PEDIATRICS PERSPECTIVES

Ingesting and Aspirating Dry Cinnamon by Children and Adolescents: The "Cinnamon Challenge"

AUTHORS: Amelia Grant-Alfieri,[a,b] Judy Schaechter, MD, MBA,[c,d,e] and Steven E. Lipshultz, MD[a,b,d,e,f]

[a]*Division of Pediatric Clinical Research,* [b]*Program in Pediatric Integrative Medicine,* [c]*Division of Adolescent Medicine,* [d]*Department of Pediatrics, University of Miami Leonard M. Miller School of Medicine, Miami, Florida;* [e]*Holtz Children's Hospital of the Jackson Health System, Miami, Florida; and* [f]*Batchelor Children's Research Institute, Miami, Florida*

KEY WORDS

cinnamon, particulate inhalation, pediatrics, respiratory effects

www.pediatrics.org/cgi/doi/10.1542/peds.2012-3418

doi:10.1542/peds.2012-3418

Accepted for publication Feb 25, 2013

Address correspondence to Steven E. Lipshultz, MD, Department of Pediatrics (D820), Leonard M. Miller School of Medicine, University of Miami, PO Box 016820, Miami, FL 33101. E-mail: slipshultz@med.miami.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: *The authors have indicated they have no financial relationships relevant to this article to disclose.*

FUNDING: Supported in part by the US Department of Health and Human Services Health Resources and Services Administration (HRSA-C76HF15614-10679, Pediatric Integrative Medicine Research Center), the National Center for Toxicological Research (NCTR-E0728711), the L. Coulter Foundation (Division of Pediatric Clinical Research), and the Batchelor Foundation (Batchelor Children's Research Institute). This work was supported by the National Institutes of Health, Bethesda, MD (HL111459, HL109090, HL078522, HL053392, HL079233, HL087000, HL095127, HD060325, NR012885, CA127642, CA068484, HD052104). Funded by National Institutes of Health.

The "Cinnamon Challenge" entails swallowing a tablespoon of ground cinnamon in 60 seconds without drinking fluids. However, as stated on www.cinnamonchallenge.com, this challenge is practically impossible, decidedly unpleasant, and potentially harmful. The site warns: "Do not attempt the cinnamon challenge without talking to a doctor. Obviously they [sic] are going to tell you not to do it. [It] can be dangerous and shouldn't be taken lightly. You never want to purposely or mistakenly inhale any substances such as cinnamon. It's going to burn, you are going to cough, and regret you tried."[1]

Videos of people attempting the Cinnamon Challenge have become an Internet sensation. Typically, a video reveals a group of adolescents watching as someone taking the challenge begins coughing and choking when the spice triggers a severe gag reflex in response to a caustic sensation in the mouth and throat. As of August 10, 2012, there were 51 100 YouTube clips depicting the Cinnamon Challenge. One video was viewed >19 million times, predominantly by 13- to 24-year-olds, ages similar to people taking the Cinnamon Challenge and associated with the greatest need for conformity.

These videos have raised concerns of choking, aspiration, and pulmonary damage. In most cases, the effects are temporary, yet the Cinnamon Challenge has led to dozens of calls to poison centers, emergency department visits, and even hospitalizations for adolescents requiring ventilator support for collapsed lungs.[2]

RESULTS FROM PRECLINICAL STUDIES

Cinnamon is a caustic powder composed of cellulose fibers, which are bioresistant and biopersistent; they neither dissolve nor biodegrade in the lungs. We found no studies of cinnamon inhalation in humans, but 1 study of rats examined the pulmonary effects of a single intratracheal dose of 2 mg of cellulose in 2 test groups (particle sizes, 7.6 and 4.2 μm).[3] Mild multifocal granulomatous inflammation was observed 2 to 30 days after exposure. More serious consequences, such as granulomata, interstitial fibrosis, alveolar histiocytosis, alveolar lipoproteinosis, and alveolar cell hyperplasia, occurred 3 to 6 months later, and granuloma and thickened interalveolar septa with worsened inflammation and fibrotic lesions were apparent 1 year later.

In a second study, rats receiving single intratracheal doses of 15 mg (particle size <7 μm) of cinnamon dust and cellulose dust had

evidence of damaged lung elasticity and alveobronchiolitis at days 1 and 7 and evidence of fibrotic changes at 1 month.[2] Thus, cellulose is not inert and is in fact the component of cinnamon responsible for inducing pulmonary fibrosis.[4]

In rats receiving a single intratracheal dose (15 mg; particle size <5 μm) of cellulose dust, alveobronchiolitis and granulation developed 1 month after exposure.[5] Three months after exposure, granulation in the alveolar and bronchial lining indicated fibrotic changes. These results confirm that high cellulose content can trigger a hypersensitive airway and irritate mucous membranes.

CLINICAL EFFECTS OF CINNAMON

The temporary responses to cinnamon are common to several substances and probably do not increase the risk of long-term damage. Reports of caustic and allergic responses to cinnamon-containing household food or personal hygiene products are rare, and cinnamon-flavored cereals and toast are usually benign. However, attempts to swallow a large quantity of dry cinnamon carry a real risk of aspiration. At least 30 participants nationwide have required medical attention.[6] Cinnamon inhalation can cause pulmonary inflammation, predisposing airways to epithelial lesions and scarring. Aspirated powder entering the upper airways can cause inflammation and, in more severe cases, aspiration pneumonia. Thus, the Cinnamon Challenge may pose greater and unnecessary health risks for persons allergic to cinnamon or with bronchopulmonary diseases, including asthma.

