

## Adaptation, Validity, and Reliability Assessments for the Persian Version of the Tobacco Craving Questionnaire-Short Form

### Abstract

**Background:** Craving is one of the diagnostic criteria for nicotine dependence. The aim of this study was Translating and Validating of Tobacco Craving Questionnaire-Short Form (TCQ-SF) on Persian. **Methods:** Fifty smokers aged 15–65 years participated through a public invitation. The forward and backward translation was done according to Beaton's guideline, then all smokers completed questionnaire, in non-deprived and deprived states with a 1-week interval. After expert committee confirmed forward and backward translation, construct validity evaluated by confirmatory factor analysis (CFA), mean craving scores Independent sample T-tests between high and low Fagerstrom Test for Nicotine Dependent (FTND), and also, deprived and non-deprived smokers. The reliability assessment was done by Intraclass coefficient (ICC) and mean craving scores paired sample t test between two deprived states. The Cronbach's alpha was conducted for internal consistency. **Results:** The consensus Persian version of the questionnaire was obtained. The CFA indicated a significant ( $P < 0.001$ ) association of four latent variables with questionnaire structure. The significant ( $P < 0.001$ ) difference between craving scores in Independent sample t tests indicated the construct validity as concurrent validity. There was no significant difference ( $P = 0.063$ ) between two deprived states' scores and ICC = 0.97, indicated questionnaire reliability. The Cronbach's alpha was 0.89, shows good internal consistency. **Conclusions:** The results confirmed the validity and reliability of the Persian version of the Tobacco Craving Questionnaire-Short Form.

**Keywords:** Appetite, cigars, Iran, nicotine, smokers

### Introduction

It is generally accepted that craving is one of the most commonly reported symptoms among individuals who intend to quit smoking.<sup>[1,2]</sup> The severity of craving can be a factor affecting relapse among addicted patients.<sup>[3,4]</sup> The importance of craving in the diagnosis and treatment of addiction is to the extent that it is referred to as one of the addictions diagnostic criteria in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5).<sup>[5]</sup> Numerous multiple theories of craving indicate that the craving is a multidimensional phenomenon.<sup>[6,7]</sup> Heishman S *et al.*,<sup>[8]</sup> developed on the 4-dimensional, 47-items, Tobacco Craving Questionnaire (TCQ) for the nicotine craving assessment and confirmed its validity and reliability. This instrument consists of four factors including emotionality, expectancy, compulsivity, and purposefulness.<sup>[8]</sup> Because of the

long-time (approximately, 8 min) required to measure craving in this 47-item scale, Heishman S *et al.*,<sup>[9]</sup> confirm reliability and validity of the Tobacco Craving Questionnaire-short form (TCQ-SF), 12-items short version of TCQ. The Comprehensive Exploratory Factor Analysis (CEFA) study (Browne, Cudeck, Tateneni & Mels, 2004) confirms that TCQ-SF retains the same TCQ 4-factor structure.<sup>[9]</sup> The TCQ-SF also has been translated into Arabic<sup>[10]</sup> and French<sup>[11]</sup> languages and verified its reliability and validity by maintaining the same 4-factor structures. Because there are not appropriate valid and reliable questionnaire for measuring tobacco craving in the Persian language, this study was developed to assess the normalization, reliability, and validity of the Persian version of the Tobacco Craving Questionnaire-Short Form (PTCQ-SF).

### Methods

This study was conducted on 50 smokers aged 15–65 years old who were not

**How to cite this article:** Ghorbani Behnam S, Mousavi SA, Emamian MH. Adaptation, validity, and reliability assessments for the Persian version of the tobacco craving questionnaire-short form. *Int J Prev Med* 2020;11:161.

