Brief Report

Ad lib Smoking of Black & Mild Cigarillos and Cigarettes

Lacy A. Fabian, Ph.D., Lauren L. Canlas, B.S., Jennifer Potts, M.A., & Wallace B. Pickworth, Ph.D.

Centers for Public Health Research and Evaluation, Battelle, Baltimore, MD

Corresponding Author: L. A. Fabian, Ph.D., Centers for Public Health Research and Evaluation, Battelle, 6115 Falls Road, Suite 200, Baltimore, MD 21209, USA. Telephone: 1-410-372-2731; Fax: 1-614-458-0661; E-mail: fabianl@battelle.org

Received February 17, 2011; accepted May 23, 2011

Abstract

Introduction: Over the past 20 years, there has been a tripling in the consumption of small cigars and cigarillos, with further increases expected because cigar products are not subject to Food and Drug Administration regulations. Acute toxin exposure from cigar smoking is difficult to assess because unlike cigarettes, cigars vary widely in size, design, composition, and in the smoking behavior of their consumers. For example, a recent practice among urban youth is to remove the paper liner (i.e., “freaking”) of a small cigar in the belief that it is this paper liner that leads to addiction and cancer.

Methods: We examined acute exposure (CO and nicotine boosts) and puffing behavior in 12 participants (10 men) who smoked (*ad lib*) their usual conventional cigarette, a Black & Mild cigar (B&M) and a B&M without the paper liner (i.e., “freaked” [B&Mf]).

Results: All products (cigarettes, B&M, and B&Mf) significantly increased heart rate and CO with a trend for plasma nicotine. Nicotine boost was significantly higher after cigarette smoking than both B&M and B&Mf, while CO boost was significantly greater after B&M and B&Mf than cigarettes. The CO boost after B&M was larger than after B&Mf.

Conclusions: These findings suggest that small cigar smoking is associated with smoke inhalation that leads to significant exposure to nicotine, CO, and presumably other components of tobacco smoke and that removing the inner liner does not substantially reduce toxin exposure.

Introduction

The authority to regulate tobacco products granted to the Food and Drug Administration (FDA) through the Family Smoking Prevention and Tobacco Control Act (FSPTCA) is limited to cigarettes, roll-your-own tobacco, and smokeless tobacco products; tobacco products meeting the legal definition of cigars are exempt from that regulation. Although the cigar market is a small fraction of the tobacco market (5.4% of adults are current cigar users in the United States; CDC, 2011), it is on the rise

(Connolly & Alpert, 2008). In 2008, cigar sales increased 8.3% and yielded more than \$4 billion in retail sales (CDC, 2011) with a trend toward greater use of cigarillos and small cigars (23%), while cigarette sales declined approximately 20% (Connolly & Alpert, 2008; U.S. Department of Agriculture. Economic Research Service, 2007). Recent survey data show high rates of small cigar use among military recruits, college students particularly at historically black colleges, and inner city youth (Soldz, Huyser, & Dorsey, 2003).

Traditionally, a cigar is a tobacco product whose wrapper is at least 70% tobacco (CDC, 2011) that can be sold in small units or singly. Small cigars differ from the traditional cigars by their smaller size and availability in a wide range of flavors, including some that may appeal to youth (cherry, cream vanilla, menthol, etc.). Since the 1970s, the tobacco industry has produced and promoted cigar products that blur the distinction between cigarettes; small cigars and cigarillos are not subject to the same taxation as cigarettes (Delnevo & Hrywna, 2007). One popular cigarillo is the Black & Mild (B&M). Internet sites document the practice of “freaking” or “hyping” the B&M (Freaking, 2011; How to freak a Black & Mild, 2011; Hyping, 2011). This practice involves removing the tobacco from a B&M, taking out the inner paper liner, and repacking the tobacco. It is uncertain how the practice of “freaking” arose, but it apparently emanated from the urban legend (belief) that it is the paper liner—sometimes called “cancer paper”—that causes health risks and addiction (How to freak a Black & Mild, 2011).

