Original Article

Brief Arabic tobacco craving questionnaire: An investigation into craving and heavy smoking in Saudi Arabian males

Abdulaziz A. Albrithen, Edward G. Singleton[1]

Department of Social Studies, King Saud University, Riyadh, Kingdom of Saudi Arabia, [1]Department of Psychology, Stevenson University, Stevenson, MD, USA

Address for correspondence: Dr. Abdulaziz A. Albrithen, Department of Social Studies, College of Arts, King Saud University, P.O Box: 163, Riyadh 11342, Kingdom of Saudi Arabia. E-mail: aziz88@hotmail.co.uk

ABSTRACT

Background and Objectives: Research in the United States has shown that craving tobacco is associated with smoking, yet no investigation has been done into the relationship between craving and the use of tobacco in Saudi Arabian smokers. The aim of this cross-sectional study was to examine the craving of tobacco by Saudi males and its influence on daily smoking. Subjects were recruited under the auspices of the Tobacco Control Program in Jeddah City and Riyadh. **Methods:** The American English version of the tobacco craving questionnaire (TCQ-12) is a valid measure of four distinct aspects (factors) of tobacco craving. The TCQ-12 was translated into Arabic tobacco craving questionnaire (ATCQ-12) and administered to a sample of 322 male smokers. Predictive validity was determined by examining the relationship between the factors and the number of cigarettes smoked per day (CPD). **Results:** In a general linear multivariate analysis of variance model, CPD increased significantly as either ATCQ-12 Factor 1 (emotionality) or Factor 3 (compulsiveness) increased. A significant Factor 1 by Factor 3 interaction indicated that Factor 1 was a better predictor of heavy smoking, but only when Factor 3 was low. Factor 3 was a better predictor of heavy smoking, but only when Factor 1 was low. **Conclusions:** The ATCQ-12 is a rapid measure of craving and valid predictor of CPD and heavy smoking. Craving in anticipation of smoking as relief from a negative mood (emotionality) is an indicator of psychological withdrawal symptoms, while craving in anticipation of the inability to control tobacco use (compulsiveness) is an indicator of physical dependence.

Key words: Heavy Smoking, Saudi Arabian, tobacco craving

INTRODUCTION

Cigarette smoking remains an important public health problem in Saudi Arabia, especially among males, most of whom begin to smoke cigarettes in adolescence and continue for many years.[1] Recent estimates[2] of the annual prevalence of smoking in males ranged from 13% to 38% (median = 26.5%) compared to the prevalence of smoking in females, which ranged from 1% to 16% (median = 9.0%).

In addition, annual prevalence data are only crude indicators of dependence. Better measures are needed to combat smoking in real time. For example, the number of cigarettes per day (CPD) might be a better measure because heavy smoking (>30 CPD) is an indicator of high nicotine dependence.[3] Tobacco craving is another potential measure. Craving is experienced by most persons with diagnostic and statistical manual of mental disorders nicotine use disorders[4-6] and is a diagnostic criterion for addiction in the International Classification of Diseases.[7] Current smokers also tend to smoke when experiencing craving and smoking increases as levels of craving rise.[8]

In addition, individuals attempting to break their dependence on nicotine typically report intense craving to smoke cigarettes.[9] Other studies have shown that craving increases during attempts to quit and that craving and heavy smoking are strong predictors of relapse in

smokers who are trying to quit the use of tobacco.[10] To the best of our knowledge, no studies that examine the relationship between tobacco craving and CPD in Saudi smokers attempting to quit smoking have been published.

The aim of our study was to determine the predictive validity of an Arabic translation of the short version of the tobacco craving questionnaire (TCQ-12).[11] We hypothesized that craving would be significantly associated with CPD in a population seeking treatment to quit smoking. The target population was a sample of predominantly Saudi male heavy smokers (i.e. >30 CPD). This brief measure would lead to the rapid assessment of craving in busy clinical settings as an add-on questionnaire that can be easily implemented. Increased understanding of the relationship between craving and heavy smoking could also contribute to the development of more effective programs for smoking cessation.

