

BRIEF REPORT

Make Your Own Cigarettes: Characteristics of the Product and the Consumer

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ABSTRACT

Introduction: Despite a worldwide increase in the use of Make Your Own (MYO) cigarettes, there is little research characterizing MYO smokers in the United States and the cigarettes they make.

Methods: In a single laboratory visit, exclusive MYO smokers brought 5 MYO cigarettes they prepared at home, completed demographic and smoking history questionnaires, and prepared 25 cigarettes using their own tobacco and materials.

Results: Participants were mostly male (86.7%), average age of 41.3 years, and smoked an average of 19.5 (SD = 7.9) MYO cigarettes per day. They produced two types of cigarettes—by rolling tobacco in a paper leaf (Roll Your Own [RYO], $n = 56$) and by injecting tobacco into a tube (Personal Machine Made [PMM], $n = 42$). The PMM cigarettes were significantly larger than RYO cigarettes ($p < .001$). Home- (0.97 g) and laboratory-produced (0.95 g) PMM cigarettes did not differ by weight; however, the RYO cigarettes made at home (0.45 g) were slightly, but significantly, larger than those produced in the laboratory [0.43 g ($p < .05$)]. There was significant internal consistency in the weight of RYO and PMM cigarettes (intraclass correlation coefficient = 0.82, 0.84, respectively). Time to produce RYO cigarettes (53 s/cigarette) was significantly longer than that of PMM cigarettes (42 s/cigarette) ($p < .01$).

Conclusions: By using commercially available tobacco, tubes, and paper, experienced MYO smokers can quickly and consistently prepare cigarettes that may be useful in laboratory smoking topography and exposure experiments. Increasing the regulation of Factory Made (FM) cigarettes may lead to increased use of MYO cigarettes with unknown toxicant exposure and health risks to their consumers.

INTRODUCTION

With the implementation of tobacco control policies and increased price and taxation of cigarettes both domestically and internationally, the use of Make Your Own (MYO) cigarettes is significant and may be increasing (Centers for Disease Control and Prevention [CDC], 2012; Hanewinkel, Radden, & Rosenkranz, 2008; Kengganpanich, Termsirikulchai, & Benjakul, 2009; Kraft, Svendsen, & Hauknes, 1998; Oddoux & Melihan-Cheinin, 2001; Young et al., 2012). In the International Tobacco Control Four Country Survey (ITC-4) of tobacco use, the prevalence of MYO cigarette smoking was reported as follows: United Kingdom (28.4%), Canada (17.1%), Australia (24.2%) (Young et al., 2006), Malaysia (17%), and Thailand (58%) (Young et al., 2008). Recently, a substantial prevalence (24.2%) of RYO smoking among Canadian youth smokers was reported by Leatherdale and Burkhalter (2012). The U.S. prevalence was reported as 6.7% (Young et al., 2006); however, reports in trade journals (Williams, 2007) and the popular press

(Weichselbaum, 2012) suggest that current use may be even greater in the United States.

In other countries, MYO smokers were generally lower income, male, younger, and had higher levels of nicotine addiction compared with conventional, Factory Made (FM) cigarette smokers (Young et al., 2006). Most MYO smokers cited reduced cost as a reason for their choice (Nosa et al., 2011) although some believe that MYO cigarettes are safer than conventional cigarettes (Nosa et al., 2011; Young, Wilson, Borland, Edwards, & Weerasekera, 2010) or that MYO cigarettes would help them quit smoking. Published research has examined MYO users, cigarettes, and smoking topography outside the United States (Darrall & Figgins, 1998; Kaiserman & Rickert, 1992a, 1992b; Laugesen, Epton, Frampton, Glover, & Lea, 2009; Leatherdale & Burkhalter, 2012; Lewis, Truman, Hosking, & Miller, 2012; Li, Grigg, Weerasekera, & Yeh, 2010; Raisamo, 2011; Shahab, West, & McNeill, 2008, 2009).

In this report, we examined the production of MYO cigarettes and the characteristics of those that made them in a