Toxin exposure from cigar smoking is difficult to assess in laboratory studies because there are differences in the cigar products and in individual smoking behavior—whether the whole cigar is consumed at one time, the smoke is inhaled or puffed, or the product is relit. In the present study, a within-subject experimental design was employed for a preliminary comparison of toxin exposure from cigarettes with a popular brand of cigarillos to determine if there was any support for the assumption that “freaking” diminished toxin exposure. The primary hypothesis was that there would be increases in heart rate (HR), exhaled carbon monoxide (CO), and nicotine boosts after smoking all tobacco products. The secondary hypothesis was that HR, CO, and nicotine boosts would vary across the types of products smoked.

doi: 10.1093/ntr/ntr131

Advance Access published on October 24, 2011

© The Author 2011. Published by Oxford University Press on behalf of the Society for Research on Nicotine and Tobacco. All rights reserved. For permissions, please e-mail: journals.permissions@oup.com

Methods

Participants

Twelve adult (average age = 43.6 years; range: 29–55) volunteers (10 men and 2 women) were recruited from the community through newspaper advertisements and word of mouth. All the participants were Black daily menthol cigarette smokers—10 smoked Newport 100's and the others smoked Newport Kings and Kool 100's. They smoked an average of 16.1 cigarettes/day (range: 10–30). Their score on a test of nicotine dependence averaged 6.0 (range: 3–9; [Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991](#)). All participants were required to have smoked B&M in the past, though no specific amount smoked was required; two reported that they had smoked B&Mf. All the participants signed a consent form approved by the institutional review board describing the study, its risks, and benefits.

Tobacco Products Smoked

Unflavored B&M cigars with plastic tips (John Middleton Company, Limerick, PA) were provided by the investigators; the cigarettes were provided by the participants. At their initial visit, participants were shown a picture (actual size) of a B&M and were asked to draw a line on the picture indicating how much of the tobacco rod (total length = 88 mm) they usually smoked in one sitting. Three participants stated that they usually smoked all (100%) the tobacco rod, whereas the others usually smoked only a portion (35%–83%) and typically saved the remainder for later consumption. In subsequent laboratory sessions, participants smoked only that portion of the B&M or B&Mf that they usually smoke. On one occasion, the participants smoked B&Mf that had been amended (i.e., “freaked”) by the laboratory personnel using methods described on an Internet site ([How to freak a Black & Mild, 2011](#)) as follows: Tobacco was gently removed from the rod, the thin paper liner of the tube was removed, and the loose tobacco was repacked into the outer tobacco wrapping.

Experimental Protocol

This study was performed on an outpatient basis in Battelle's Human Exposure Assessment Laboratory. Participants reported for four sessions at least one day apart. Data from the first session, where participants smoked a conventional cigarette while standing, are not reported. The order of the remaining experimental conditions was randomized (i.e., cigarette, B&M, B&Mf). There were no restrictions on smoking prior to the experimental visits. Baseline physiologic measures of HR and blood pressure (BP), a blood sample, exhaled CO levels, and normal tidal breathing records (data not presented) were obtained. The participant then smoked ad lib the entire cigarette or the portion of the B&M that they had previously indicated was a usual amount smoked (identified by a line drawn on the product). Immediately after smoking, physiologic measures, a blood sample (i.e., for nicotine boost), and exhaled CO levels were collected.

Dependent Measures

Physiologic Measures

HR and BP were collected before and within 2 min after smoking using an automated BP monitor (DRE, Inc., Louisville, KY).

Biochemical Measures

A 7 ml sample of venous blood was drawn before and within 2 min after smoking from a forearm vein using a Vacutainer

blood collection set (Becton Dickinson, Franklin Lakes, NJ). Blood samples were centrifuged, and the plasma was removed and frozen until analysis (Labstat International, Kitchener, Ontario, Canada) using flame ionic detection methods. Exhaled CO was measured before and within 5 min after smoking using a BreathCO Monitor (Vitalograph, Lenexa, KS).

