

Preliminary Effects of Progressive Muscle Relaxation on Cigarette Craving and Withdrawal Symptoms in Experienced Smokers in Acute Cigarette Abstinence: A Randomized Controlled Trial

Thatsanee Limsanon
Rasmon Kalayasiri
Chulalongkorn University

Cigarette craving usually occurs in conjunction with unpleasant feelings, including stress, as part of a withdrawal syndrome. Progressive muscle relaxation (PMR), a behavioral technique used to reduce stress by concentrating on achieving muscle relaxation, may reduce levels of cigarette craving and other substance-related negative feelings and withdrawal symptoms.

Demographic and cigarette use data were collected from 32 experienced smokers at the King Chulalongkorn Memorial Hospital, Bangkok, Thailand using the Semi-Structured Assessment for Drug Dependence and Alcoholism. Participants were asked to refrain from smoking for at least 3 hours before the visit (acute abstinence) and were randomly allocated to a 1-session PMR group ($n = 16$) or a control activity group (e.g., reading newspaper, $n = 16$). The intervention group was instructed to practice PMR individually in a quiet, private, air-conditioned room for about 20 minutes. Craving, other substance-related feelings,

and autonomic nervous responses (e.g., blood pressure and pulse rate) were assessed immediately before and after the 1-session intervention.

There were no differences in demographics, cigarette use/dependence, and baseline craving characteristics between the PMR and control groups. However, the control group had higher levels of high and paranoia feeling, and pulse rate than the PMR group at baseline. After practicing PMR, but not after a control activity, smokers undergoing acute abstinence had significantly lower levels of cigarette craving, withdrawal symptoms, and systolic blood pressure than at baseline. After controlling for baseline differences, abstaining smokers using PMR had lower levels of cigarette craving, withdrawal symptoms, and systolic blood pressure than smokers who undertook a control activity.

PMR significantly reduces cigarette craving, withdrawal symptoms, and blood pressure in smokers undergoing acute abstinence. PMR may be used as an adjunct to cigarette dependency treatments.

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Address correspondence to Rasmon Kalayasiri, M.D., Department of Psychiatry, Faculty of Medicine, Chulalongkorn University, 1873 Rama 4 Road, Pathumwan, Bangkok 10330, Thailand; e-mail: rasmon.k@chula.ac.th.

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CIGARETTES ARE WIDELY USED PRODUCTS that affect the central nervous system and are hazardous to general physical health, especially the cardiovascular and pulmonary systems (International Agency for Research on Cancer, 2004; U.S. Department of Health and Human Services, 2014). In 2012, 967 million people worldwide (Ng et al., 2014) were estimated to be casual smokers. A national survey of smoking in Thailand in 2011 found that 21.4% of the Thai population aged 15 years or more were smokers; mean cigarette consumption

was approximately 10 cigarettes per day (Office of Tobacco Control, 2012). Successful quitting methods reported by ex-smokers in this survey were (a) pharmacotherapy plus group therapy (30%), (b) pharmacotherapy plus counseling (20%), (c) counseling only (10%), and (d) acute abstinence without pharmacotherapy or psychotherapy (5%) (Lalitanantpong, 2006). Pharmacotherapy for smoking cessation including nicotine replacement therapy, bupropion, and varenicline increases the smoking abstinence rate (Cahill, Stevens, Perera, & Lancaster, 2013); however, the success rate 6 months or more after a quit date is still as low as 10% to 35% (Gonzales et al., 2006; Hurt et al., 1997; Rennard et al., 2012; Schnoll et al., 2010; Sutherland et al., 1992; Westman, Levin, & Rose, 1993). The recommended treatment for cigarette addiction is a combination of psychosocial treatment, medication, and behavioral therapy (Stead & Lancaster, 2012).