Shahram Ghorbani Behnam,  
Seyed A. Mousavi<sup>1,2</sup>,  
Mohammad H. Emamian<sup>3</sup>

Student Research Committee,,  
School of Medicine, Shahroud  
University of Medical Sciences,  
Shahroud, Iran, <sup>1</sup>Center of  
Health-Related Social and  
Behavioral Sciences Research,  
Shahroud University of Medical  
Sciences Shahroud, Iran,  
<sup>2</sup>Psychiatric Research Center of  
Golestan, Golestan University of  
Medical Sciences, Gorgan, Iran,  
<sup>3</sup>Departments of Epidemiology,  
School of Public Health,  
Shahroud University of Medical  
Sciences, Shahroud, Iran

**Address for correspondence:**  
Dr. Seyed A. Mousavi,  
Centre of Health-Related  
Social and Behavioral  
Sciences Research, Shahroud  
University of Medical Sciences,  
Shahroud, Iran.  
E-mail: mmm89099@gmail.com

### Access this article online

**Website:**  
[www.ijpvmjournal.net/www.ijpvm.net](http://www.ijpvmjournal.net/www.ijpvm.net)

**DOI:**  
10.4103/ijpvm.IJPVM\_247\_18

### Quick Response Code:



This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: [reprints@medknow.com](mailto:reprints@medknow.com)

currently want to quit smoking and were invited by a public invitation. According to psychiatric examination, they are not any symptoms and signs of physical or psychosocial disease and drug taking. According to the DSM-5 criteria, they were nicotine addicts. We performed the study in 2 steps. In step 1, translation and cultural adaptation processing were done according to Beaton's guideline,<sup>[12]</sup> and in step 2, they performed validating assessment of the questionnaire.

### Translating

This process consisted of the forward-backward translating method following Beaton's guideline.<sup>[12]</sup> Initially, an expert committee was constituted. The members of this committee included experts who were familiar with the nicotine addiction, a methodologist, and both the forward and backward translators. Then, the two Persian naïve bilingual translators translate the original English questionnaire into Persian. So that, one translator informed of the original questionnaire concepts and another naïve translator uninformed of the original questionnaire concept. The expert committee discussed two translation adaptations in a session to reach a consensus version of the translation and the wording of the items (forward translation). In the following, two other native English translator, back-translated this Persian translation into English (Backward translation). The expert committee reviewed all versions of the translations and confirmed the morphological, dialectal, preliminary, and conceptual similarity of initial translation and produced the pre-final version of the translation. Our Institutional Review Board approved this translation.

### Validity

In this study, to test the face validity, pre-final version of PTCQ-SF piloted to 20 cigarette smokers and was evaluated understanding difficulties by interview. The construct validity assessment was done by Confirmatory Factor Analysis (CFA) for evaluating the four-dimensional structure of the questionnaire, and in addition, the criterion validity as concurrent validity was conducted by Independent sample t test of mean PTCQ-SF scores between deprived and non-deprived conditions and also between high- and low-dependent smokers. An indicator that was used to confirm 12-hour deprived state of smokers was expiratory carbon monoxide (CO) that was measured by calibrated MD Diagnostics Ltd CO Check Pro - Catalog Number CO20.

### Reliability

Test-Retest Reliability: The reliability assessment of this questionnaire were used to (1) Paired sample t test to compare mean PTCQ-SF craving scores between two repeated deprived conditions with 1-week interval and (2) ICC exam.

Internal consistency: To evaluate the within-factor reliability of the questionnaire, The Cronbach's alpha was employed. The Cronbach's alpha between 0.70 and 0.90 is considered as good internal consistency, whereas values above 0.90 show excellent internal consistency.

All statistical analysis and description of the actual method in this study was performed by SPSS 24. The Ethics Committee of the study place University of Medical Sciences approved the research study under the Declaration of Helsinki (Code of Ethics Committee, IR.SHMU.REC.1395.162). All the participants completed informed consent forms. The Center for Behavioral Research at study place University of Medical Sciences supervised and financed all stages of this study.

### Sample size

On the basis of the 5:1 participant-to-item ratio in behavioral research,<sup>[13]</sup> the minimum sample size of this brief questionnaire were calculated, 50 participants.

### Instruments

The TCQ-SF is a valid and reliable scale for determining the ongoing tobacco craving,<sup>[9]</sup> which is according to a 4-factor structure, and consists of 12-items scored according to a Likert scale. Each subject gives a score from 1 (strongly disagree) to 7 (strongly agree) for questions, and the sum of these scores is the total tobacco craving score.