METHODS

Subjects were 322 male smokers recruited at the Tobacco Control Programs in Jeddah and Riyadh, Saudi Arabia. The study was approved by the institutional review board at King Saud University.

The main variable of interest was self-reported number of CPD. Tobacco craving was assessed using an Arabic translation Arabic tobacco craving questionnaire (ATCQ-12) of the 12-item TCQ-12 that has been shown to be a valid and reliable measure of craving to smoke cigarettes.[11] The developers granted permission to translate the questionnaire. ATCQ-12 items were rated on a scale of 1 (strongly disagree) to 7 (strongly agree). ATCQ-12 factors were defined exactly the same as the four-factor TCQ-12: (a) Emotionality, craving in anticipation of smoking to relieve withdrawal or negative mood; (b) expectancy, craving in anticipation of positive outcomes from smoking; (c) compulsiveness, uncontrollable craving in anticipation of the inability to control tobacco use; and (d) purposefulness, urges and desires coupled with intention and plan to smoke. Factor scores were calculated by summing up the items in each factor and dividing by the number of items under that factor, yielding a score ranging from 1 to 7 (higher scores denoted greater levels of tobacco craving). Table 1 presents the Arabic, American English, and retranslation of the ATCQ-12 for each of the four factors. Copies of the ATCQ-12 are available from the first author.

Descriptive analyses were performed on sociodemographics and smoking history, including age, marital status, number of years of smoking, family history of smoking, friends

Table 1: Translations of the ATCQ-12

Item	Factor
	Factor 1 (emotionality)
5	سوف أكون أقل عدم ارتياحا فيما لو شربت التدخين
	I would be less uncomfortable now if I could smoke[a]
	I would be less irritable now if I could smoke[b]
9	Arabic[a]
	ولو شربت التدخين الآن فسوف أفكر بشكل أكثر وضوحا[a]
	If I were smoking now, I could analyze more accurately[a]
	If I were smoking now, I could think more clearly[b]
12	سوف شربت ولو فيما الآن بشكل أفضل للأشكل بشكل الأمور في أتحكم التدخين
	I could handle things better right now if I could smoke[a]
	I could control things better right now if I could smoke[b]
	Factor 2 (expectancy)
1	سوف استمتعت بالسيجارة الآن فيما لو شربت التدخين
	I would love a cigarette right now[a]
	I would enjoy a cigarette right now[b]
4	ولو شربت سيجارة الآن فسوف يكون طعمها جيداً
	A cigarette would taste well right now[a]
	A cigarette would taste good right now[b]
8	فيما لو شربت سيجارة فسوف يكون ذلك متعاً بالنسبة لي
	Having a cigarette would be beautiful[a]
	Smoking a cigarette would be pleasant[b]
	Factor 3 (compulsiveness)
2	فيما لو شربت الآن فلن أستطيع التوقف
	If I smoked right now, I would not be able to discontinue[a]
	If I smoked right now, I would not be able to stop[b]
7	لن أستطيع إيقاف نفسي عن شرب التدخين فيما لو شربت سجائر هنا
	I could not cease myself from smoking if I had some cigarettes here[a]
	I could not stop myself from smoking if I had some cigarettes here[b]
10	ولو شربت بعض السجائر هنا فلن أستطيع التحكم في عدد السجائر التي سوف أشربها
	I would not be able to modify how much I smoked if I had some cigarettes here[a]
	I would not be able to control how much I smoked if I had some cigarettes here[b]
	Factor 4 (purposefulness)
3	ولو أن معي سيجارة في يدي فمن المرجح أن أشربها
	If I had a started cigarette in my hand, I possibly would smoke it[a]
	If I had a lit cigarette in my hand, I probably would smoke it[b]
6	من الصعب علي تفويت فرصة شرب التدخين
	It would be difficult to pass up the opportunity to smoke[a]
	It would be hard to pass up the chance to smoke[b]
11	سيكون من غير اليسير علي تقليل كمية التدخين فيما لو شربت الآن
	I would not easily limit how much I smoked right now[a]
	I could not easily limit how much I smoked right now[b]

