine consumption. However, on questioning the child admitted to having restarted drinking caffeinated beverages. Exposure to caffeine continues to date, although at smaller doses (four to seven soft drinks per week compared with two to four daily in the past), and tics remain as a less frequent and intense isolated manifestation of abnormal motor behavior.

DISCUSSION

Tics may occur as an isolated phenomenon for several weeks or months and remit spontaneously and never recur.9 To establish more firmly a cause–effect relationship, on two separate occasions over a 2-year period, one of these children was allowed reexposure to caffeine. Reintroduction of this compound, although at lower doses than before, once more exacerbated the abnormal movements, which disappeared again only after complete restriction of caffeine. This clear temporal relationship between caffeine ingestion and tic recurrence imparts a causal relationship. The other child reexposed himself initially (without his parents knowledge) to caffeine and the motor tics reappeared. Although administration of pseudoephedrine aggravated the tics in the first patient, this single exposure is insufficient to establish a cause–effect relationship. A literature search did not reveal any cases of tics aggravated or precipitated by pseudoephedrine.

Caffeine is the CNS stimulant used most widely by persons of all ages, and it is readily available to children in our culture today, especially in soft drinks and certain foods (Table 1).10–12 Caffeine crosses the blood–brain barrier very rapidly, and its...
concentration in brain is highly correlated with that in plasma.10 There is evidence that caffeine stimulates motor activity10 and that children are particularly susceptible to this effect.13,14 Pharmacologically induced akinesia in rats was reverted in a dose-dependent manner by caffeine,15 an effect that has been interpreted as reflective of dopamine mimetic activity of this methylxanthine. Given that dopamine receptor blockers such as haloperidol have a suppressant action on tics,4 and although the pathophysiology of this disorder has not been established, it is likely that the dopaminergic system modulates or facilitates their expression. Therefore, it is probable that an agent, such as caffeine, with dopamine mimetic activity would exacerbate tics. An extensive literature review did not yield any human or animal reports on the role of caffeine on abnormal motor behavior, such as tics. This observation and previous findings that other CNS stimulants,5–8 such as methylphenidate or cocaine, precipitate or worsen tics or Tourette’s syndrome suggest that the expression of this motor phenomena is susceptible to chemical influences. Clarification of the potential role of chemical precipitants such as caffeine would further the development of preventive therapies for tics, decreasing the reliance on pharmacologic treatments, which may have long-term adverse effects, while increasing our understanding of the pathophysiology of this disorder and of the role that chemicals may play in its expression. A large, double-blind crossover study to investigate the role of caffeine and other nonprescription compounds in the expression of tics should yield valuable information.

Richard E. Davis, MD
Ivan Osorio, MD
University of Kansas Medical Center
Comprehensive Epilepsy Center
Kansas City, KS 66160

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Richard E. Davis and Ivan Osorio

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