A *Fagerstrom Test for Nicotine Dependence* (FTND) is a valid and reliable scale for determining the intensity of nicotine dependence,<sup>[14]</sup> which consists of 6 items. Each of these questions has a special rating, and the total of these points reflects the severity of nicotine dependence. The total of these points will be between 0 and ten so that the FTND was to distinguish high-dependent ( $\geq 6$ ) from less-dependent ( $\leq 5$ ) smokers.<sup>[15,16]</sup>

*Expiratory Carbon Monoxide*: Bell et al.,<sup>[17]</sup> reported the average expiratory CO values of 11.1 and 6.7 (ppm) for forced tobacco deprived after 8 and 16 h, respectively. In this study, the CO cut-off limit was set to be  $\leq 11$  ppm to confirm the deprived (12 H) state.

### Results

After forward and backward translations and comparing points in specialist's committee discussions, one of the translated versions was considered appropriate for assessing. This team suggested alternate words and phrases for difficult and unacceptable translations, as the word "irritability" was replaced by the phrase "lose temper" in item 5 and "chance of smoking" was also replaced with "smoking situation" in item 6 because the latter was more familiar with the community and closer to their culture.

Fifty subjects participated in this study, but 48 subjects (81.3% male and 18.7% female) were completed the entire

study. Two subjects were excluded from the study because of non-observance deprived state. The Mean  $\pm$  SD of participants age was  $42.8 \pm 10.6$  years. The Mean  $\pm$  SD cigarettes per day (CPD) of subjects were  $17.3 \pm 3.3$  and presented a mean  $\pm$  SD of FTND score,  $4.84 \pm 1.83$ . More evaluation revealed 35.4% of subjects were high dependent (FTND  $\geq 6$ ) (Mean = 7.3) and 64.6% subjects were low dependent (FTND  $\leq 5$ ) (Mean = 4.5). Therefore, the most participants had a low dependency on nicotine. The mean  $\pm$  SD years of education for the participants were  $10.2 \pm 1.07$  years. Table 1 shows the descriptive demographic information of participants.

The CFA showed that four latent variables (emotionality, compulsivity, purposefulness, and expectancy) significantly associated with PTCQ-SF questions [Figure 1] with a well-fitted model,  $\chi^2 = 0.086$ ; root mean square error of approximation = 0.079, (90% CI = 0.000–0.132); and comparative fit index (CFI) = 0.97.

The mean comparison of PTCQ-SF scores between deprived and non-deprived states revealed that there was a significant difference between mean PTCQ-SF scores (MD -19.68, 95% CI -22.70 to -16.67,  $P$  value  $< 0.001$ ), so that its values are significantly higher in withdrawal states. Table 2 illustrated details of this comparison.

Mean comparison of PTCQ-SF scores between low and high dependent smokers revealed that there was a significant difference between mean PTCQ-SF scores (MD -18.27, 95% CI -23.61 to -12.93,  $P$  value  $< 0.001$ ), so that its values higher in highly dependent smokers. Table 3 illustrated details of this comparison.

The mean comparison of PTCQ-SF scores between two deprived states with 1-week interval (test-retest) revealed that there was no significant difference between mean PTCQ-SF scores (MD -0.64, 95% CI -1.33 to 0.03,  $P$  value = 0.063). Table 4 illustrated details of this compression. The

canonical correlation examination indicated that a linear combination of PTCQ-SF craving measurements on two withdrawal states was the best correlated at almost 0.994 ( $P < 0.001$ ). In addition, ICC reliability in a test-retest examination (confidence interval 95%) was 0.97

**Table 1: Demographic information of participants**

Characteristic	Value
Age in year, mean (SD)	42.8 (10.6)
Gender (M/F)	39/9
Cigarette per day, mean (SD)	17.3 (3.3)
FTND score, mean (SD)	4.84 (1.83)
High dependency (FTND $\geq 6$ ), $n$ (%)	31 (64.6%)
Low dependency (FTND $\leq 5$ ), $n$ (%)	17 (35.4%)
Employed, $n$ (%)	31 (64.6%)
Married, $n$ (%)	38 (79.2%)