[a]Retranslation to American English; [b]American English version of the 12-item TCQ. (TCQ Heishman *et al.*, 2008). TCQ: Tobacco craving questionnaire; ATCQ: Arabic tobacco craving questionnaire

who smoke, and smoking at home. A general linear model (GLM) for multivariate analysis of variance was used to test the hypothesis that CPD varied as a function

of self-reported tobacco craving. The relationship between CPD and ATCQ-12 Factors 1–4 with sociodemographics and smoking history were evaluated using Pearson Chi-Square tests. Sociodemographics and variables of smoking history with significant results in the Chi-Square tests were added as covariates to control for potential confounds. Results were considered significant at $P < 0.05$. The analyses were performed using STATISTICA software (StatSoft, Inc., Tulsa, OK, USA).

RESULTS

The majority of subjects were 30–59 years of age (64.6%), married (46.3%), and living with family (88.8%). Most were working (46.6%), and most had attended college (41.0%). Approximately 88% smoked at work, and approximately 71% smoked at home. Few (29.5%) had a family history of smoking, but a substantial number (90.1%) had friends who smoked. Most (91.9%) smoked 30 cigarettes or more each day, primarily either Marlboro Reds (37.3%) or Marlboro Whites (33.2%). Over ½ (51.6%) had been smoking for 30 years or more. Mean (with standard deviation in parentheses) craving levels were 2.3 (0.6), 4.5 (0.8), 3.1 (0.8), and 4.3 (0.8) for ATCQ-12 Factors 1–4, respectively.

Pearson tests revealed that CPD was positively associated with age, Chi-square (25, $N = 322$) =116.50, $P < 0.00001$; number of years of smoking, Chi-square (5, $N = 322$) =42.70, $P < 0.00001$; and marital status, Chi-square (20, $N = 322$) =89.98, $P < 0.00001$. CPD increased significantly as age and the number of years of smoking increased. CPD was also significantly higher among subjects who were separated, widowed, or divorced than those who were married. CPD also was negatively associated with smoking at home, Chi-square (5, $N = 322$) =42.70, $P < 0.00001$; and a family history of smoking, Chi-square (5, $N = 322$) =42.71, $P < 0.00001$. CPD was significantly lower among subjects who did not smoke at home compared to those who did smoke at home. CPD was also significantly lower in subjects that had no family history of smoking than subjects who had a family history of smoking. There were no significant relationships for any sociodemographic characteristics or smoking history variables with ATCQ-12 Factors 1–4 (all $P > 0.06$).

The results of the GLM analysis are presented in Table 2. There were significant main effects for ATCQ-12 Factors 1 and 3, and a significant Factor 1-by-Factor 3 interaction. Adjusting the analysis by age, marital status, years of smoking, smoking at home, and a family history of smoking did not alter the statistical significance of the outcome for the GLM. Significant main effects remained for Factor 1 (ß =0.37, 95% confidence interval [CI] =0.01, 0.73,

$t = 1.97$, $P < 0.05$) and Factor 3 (ß = 0.38, 95% CI = 0.04, 0.71, $t = 2.23$, $P < 0.03$), and a significant Factor 1-by-Factor 3 interaction (ß = −0.57, 95% CI = −1.08, −0.06, $t = −2.21$, $P < 0.03$). Thus, CPD increased significantly as Factor 1 (emotionality) and Factor 3 (compulsiveness) increased. This means that we can interpret the relationship between craving and CPD using either the emotionality subscale or the compulsiveness subscale alone. Both of these ATCQ-12 subscales are equally effective in predicting CPD.