Cigarette craving, a strong desire for smoking when abstaining from cigarettes, is one of the criteria for cigarette dependence or addiction given in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013; Hasin et al., 2013) and may be used as one of target symptoms in treatment for cigarette addiction. Craving is one of the symptoms most frequently cited by smokers as a reason to continue smoking (Liu, Li, Lanza, Vasilenko, & Piper, 2013; McKay, 1999). Cigarette craving is usually accompanied by negative affect and occurs as a response to smoking withdrawal, environmental cues, and stress (Buchmann, Laucht, Schmid, Wiedemann, Mann, & Zimmermann, 2010; Colamussi, Bovbjerg, & Erblich, 2007; Dagher, Tannenbaum, Hayashi, Pruessner, & McBride, 2009; DiFranza, Ursprung, & Biller, 2012; Erblich, Boyarsky, Spring, Niaura, & Bovbjerg, 2003; Schlauch, Gwynn-Shapiro, Stasiewicz, Molnar, & Lang, 2013; West, Hajek, & Belcher, 1989). Therefore, a relaxation technique that reduces stress might potentially be very helpful in alleviating unpleasant feelings, including craving, that smokers experience when attempting to quit.

Progressive muscle relaxation (PMR), a behavioral technique used to reduce stress and anxiety by concentrating on achieving muscle contraction and relaxation (Conrad, & Roth, 2007), was developed by Jacobson in 1934 (Gessel, 1989; Jacobson, 1938; Lehrer, 1982) and adapted by Bernstein and Borkovec for practical use in reducing stress of various physical or mental disorders (Bernstein, & Borkovec, 1973; Bernstein, Borkovec, & Hazlett-Stevens, 2000). The principle of the technique is that one should focus on the differences between

feelings of anxiety or stress and relaxation. Feelings associated with stress and relaxation are mutually exclusive. PMR is a safe, simple, brief intervention that does not require any specific expertise. To our knowledge, the effect of PMR on smoking behaviors, smoking cessation, and withdrawal symptoms has never been investigated in a randomized, controlled study, although muscle relaxation has been part of smoking cessation treatment strategies for decades (Ravensborg, 1976). In addition, simple muscle contractions against resistance without relaxation method, so-called isometric exercise, reduces cigarette craving in acute abstinent smokers (Ussher, West, Doshi, & Sampuran, 2006) and might be helpful as rated by smokers a month after quit date (Al-Chalabi et al., 2008).

Several other relaxation techniques, including breathing exercises, and guided or suggestive relaxation methods, have been shown to reduce tobacco cravings or withdrawal symptoms (Cropley, Ussher, & Charitou, 2007; Dickson-Spillmann, Haug, & Schaub, 2013; Frances, Tabares, & Palarea, 2012; Shahab, Sarkar, & West, 2013; Sopajaree, & Songthuan, 2009). Specifically, breathing exercise, a simple full and deep breathing relaxation technique (McClernon, Westman, & Rose, 2004; Shahab et al., 2013; Sopajaree & Songthuan, 2009), and Brief Automated Suggestive Relaxation (BASR), a relaxation technique that comprises breathing, suggestion, and music (Frances et al., 2012), reduce strong desire to smoke in acute abstinent smokers. The success rate of a single smoking cessation session comprising psychoeducation and relaxation plus at-home self-relaxation 6 months after the quit date is 15% to 18% in a cohort of treatment-seeking smokers (Dickson-Spillman et al., 2013). Taken together, various types of relaxation techniques have been proven to be helpful in the reduction of cigarette craving and/or increased success of the smoking quit rate.

Interestingly, body scan, a relaxation technique similar to PMR in which the individual simply focuses on each part of the body, also reduces cigarette craving in acute abstinent smokers (Cropley et al., 2007) and has been reported as slightly helpful in cigarette craving reduction by typical smokers (i.e., nonacute abstinence) after 4 weeks of quit date (Al-Chalabi et al., 2008). Since PMR is a technique that combines muscle contraction/relaxation with focusing on each part of the body, it may be assumed to be the combination of the elements of isometric exercise and body scan. Thus we expect PMR, a common relaxation technique, to be particularly efficacious in the reduction of cigarette craving. This study was a randomized control trial investigating the effects of PMR on cigarette craving in smokers undergoing acute cigarette abstinence.

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