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convenience sample of U.S. urban MYO smokers. This study has theoretical, practical, and policy implications for U.S. tobacco control efforts. The use of MYO cigarettes may have the unintended consequences of sustained tobacco use and unknown health effects. The Family Smoking Prevention and Tobacco Control Act (U.S. Congress, 2009) specifically places MYO tobacco among the products subject to the Food and Drug Administration (FDA) regulation; to date, there have been no FDA control efforts specifically directed at MYO cigarettes. For example, there are no health warnings (of the type required on FM cigarette packages) on the loose tobacco, papers, tubes, or machines used to prepare MYO cigarettes; because the cigarettes are self-made, there is no control over flavoring additives that a user may add. Although the use of MYO cigarettes was cited as a cost-conserving measure (Choi, Henrikus, Forster, & St. Claire, 2012), smokers may switch to even lower priced products by engaging in the practice of utilizing pipe tobacco—taxed at a lower rate than loose tobacco—to prepare their cigarettes (CDC, 2012). In addition to the policy implications from FM regulation on MYO use, there are practical considerations as well. The practical health consequences of MYO smoking are uncertain but compared with FM cigarettes machine smoking studies (Darrall & Figgins, 1998; de Kok, Besamusca, Vreeker, & Lagrand, 1993; Kaiserman & Rickert, 1992a, 1992b; Rickert, Robinson, Bray, Rogers, & Collishaw, 1985) consistently indicate higher delivery of tar and nicotine from mainstream MYO smoke. Consistent with these findings, an epidemiological study suggested an elevated risk of lung cancer (Engeland, Haldorsen, Andersen, & Tretli, 1996) in MYO smokers. Tobacco control policy exerted on FM cigarettes may result in the unintended consequence of increasing the use of potentially more harmful alternatives such as MYO cigarettes.

METHODS

Participants

Participants were adult MYO smokers ($N = 98$) from the Baltimore, MD, metropolitan area who reported smoking MYO cigarettes >80% of all cigarettes smoked. Participants responded to local newspapers (21%), direct mailers (12%), or Craigslist (6%) were referred by other participants (59%). Data collection occurred between April 2010 and November 2011 at Battelle's Human Exposure Assessment Laboratory.

Procedure

At their single laboratory visit, participants provided five MYO cigarettes that they had prepared at home, signed an IRB-approved informed consent document and completed demographic and smoking history questionnaires. Participants prepared 25 MYO cigarettes in the laboratory using their own tobacco and paper (or tubes and PMM machines). They prepared 10 cigarettes, took a 15-min break, and then prepared 15 cigarettes. The rate of production of the laboratory cigarettes was determined using a laboratory timer. During the 15-min break, a questionnaire assessing reasons for smoking MYO cigarettes and risk perception of MYO smoking was administered. Cigarette weights were recorded to the nearest mg. Participants received \$75 for completion of the study.

Statistical Analyses

Cigarette weights and production time were characterized using descriptive statistics; analysis of variance and chi-square tests were used to assess group level differences. To assess the within-participant consistency of MYO production, intra-class correlation coefficient (ICC) analysis was conducted on the home- and laboratory-produced cigarettes. Analyses were conducted using SPSS 19.0.

RESULTS

Consumer Characteristics

Two different types of cigarettes were made by the study participants: those made by rolling tobacco in a paper leaf (Roll Your Own [RYO, $n = 56$]) or those made by injecting tobacco into a tube (Personal Machine Made [PMM, $n = 42$]). Demographics and smoking history characteristics of the study participants are shown in Table 1. The study sample was mostly Caucasian, who had been smoking FM cigarettes for 18.3 years and MYO cigarettes for 9.5 years. Most participants had at least a high school education and had a yearly income of \$35,000 or less. RYO smokers generally had fewer years of education, had been smoking self-made cigarettes longer, and were more likely to use menthol compared with PMM smokers ($p < .001$). The PMM group smoked significantly more cigarettes per day than the RYO smokers ($p < .05$). Nearly, all participants (91.8%) began smoking FM cigarettes before switching to MYO cigarettes.

Reasons for Smoking MYO

Reduced price was the reason 89.8% of the sample chose to make their own cigarettes. Other reasons included a healthier alternative (20.4%), preferred taste (20.4%), and to reduce smoking (11.2%). There were no significant differences between RYO and PMM smokers in their reasons for choosing self-produced cigarettes. No significant gender differences existed for reasons of smoking MYO cigarettes.

Risk Perceptions

Approximately 28% of the MYO participants believed that certain types of tobacco are more harmful than others. Among those participants, most believed FM cigarettes were most harmful (58.6%) and PMM cigarettes were least harmful (55.2%).

Menthol Preference

Among the 16 African Americans, 13 smoked menthol (RYO = 11). Significantly more Caucasian RYO smokers used menthol compared with the Caucasian PMM smokers [21 and 7, respectively ($p < .001$)].