To ease interpretation of the interaction, Factors 1 and 3 scores were split at the mean to form high and low groups. CPD was reported in terms of the proportion of heavy smokers (i.e., the percentage of subjects that smoked >30 CPD). Figure 1 illustrates that only certain patterns of Factors 1 and 3 scores were correlated with heavy smoking. High scores on Factor 1 were significantly associated with increased heavy smoking only when Factor 3 scores were low. Conversely, high scores on Factor 3 were significantly associated with increased heavy smoking only when Factor 1 scores were low. This means that we cannot interpret the relationship between craving and heavy smoking without administering both subscales (emotionality and compulsiveness) simultaneously. This also means that we cannot describe the relationship between emotionality and heavy smoking without referring to compulsiveness. Likewise, if we want to talk about the effect of diet, we need to specify the intensity of compulsiveness we are dealing with.

Table 2: Results for the final general linear model (GLM) analysis*

	Beta (β)	95% (CI)	t	P
Factor 3	0.42	0.06, 0.78	2.30	0.02193
Factor 1	0.42	0.03, 0.82	2.13	0.03395
Factor 1 *Factor 3	−0.63	−1.18, −0.09	−2.27	0.02364

*Only significant results in the final model are reported. GLM: General linear model; CI: Confidence interval.
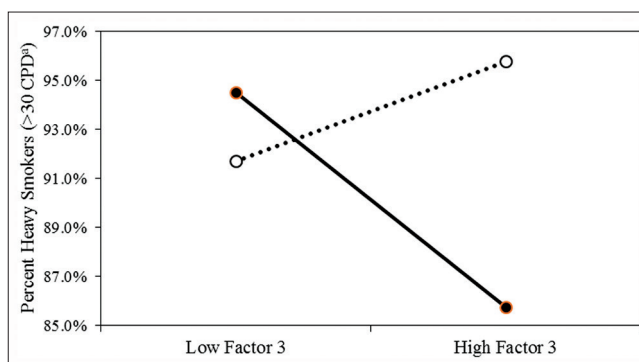

Figure 1: Arabic tobacco craving questionnaire-12 Factor 1 (emotionality)-by-Factor 3 (compulsiveness) interaction effect on heavy smoking ([a]CPD = cigarettes per day)

DISCUSSION

This study examined the association between tobacco craving and the number of CPD in a Saudi Arabian population of 322 male smokers. In this study, 9 out of 10 subjects (91%) were heavy smokers or persons who smoked 30 or more CPD. The high prevalence of heavy smoking in this study is alarming, because it is substantially higher than populations with the greatest rates of heavy smoking, such as the mentally ill. For example, the rate of heavy smoking was 43% in a recent investigation of psychiatric patients in the United States[12] while the prevalence of heavy smoking reported in a previous investigation of Saudi psychiatric patients was 78%.[13]

Another finding was that nearly 70% smoked Marlboro cigarettes. Research has shown that smoking in Saudi Arabia is strongly influenced by cigarette advertisements.[14] Saudis have a high per capita income and cigarettes are among the cheapest of imported commodities.[15] Efforts to counteract the aggressive marketing of Marlboros as cheap men's cigarettes should be a target for research on smoking intervention in Saudi males.

Of primary interest is the fact that daily smoking rose in concert with craving. Specifically, high levels of ATCQ-12 emotionality (Factor 1) or craving in anticipation of smoking for relief from a negative mood was associated with increased CPD. Research has demonstrated that a negative mood is linked with tobacco craving[16] and that negative emotions precede smoking, but decrease with smoking cigarettes.[17] Negative emotions are clearly associated with not only tobacco craving[18,19] but also with CPD[20] to affect heavy smoking. ATCQ-12 compulsiveness (Factor 3) assessed uncontrollable craving in anticipation of the inability to control tobacco use, a widely accepted feature of addiction.[21] Compulsiveness was also positively correlated with CPD. Another research has found that the frequency of smoking is also strongly associated with compulsive behaviors.[22]

The significant Factor1-by-Factor 3 interaction also indicates that compulsiveness mediates the relationship between emotionality and CPD. The finding that CPD increased as emotionality increased only when compulsiveness was low suggests that craving differentially affects nicotine dependent individuals. This means that in the absence of nicotine addiction, craving in anticipation of smoking to get relief from a negative mood is an indicator of psychological withdrawal symptoms such as irritability, difficulty of handling issues (coping), and problems in concentration.[4] Conversely, in the absence of psychological withdrawal, uncontrollable craving in anticipation of an inability to control tobacco use is an indicator of physical dependence on nicotine, and addiction becomes the overriding factor in continuing the use of tobacco.