Data Analysis

A mixed analysis of variance with a within-subjects factor (i.e., change pre to post) and between-subjects factor (i.e., difference across conditions) was used. The within-subjects factor was used to test the primary hypothesis that smoking any product (i.e., conventional cigarette, B&M, or B&Mf) caused changes in HR, CO, and nicotine boosts. The between-subjects factor was used to test the secondary hypothesis that there were significant differences in toxin exposure among the products. Tukey's post-hoc tests were used to determine specific sources of differences. The data were examined for normality, and two outliers were identified for CO (outlier = 97 ppm) and nicotine (outlier = 57.1 ng/ml) boosts. Nicotine dependency ([Heatherton et al., 1991](#)) and the percent of the cigar smoked were evaluated as potential covariates in the analyses; however, neither were significantly associated with the HR, CO, or nicotine boosts ($p > .05$). There was a trend toward significance for CO boost and percent smoked, $r(12) = .55, p < .10$.

Results

Change in HR, Nicotine and CO Pre- to Postsmoking

The primary hypothesis was partially supported in that HR, $F(11, 33) = 4.36, p = .002, \eta^2 = .67$, and CO, $F(11, 33) = 3.22, p = .009, \eta^2 = .50$, significantly increased from pre- to post-smoking for all smoking conditions. Nicotine boost only trended toward a significant increase from pre- to postsmoking, $F(11, 33) = 2.16, p = .065$ (see Table 1).

Variation in HR, Nicotine and CO Boosts Across Conditions

The secondary hypothesis was partially supported in that CO boost, $F(2, 33) = 6.69, p = .005, \eta^2 = .19$, and nicotine, $F(2, 33) = 5.67, p = .011, \eta^2 = .02$, significantly varied across the three conditions. The boost in HR did not vary across the three conditions, $F(2, 33) = 0.74, p = .489$.

To examine the between-subjects differences, a Tukey's post-hoc test was used. B&M resulted in a higher CO boost than the conventional cigarette, $t(22) = -3.58, p = .0046$, and trended toward a higher CO boost than the B&Mf, $t(22) = 2.43, p = .0588$. The B&M, $t(22) = 3.11, p = .0148$, and B&Mf, $t(22) = 2.83, p = .0268$, resulted in a significantly lower nicotine boost than the conventional cigarette. Significant analyses were repeated without outliers. Eliminating the CO boost outlier resulted in the B&M having a higher CO boost than the B&Mf, $t(20) = 2.66, p = .0385$ (see Table 1). No other significant differences were noted.

Discussion

Previous research had shown that there has been an increase in small cigar and cigarillo use especially among urban minority

Table 1. Denotes the Average HR, Exhaled CO, and Plasma Nicotine Across the Three Conditions

	Conventional cigarette					Black & Mild cigarillo (unamended)					Black & Mild cigarillo ("freaked")				
	Presmoking		Postsmoking		Boost	Presmoking		Postsmoking		Boost	Presmoking		Postsmoking		Boost
	M	SD	M	SD		M	SD	M	SD		M	SD	M	SD	
Average HR (bpm)	78	13.0	83	7.7	5	79	13.1	86	10.5	7	81	12.7	87	8.6	6
Average CO (ppm)*	29	20.0	36	19.9	7	30	19.1	50 ^a	24.9	20 ^b	28	17.8	41	24.7	13
Average nicotine (ng/ml)*	12	8.9	37	21.6	25	13	9.0	24	12.2	11 ^c	11	6.1	23	13.6	12 ^c

Note. HR = heart rate; bpm = beats per minute; CO = carbon monoxide; ppm = parts per million.

^aData for Black & Mild Cigarillo (unamended) are reflected without outlier. With the outlier, average CO (ppm) $\pm$ SD = 57 $\pm$ 34.8.

