Original Article

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

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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 estimates2 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 disorders4‑6 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. 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) [10]. 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 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

### Table 1: Translations of the ATCQ-12

| Item | Factor |
|------|--------|
| 5    | Factor 1 (emotionality) |
| 8    | Factor 2 (expectancy) |
| 12   | Factor 3 (compulsiveness) |
| 10   | Factor 4 (purposefulness) |

*Retranslation to American English; †American English version of the 12-item TCQ (TCQ Heishman et al., 2008). TCQ: Tobacco craving questionnaire; ATCQ: Arabic tobacco craving questionnaire.
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 (β =0.37, 95% confidence interval [CI] =0.01, 0.73, t = 1.97, P < 0.05) and Factor 3 (β = 0.38, 95% CI = 0.04, 0.71, t = 2.23, P < 0.03), and a significant Factor 1-by-Factor 3 interaction (β = −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 (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 Factor 1-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.[14] 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.[28,23,26,27] 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]

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