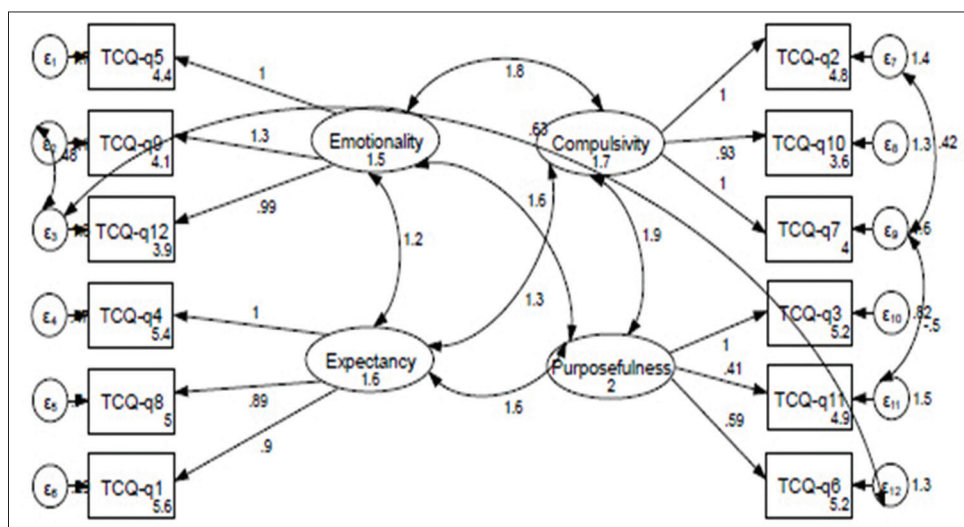
FTND=Fagerstrom Test for Nicotine Dependence

**Table 2: The comparison of PTCQ-SF scores between free use and withdrawal states**

Items	Mean differences	95% confidence interval	$t$	$P^*$
Question 1	-2.29	-2.70 to -1.88	-11.23	$< 0.001$
Question 2	-1.91	-2.47 to -1.36	-6.95	$< 0.001$
Question 3	-2.20	-2.68 to -1.73	-9.35	$< 0.001$
Question 4	-2.27	-2.70 to -1.83	-10.50	$< 0.001$
Question 5	-1.47	-1.98 to -1.01	-6.36	$< 0.001$
Question 6	-0.75	-1.23 to -0.26	-3.11	0.003
Question 7	-1.62	-2.70 to -1.88	-7.68	$< 0.001$
Question 8	-2.02	-2.05 to -1.20	-9.95	$< 0.001$
Question 9	-1.48	-2.42 to -1.61	-5.86	$< 0.001$
Question 10	-1.48	-1.98 to -0.97	-6.83	$< 0.001$
Question 11	-0.87	-1.91 to -1.04	-4.45	$< 0.001$
Question 12	-1.29	-1.78 to -0.80	-5.34	$< 0.001$
Total	-19.68	-22.70 to -16.67	13.83	$< 0.001$

PTCQ-SF=Persian version of Tobacco Craving

Questionnaire-Short Form; \*Independent sample  $t$  test



**Figure 1: Confirmatory factor analysis (CFA)**

**Table 3: The comparison of PTCQ-SF scores between less (FTND\* ≤5) and highly (FTND ≥6) nicotine dependents**

Items	Mean differences	95% confidence interval	t	P**
Question 1	-2.58	-3.51 to -1.65	-5.5	<0.001
Question 2	-1.46	-2.39 to -5.48	-3.21	0.002
Question 3	-2.18	-3.02 to -1.35	-5.25	<0.001
Question 4	-2.11	-2.98 to -1.25	-4.92	<0.001
Question 5	-1.19	-2.08 to -0.31	-2.72	0.009
Question 6	-1.87	-2.72 to -1.02	-4.44	<0.001
Question 7	-1.30	-2.10 to -0.49	-3.24	0.002
Question 8	-1.67	-2.49 to -0.84	-4.09	<0.001
Question 9	-0.97	-1.86 to -0.83	-2.20	<0.05
Question 10	-0.86	-1.56 to -0.17	-2.52	<0.05
Question 11	-1.54	-2.43 to -0.65	-3.49	<0.05
Question 12	-0.49	-1.26 to 0.27	-1.30	0.20
Total	-18.27	-23.61 to -12.93	-6.88	<0.001

PTCQ-SF=Persian version of Tobacco Craving Questionnaire-Short Form; FTND=Fagerstrom Test for Nicotine Dependence. \*Independent sample t test