Cigarette Characteristics

As many as 15 distinct tobacco brands were used by the participants; 18 (18.3%) people utilized tobacco labeled as pipe tobacco opposed to that labeled as rolling tobacco—a practice that has been noted by Morris and Tyman (2012). The average weights of the five cigarettes produced at home and the 25 cigarettes produced in the laboratory are shown in Figure 1A. Both home- and laboratory-produced PMM cigarettes were

Table 1. Demographics and Smoking Characteristics of RYO and PMM Cigarette Smokers

Variable	MYO (<i>N</i> = 98)	RYO (<i>n</i> = 56)	PMM (<i>n</i> = 42)
	%	%	%
Gender			
Male	86.7	87.5	85.7
Female	13.3	12.5	14.3
Race**			
Caucasian	75.5	64.3	90.5
African American	16.3	25.0	4.8
Other	8.2	10.7	4.7
Education**			
Less than high school	14.3	19.6	7.1
High school grade/GED	48.0	55.4	38.1
More than high school	37.7	25.0	54.8
Income			
<\$20,000	61.2	67.9	52.4
\$20,001–\$35,000	20.4	19.6	21.4
>\$35,000	18.4	12.5	26.2
Menthol Smoking ***	45.9	64.3	21.4
MYO cigarettes per day*			
Mean (SD)	19.5 (7.9)	17.9 (6.0)	21.5 (9.5)
Age in years			
Mean (SD)	41.3 (12.8)	40.7 (12.7)	42.1 (13.1)
Years smoked FM			
Mean (SD)	18.3 (11.8)	17.0 (10.9)	20.0 (13.0)
Years smoked MYO**			
Mean (SD)	9.5 (10.4)	13.3 (11.8)	4.4 (4.4)

Notes. MYO, Make Your Own; RYO, Roll Your Own; FM, Factory Made; PMM, Personal Machine Made. Comparisons were made between RYO and PMM groups. Percentages are provided for categorical variables; means and SDs are provided for continuous variables.

* $p < .05$; ** $p < .01$; *** $p < .001$.

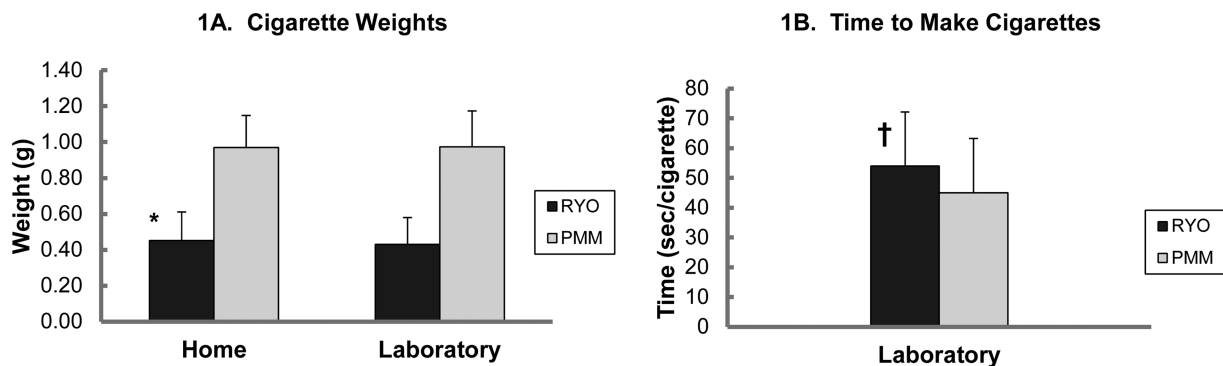


Figure 1. Average (SD) weights of Roll Your Own (RYO, *n* = 56) and Personal Machine Made (PMM, *n* = 42) cigarettes at home (5 cigarettes) and in the laboratory (25 cigarettes), and time to produce RYO and PMM cigarettes in the laboratory. *RYO cigarettes made at home were significantly larger than those made in the laboratory ($p < .05$); PMM cigarettes were significantly larger ($p < .001$) than RYO cigarettes. †PMM cigarettes take significantly less time to produce than RYO cigarettes ($p < .01$).

significantly larger than RYO cigarettes ($p < .001$). RYO cigarettes produced at home were slightly but significantly ($p < .05$) larger with a mean weight of 0.45 g (range: 0.18–0.94 g) than those RYO produced at the laboratory 0.44 g (range: 0.18–0.83 g). ICC values reflecting the within individual consistency of RYO cigarette weight was high (0.82).

PMM cigarettes produced at home had a mean weight of 0.97g (range: 0.53–1.30 g); laboratory-produced PMM

cigarettes had a mean weight of 0.95 g (range: 0.60–1.32 g). As with the RYO cigarettes, ICC values reflecting the within individual consistency of PMM cigarette weight were high (0.84).

Production Time

As illustrated in [Figure 1B](#), PMM cigarettes took significantly ($p < .01$) less time to produce than RYO cigarettes

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(42 s/cigarette [range: 10–83 s/cigarette] and 53 s/cigarette [range: 25–93 s/cigarette], respectively).