^bCO boost significantly higher in Black & Mild Cigarillo (unamended) than Black & Mild Cigarillo ("freaked").

^cNicotine boost significantly lower than conventional cigarette.

* $p < .05$; denotes significant overall change in outcome of interest from pre to post.

youth (Connolly & Alpert, 2008; Page & Evans, 2004; Singer et al., 2007; Terchek, Larkin, Male, & Frank, 2009). The FSPTCA does not give the FDA authority to regulate cigar marketing. Unlike cigarettes, cigars can have flavoring and be sold singly or in small packages. The impact of the FSPCTA on tobacco smoking is not yet evident; however, it is conceivable that enhanced restrictions on the cigarette market could lead to greater use of cigars—especially small cigars that look like and are smoked like cigarettes. This study was a preliminary investigation to compare nicotine and exhaled CO delivery from cigarettes and a popular cigarillo (i.e., B&M) to determine if there is any validity to the urban legend that "freaking" the B&M reduces their delivery of toxicants, which is a viable area for continued research to further explore actual use practices. B&M and B&Mf, like conventional cigarettes, significantly increased nicotine and CO levels and immediately increased HR (similar to Blank et al., 2011). Compared with cigarette smoking, B&M and B&Mf smoking showed significantly less increase in nicotine but significantly more CO exposure. Removing the inner liner ("freaking") did not influence nicotine delivery but showed a significant decrease in CO exposure.

The increase in CO exposure after cigar smoking suggested that there was considerable inhalation of cigar smoke. It is commonly reported (Turner, McNicol, & Sillett, 1986; Turner, Sillett, & McNicol, 1977) that cigars are puffed but not inhaled and that nicotine absorption mainly occurs across the buccal membrane and less in the lower respiratory tract. It is possible that the smoking pattern of cigarillos differs from that of the larger cigars where there is less inhalation. People who are current or former cigarette smokers appear more likely to inhale than those who have only smoked cigars (Pechacek et al., 1985). "Freaking" the B&M had no effect on plasma nicotine boost, but it did diminish the CO boost. The lower CO boost in B&Mf may have occurred because (a) "freaking" removes the paper liner, a carbonaceous source of CO, (b) some tobacco may have been lost in the repacking, and (c) the repacked tobacco may not have been as dense in the rod, which could account for more efficient burning and less CO generation. Alternatively, the burn characteristics of a "freaked" cigar may lead to less inhalation than from an unamended cigar.

The practice of cigar smoking differs from cigarette smoking in that the products are consumed over a longer period of time (ciga-

rette = 360 s, B&M = 780 s, B&Mf = 660 s), and most of the participants do not smoke the whole cigar at one time. The smoking characteristics and toxin exposure from smoking the relit portion of the cigar are unknown; however, relighting cigarettes leads to increased harm (Dark, Pemberton, O'Connor, & Russell, 1963; Rimington, 1974). In the present report, *ad lib* smoking of cigarettes and a cigarillo was studied. That experimental design decision led to expected and substantial variations in the amount of the cigar rod consumed (between 35% and 100%) and may have increased the variability in the markers of acute toxin exposure. In spite of that variability in consumption, significant increases in toxin exposure after B&M and B&Mf were observed. These results confirm that cigarillos deliver quantities of nicotine that could initiate or sustain dependence and deliver CO and other toxicants to the lower respiratory tract (Henningfield, Cohen, & Pickworth, 1993), which could lead to the respiratory diseases usually associated with cigarette smoking.

Funding

This work was supported by a grant from the National Heart Lung and Blood Institute (1R21HL086514-02).

Declaration of Interests

None Declared.

Acknowledgments

We thank Dale Rhoda for his statistical contribution and Justin Byron for his thoughtful comments.