There were limitations to the study. We studied only predominantly heavy smoking male subjects, which limits our ability to generalize. Research on light versus heavy smokers has found that craving responses were affected by smoker type differentially.[23] Regarding potential gender differences, there is evidence that females who smoke have more craving and more negative emotions than male smokers.[24,25] This appears to be somewhat driven by depressive symptoms or unpleasant emotional situations, which are a risk factor for increased frequency of smoking particularly in females. Future research should examine the relationship between craving and CPD with both male and female subjects as well as a wide range of smoking types. The study was also cross-sectional, so causality could not be determined. For example, it is likely that craving has an effect on CPD just as much as CPD affects the craving to smoke. At this point, the proposed psychological-by-physical dependence interaction is also speculative and needs to be confirmed by independent research.

Nevertheless, the results support our hypothesis and are consistent with other findings that current levels of craving are an important signal for smoking and that smoking increases as levels of craving rise.[8,23,26,27] The findings also suggest that the ATCQ-12 is a potentially valid and reliable measure of tobacco craving and smoking in Saudis enrolled in smoking cessation and other Arab populations seeking treatment. The psychometric properties of the ATCQ-12 should be the subject of future research.

This new rapid means of identifying the signals of smoking could also be useful in targeting the reduction of craving as a potential intervention, and lead to the development of more effective treatments for smoking cessation. For example, the major modalities of interventions for smoking behavior in Saudi Arabia are nicotine replacement therapies (NRT), such as skin patches and chewing gum. Yet, NRT does not completely alleviate cravings and other nicotine dependence-related symptoms such as loss of control over smoking, negative mood, or emotional distress.[28] Psychological interventions such as mindfulness, distraction, delay, and other attentional control techniques might prove more beneficial.[29,30]

REFERENCES

1. Saeed AA, Khoja TA, Khan SB. Smoking behaviour and attitudes among adult Saudi nationals in Riyadh City, Saudi Arabia. Tob Control 1996;5:215-9.
2. Bassiony MM. Smoking in Saudi Arabia. Saudi Med J 2009;30:876-81.
3. de Leon J, Diaz FJ, Becoña E, Gurpegui M, Jurado D,

Gonzalez-Pinto A. Exploring brief measures of nicotine dependence for epidemiological surveys. Addict Behav 2003;28:1481-6.

4. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders-Revised (DSM-IV). 4th ed. Washington, DC: American Psychiatric Association; 1994.

5. First MB, Frances A, Pincus HA. DSM-IV-TR Guidebook. Washington, DC: American Psychiatric Association; 2004.

6. Regier DA, Narrow WE, Kuhl EA, Kupfer DJ. The Conceptual Evolution of DSM-5. Washington, DC: American Psychiatric Association; 2011.

7. World Health Organization. International Statistical Classification of Diseases and Health Related Problems, ICD-10. 2nd ed. Geneva, Switzerland: World Health Organization; 2005.

8. Shiffman S, Gwaltney CJ, Balabanis MH, Liu KS, Paty JA, Kassel JD, et al. Immediate antecedents of cigarette smoking: An analysis from ecological momentary assessment. J Abnorm Psychol 2002;111:531-45.

9. Baker TB, Breslau N, Covey L, Shiffman S. DSM criteria for tobacco use disorder and tobacco withdrawal: A critique and proposed revisions for DSM-5. Addiction 2012;107:263-75.

10. Al'Absi M, Hatsukami D, Davis GL, Wittmers LE. Prospective examination of effects of smoking abstinence on cortisol and withdrawal symptoms as predictors of early smoking relapse. Drug Alcohol Depend 2004;73:267-78.

11. Heishman SJ, Singleton EG, Pickworth WB. Reliability and validity of a Short Form of the Tobacco Craving Questionnaire. Nicotine Tob Res 2008;10:643-51.