DISCUSSION

This study describes the production of MYO cigarettes in a convenience sample of MYO smokers in a U.S. metropolitan area (Baltimore, MD). Two distinct types of self-made cigarettes were evident: RYO and PMM. In both groups, the participants were usually Caucasian, male, lower income, and chose to make their own cigarettes because of price considerations.

There were also interesting and significant differences between RYO and PMM smokers. For example, the average RYO smoker had been smoking RYO cigarettes for 13.3 years, whereas the PMM smokers had been smoking PMM cigarettes for only 4.4 years. As expected, menthol smoking predominated among African Americans in our sample and in the general population (Giovino et al., 2004). However, the prevalence of menthol smoking among Caucasian RYO smokers (58.3%) in this study differed greatly from that seen in the general population (approximately 20%) (Giovino et al., 2004). The unexpectedly high prevalence of menthol among poor Caucasians and African Americans tentatively suggests that menthol cigarette smoking may be more associated with low socioeconomic status than race among MYO smokers. The price concerns as a reason for choosing MYO cigarettes suggests that prevalence of MYO smoking in the United States and elsewhere may continue to rise with increasing FM cigarette prices and as economic and employment struggles continue.

Some differences were seen in the characteristics of the MYO products in this study compared with others published in the literature. RYO cigarettes from the United Kingdom contained more tobacco (0.51 g) and were more likely to include a filter (65.5%) than the cigarettes in this study (7.1%) (Shahab et al., 2008). However, the weight of tobacco in PMM cigarettes reported in this sample is similar to FM weights reported in the United States and abroad (Laugesen et al., 2009; O'Connor, Wilkins, Caruso, Cummings, & Kozlowski, 2010; Shahab et al., 2009).

The similarity in weight between cigarettes made at home and in the laboratory has important implications for research on MYO smoking. There were concerns that cigarettes produced in the laboratory may be smaller than those produced at home and therefore affect results of use patterns and toxicant exposures when laboratory-produced cigarettes were used in experimental smoking studies. The demonstration that cigarettes produced in the laboratory are very similar to those produced at home indicates that home- and laboratory-produced cigarettes are acceptable for research studies on smoking behavior and toxicant exposure (Darrall & Figgins, 1998; Laugesen et al., 2009; Shahab et al., 2008).

Lower costs were cited by nearly all of the participants as a reason for choosing MYO over FM cigarettes although participants were not specifically asked if price was the reason they began using MYO cigarettes. Currently, the price of loose tobacco varies from approximately \$5/oz for popular commercial brands (e.g., Top) to about \$8/oz for premium brands (e.g., American Spirit). Tubes for the PMM cigarettes cost approximately \$3 for a carton of 200, whereas the rolling paper leaves cost about \$2 for a pack of 100. Thus, RYO cigarettes can be

made for as low as \$1.70/pack (of 20) and PMM cigarettes can be made for about \$3.00/pack. Those estimates do not include the price of the PMM injector which varies between \$7 (for an inexpensive handheld) to over \$50 (for table models and electric injectors). The average cost of a pack of FM cigarettes in the United States is \$5.29 (Guilfoyle, 2012) but can cost up to \$13.50 for common brands (e.g., Newport) in some states (Weichselbaum, 2012). Changes in U.S. tax policy in 2011 substantially increased the tax on RYO loose tobacco but did not significantly increase tax on loose tobacco labeled as pipe tobacco causing a \$21.95/lb tax disparity. Between 2000 and 2011, pipe tobacco sales increased by 482.1% and loose tobacco labeled as RYO decreased by 56.3% (CDC, 2012).

It is possible for MYO smokers to roll cigarettes of different size in response to the amount of tobacco they have, the time they have to smoke, and their desire to smoke. The flexibility in the production of MYO cigarettes offers MYO users an opportunity to adaptively change the size of the cigarette to respond to economic circumstances, as others have observed (Morris & Tyman, 2012). In our study, there was a small ($r = .21$) but significant ($p < .05$) correlation between reported income and weight of home-produced cigarettes. Recently, the use of RYO cigarettes was recognized as a price-minimizing strategy in about 9% of smokers (Choi et al., 2012).

Although the data in this study are derived from a single urban area, they are nevertheless the first to look at U.S. MYO smokers and the types of cigarettes they quickly and consistently produce. Laboratory-prepared MYO cigarettes were sufficiently similar to home-produced cigarettes which can be useful in future smoking topography and exposure experiments. This research is needed to understand the comparative toxicant exposure between MYO and FM cigarettes as price and regulatory disparities between MYO and FM cigarettes have resulted in increasing use of MYO cigarettes—products with unknown and potentially greater health consequences.

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DECLARATION OF INTERESTS

The authors report no competing interests.

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