In humans, the fibers and other components of cinnamon can also cause allergic and irritant reactions, including acute symptoms and temporary, if not permanent, lung function changes. As an allergen, cinnamon may also trigger a hypersensitivity-induced asthma attack. Although asthma is fairly controllable, it can be fatal if the airways swell and close, suffocating the patient.

In 2011, the US American Association of Poison Control Centers received 51 calls related to the Cinnamon Challenge.[6] For the first 6 months of 2012, there were 178 such calls, or ~0.03% of the 600 000 total calls received in this period. Of these 178 calls, 122 (69%) were classified as intentional misuse or abuse (consistent with the Cinnamon Challenge), and ~30 (17%) required medical attention. The surge in calls during 2012 coincided with the increased number of Cinnamon Challenge videos on YouTube.[2]

According to the Florida Poison Information Center–Miami, between July 2011 and June 2012, there were 26 calls regarding cinnamon exposure in individuals ranging from age 1.5 to 83 years. Most patients had only minor consequences that resolved after dilution, irrigation, and washing the affected area, and most did not require follow-up. Of the 5 cases that did involve follow-up, symptoms resolved in 1 to 2.5 hours. Of the overall 26 cases, 13 (all youths aged 8–18 years) involved the Cinnamon Challenge. Of these 13 cases, 2 had "potentially toxic" exposures. Common symptoms included coughing and burning of the mouth, nose, and throat. More serious symptoms included extensive coughing, vomiting, nosebleed, and chest tightness. With only 1 exception (emesis), possible aspiration and pulmonary symptoms were limited to adolescents, all of whom had ingested dry powder from the Cinnamon Challenge. Although the known health risks of the challenge are relatively low, they are unnecessary and avoidable.

The Cinnamon Challenge is a behavioral phenomenon, a popular dare fueled by peer pressure that, along with competition, often instigates risk-taking behaviors among adolescents. In fact, the large Internet presence and peer pressure are what have increased the popularity of the Cinnamon Challenge. The total number of Google hits on this topic rose from 0.2 million in 2009 to 0.9 million in 2010; to 2 million in 2011; and to 2.4 million in the first half of 2012. Claiming an immense increase in popularity from 2001 to 2007, the Cinnamon Challenge Web site in January 2012 boasted 70 000 Twitter mentions daily.[7] Its presence on social media sites has been augmented with postings by celebrities and even government officials posting their own Cinnamon Challenge videos.

Given the allure of social media, peer pressure, and a trendy new fad, pediatricians and parents have a "challenge" of their own in counseling tweens and teens regarding the sensibilities of the choices they make and the potential health risks of this dare. Counseling can modify risk behaviors related to peer pressure, such as preventing tobacco and alcohol use, pregnancy, and exposure to sexually transmitted diseases. Parents should be reminded that their advice matters in countering peer pressure. Furthermore, schools and pediatricians should be encouraged to discuss with children the Cinnamon Challenge and its possible harmful effects, especially with children having cinnamon hypersensitivity, asthma, pulmonary cystic fibrosis, or chronic lung disease. Although we cannot make a strong statement on documented pulmonary sequelae in humans, it is prudent to warn that the Cinnamon Challenge has a high likelihood to be damaging to the lungs. These discussions can also help children learn to weigh the risks and rewards of yielding to peer pressure when considering senseless and risky behaviors.

ACKNOWLEDGMENTS

We thank Richard S. Weisman, PharmD, Andrew A. Colin, MD, and Vivian Franco, MPH, for assistance with the preparation of the manuscript.

REFERENCES

1. CinnamonChallenge.com. What is the Cinnamon Challenge? Available at: www.cinnamonchallenge.com/. Accessed June 18, 2012
2. Akron Children's Hospital. Video: the Cinnamon Challenge (WEWS). Available at: https://www.akronchildrens.org/cms/cinnamon_challenge/. Accessed June 18, 2012
3. Muhle H, Ernst H, Bellmann B. Investigation of the durability of cellulose fibres in rat lungs. *Ann Occup Hyg*. 1997;41(supp1):184–188
4. Tátrai E, Adamis Z, Ungváry G. The pulmonary toxicity of cinnamon dust in rats. *Indian J Med Res*. 1995;102:287–292
5. Tátrai E, Ungváry G. The aetiology of experimental fibrosing alveobronchiolitis induced in rats by paprika dust. *Br J Ind Med*. 1992;49(7):494–498
6. American Association of Poison Control Centers. Poison centers issue warning about the "cinnamon challenge." Available at: www.aapcc.org/dnn/Portals/0/Cinnamon%20challenge%203.27.2012.pdf. Accessed June 18, 2012
7. Wikipedia. Cinnamon Challenge. Available at: http://en.wikipedia.org/wiki/Cinnamon_challenge. Accessed June 19, 2012

Ingesting and Aspirating Dry Cinnamon by Children and Adolescents: The "Cinnamon Challenge"

Amelia Grant-Alfieri, Judy Schaechter and Steven E. Lipshultz

Pediatrics 2013;131;833
DOI: 10.1542/peds.2012-3418 originally published online April 22, 2013;

PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Ingesting and Aspirating Dry Cinnamon by Children and Adolescents: The "Cinnamon Challenge"

Amelia Grant-Alfieri, Judy Schaechter and Steven E. Lipshultz

Pediatrics 2013;131;833
DOI: 10.1542/peds.2012-3418 originally published online April 22, 2013;