References

- Blank, M. D., Nasim, A., Hart, A., & Eissenberg, T. (2011). Acute effects of cigarillo smoking. *Nicotine and Tobacco Research*. doi: 10.1093/ntr/ntr070
- CDC. (2011). Smoking and tobacco use. Retrieved from http://cdc.gov/tobacco/data_statistics/fact_sheets/tobacco_industry/cigars/

- Connolly, G. N., & Alpert, H. R. (2008). Trends in the use of cigarettes and other tobacco products, 2000–2007. *Journal of the American Medical Association*, 299, 2629–2630. doi:10.1001/jama.299.22.2629
- Dark, J., Pemberton, M., O'Connor, M., & Russell, M. H. (1963). Relighting of cigarette and lung cancer. *British Medical Journal*, 5366, 1164–1166.
- Delnevo, C. D., & Hrywna, M. (2007). "A whole 'nother smoke" or a cigarette in disguise: How RJ Reynolds reframed the image of little cigars. *American Journal of Public Health*, 97, 1368–1375. doi:10.2105/AJPH.2006.101063
- Freaking*. (2011). Retrieved from <http://urbandictionary.com>
- Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerstrom, K. O. (1991). The Fagerstrom Test for Nicotine Dependence: A revision of the Fagerstrom Tolerance Questionnaire. *British Journal of Addictions*, 86, 1119–1127.
- Henningfield, J. E., Cohen, C., & Pickworth, W. B. (1993). Psychopharmacology of nicotine. In C. T. Orleans & J. Slade (Eds.), *Nicotine addiction: Principals and management* (pp. 24–45). New York, NY: Oxford University Press.
- How to freak a Black & Mild*, (2011). Retrieved from <http://wikihow.com/Freak-a-Black-%26-Mild-Cigar>
- Hyping*, Retrieved February 11, 2011, from <http://urbandictionary.com>
- Page, J. B., & Evans, S. (2004). Cigars, cigarillos, and youth: Emergent patterns in subcultural complexes. *Journal of Ethnicity in Substance Abuse*, 2, 63–76. doi:10.1300/J233v02n04_04
- Pechacek, T. F., Folsom, A. R., de Gaudermaris, R., Jacobs, D. R., Luepker, R. V., Gillum, R. F., et al, (1985). Smoke exposure in pipe and cigar smokers: Serum thiocyanate measures. *Journal American Medical Association*, 254, 3330–3332. doi:10.1001/jama.1985.03360230062023
- Rimington, J. (1974). Cigarette smoker's bronchitis: the effect of relighting. *British Medical Journal*, 2, 591–593.
- Singer, M., Mirhej, G., Page, J. B., Hastings, E., Salaheen, H., & Prado, G. (2007). Black 'N Mild and carcinogenic: Cigar smoking among inner city young adults in Hartford, CT. *Journal of Ethnicity in Substance Abuse*, 6, 81–94. doi:10.1300/J233v06n03_03
- Soldz, S., Huyser, D. J., & Dorsey, E. (2003). Youth preferences for cigar brands: Rates and use characteristics of users. *Tobacco Control*, 12, 155–160. doi:10.1136/tc.12.2.155
- Terchek, J. J., Larkin, E. M., Male, M. L., & Frank, S. H. (2009). Measuring cigar use in adolescents: Inclusion of a brand-specific item. *Nicotine & Tobacco Research*, 11, 842–846. doi:10.1093/ntr/ntp074
- Turner, J. A., McNicol, M. W., & Sillett, R. W. (1986). Distribution of carboxyhaemoglobin concentrations in smokers and non-smokers. *Thorax*, 41, 25–27. doi:10.1136/thx.41.1.25
- Turner, J. A., Sillett, R. W., & McNicol, M. W. (1977). The effect of cigar smoking carboxyhaemoglobin and plasma nicotine concentrations in primary pipe and cigar smokers and ex-cigarette smokers. *British Medical Journal*, 2, 1378–1389.
- U.S. Department of Agriculture. Economic Research Service. (2007). *US tobacco import update 2005/06*, TBS-26201. Retrieved from <http://ers.usda.gov/publications>