12. Wehring HJ, Liu F, McMahon RP, Mackowick KM, Love RC, Dixon L, et al. Clinical characteristics of heavy and non-heavy smokers with schizophrenia. Schizophr Res 2012;138:285-9.

13. Al-Habeeb TA, Qureshi NA. Smoking among male psychiatric outpatients in Saudi Arabia. Ann Saudi Med 2000;20:218-23.

14. Jarallah JS, al-Rubeaan KA, al-Nuaim AR, al-Ruhaily AA, Kalantan KA. Prevalence and determinants of smoking in three regions of Saudi Arabia. Tob Control 1999;8:53-6.

15. Al-Kaabba AF, Saeed AA, Abdalla AM, Hassan HA, Mustafa AA. Prevalence and associated factors of cigarette smoking among medical students at King Fahad Medical City in Riyadh of Saudi Arabia. J Family Community Med 2011;18:8-12.

16. Taylor RC, Harris NA, Singleton EG, Moolchan ET, Heishman SJ. Tobacco craving: Intensity-related effects of imagery scripts in drug abusers. Exp Clin Psychopharmacol 2000;8:75-87.

17. Delfino RJ, Jamner LD, Whalen CK. Temporal analysis of the relationship of smoking behavior and urges to mood states in men versus women. Nicotine Tob Res 2001;3:235-48.

18. Singleton EG, Anderson LM, Heishman SJ. Reliability and validity of the tobacco craving questionnaire and validation of a craving-induction procedure using multiple measures of craving and mood. Addiction 2003;98:1537-46.

19. Berlin I, Vorspan F, Singleton EG, Warot D, Notides C, Heishman SJ. Reliability and validity of the French version of the tobacco craving questionnaire. Eur Addict Res 2005;11:62-8.

20. Heishman SJ, Singleton EG, Moolchan ET. Tobacco craving questionnaire: Reliability and validity of a new multifactorial instrument. Nicotine Tob Res 2003;5:645-54.

21. Lyvers M. "Loss of control" in alcoholism and drug addiction: A neuroscientific interpretation. Exp Clin Psychopharmacol 2000;8:225-49.

22. Spinella M. Compulsive behavior in tobacco users. Addict Behav 2005;30:183-6.

23. Sayette MA, Martin CS, Wertz JM, Shiffman S, Perrott MA. A multi-dimensional analysis of cue-elicited craving in heavy smokers and tobacco chippers. Addiction 2001;96:1419-32.

24. Cofta-Woerpel L, McClure JB, Li Y, Urbauer D, Cinciripini PM, Wetter DW. Early cessation success or failure among women attempting to quit smoking: Trajectories and volatility of urge and negative mood during the first postcessation week. J Abnorm Psychol 2011;120:596-606.

25. Saladin ME, Gray KM, Carpenter MJ, LaRowe SD, DeSantis SM, Upadhyaya HP. Gender differences in craving and cue reactivity to smoking and negative affect/stress cues. Am J Addict 2012;21:210-20.

26. Heffner JL, Lee TC, Arteaga C, Anthenelli RM. Predictors of post-treatment relapse to smoking in successful quitters: Pooled data from two phase III varenicline trials. Drug Alcohol Depend 2010;109:120-5.

27. Powell J, Dawkins L, West R, Powell J, Pickering A. Relapse to smoking during unaided cessation: Clinical, cognitive and motivational predictors. Psychopharmacology (Berl) 2010;212:537-49.

28. Fant RV, Buchhalter AR, Buchman AC, Henningfield JE. Pharmacotherapy for tobacco dependence. Handb Exp Pharmacol 2009;487-510.

29. Black DS. Mindfulness-based interventions: An antidote to suffering in the context of substance use, misuse, and addiction. Subst Use Misuse 2014;49:487-91.

30. May J, Andrade J, Willoughby K, Brown C. An attentional control task reduces intrusive thoughts about smoking. Nicotine Tob Res 2012;14:472-8.