**Table 4: The mean differences of PTCQ-SF scores in two withdrawal states (test- retest) by questionnaire items**

Items	Mean differences	95% confidence interval	t	P*	ICC**
Question 1	0.00	-0.14 to 0.14	0.000	1.000	0.96
Question 2	-0.02	-0.13 to 0.09	-0.710	0.375	0.99
Question 3	-0.04	-0.14 to 0.06	-0.814	0.420	0.99
Question 4	-0.04	-0.08 to 0.16	0.753	0.485	0.99
Question 5	-0.29	-0.61 to 0.03	-1.820	0.075	0.90
Question 6	-0.20	-0.18 to 0.14	-0.256	0.800	0.96
Question 7	-0.10	-0.39 to 0.18	-0.726	0.472	0.91
Question 8	-0.02	-0.15 to 0.11	0.330	0.743	0.98
Question 9	-0.02	-0.14 to 0.18	0.266	0.800	0.98
Question 10	0.18	-0.42 to 0.49	-1.592	0.118	0.95
Question 11	-0.04	-0.21 to 0.29	0.330	0.743	0.90
Question 12	-0.06	-0.32 to 0.19	-0.499	0.630	0.93
total	-0.64	-1.33 to 0.03	-1.906	0.063	0.99

PTCQ-SF=Persian version of Tobacco Craving Questionnaire-Short Form; \*Paired sample t test, \*\*Intraclass coefficient

that indicated an excellent convergence or repeatability of two exam results.

The Cronbach's alpha coefficient estimated for the whole questionnaire was equal to 0.89, approving the good internal consistency of the questionnaire.

Mean ± SD values of expiratory CO in non-deprived and deprived states were 22.7 ± 9.1 ppm and 5.3 ± 2.4 ppm, respectively.

## Discussion

The several studies have demonstrated the reliability and validity of the 4-factor structure TCQ-SF in French, Arabic, and original English languages,<sup>[9-11]</sup> but because of the study location, all volunteers in this manuscript

had native Persian-language (not necessarily Iranian race). After substitute alternate words and phrases for preliminary translation, the consensus PTCQ-SF was obtained. Although the content and structural validity of the questionnaire was verified in original TCQ-SF,<sup>[9]</sup> we conducted CFA for construct validity and also assessed criterion validity as the concurrent validity of the questionnaire. The CFA indicated the 4-factor structure of PTCQ-SF. The mean difference analysis in Table 2 shows significant ( $P \leq 0.001$ ) difference craving scores between deprived and non-deprived smokers that indicated the concurrent validity of Persian version questionnaire according to this assumption that craving score in deprived state higher than the non-deprived state.<sup>[17,18]</sup> In addition, as a fact that the intensity of craving in high nicotine dependents is greater than low dependents,<sup>[19]</sup> significant ( $P \leq 0.001$ ) mean difference analysis in Table 3 between low and high dependents, indicated criterion validity as the concurrent validity of the PTCQ-SF. As illustrated in Table 4, there was no significant ( $P > 0.05$ ) difference between test-retest on deprived conditions, which indicated the reliability of PTCQ-SF. In addition, ICC = 0.97 and canonical correlation = 0.994 ( $P < 0.001$ ) confirmed this reliability. Therefore, these analysis confirms previous TCQ-SF validity and reliability assessment studies.<sup>[9-11]</sup>

The mean ± SD, FTND score in our study was (4.84 ± 1.83) and in Heishman<sup>[9]</sup> study was (6.5 ± 1.7). The mean ± SD CPD consumption in our study was (17.3 ± 3.3) and in Heishman<sup>[9]</sup> study was (22.1 ± 6.6). The mean ± SD value of expiratory CO level in the non-deprived state in our study was (22.7 ± 9.1) ppm and in Heishman<sup>[9]</sup> study was (30.3 ± 12.1). Therefore, PTCQ-SF can be used both on low and high dependent smokers with any consumption.

The values of the Cronbach's alpha coefficient in our study was 0.89 (in Heishman study was 0.90) that indicated internal consistency of PTCQ-SF. Gender differences were observed only in the tobacco withdrawal state, so that the deprived condition the mean scores of craving was significantly higher in females than males ( $P < 0.05$ ); however, a study reported that women experience the more intense withdrawal symptoms and nicotine craving during the luteal phase of the menstrual period.<sup>[20]</sup> Because the menstrual cycle of women who participated in this study was not concerned, the gender differences cannot be discussed because they may have been affected by premenstrual symptoms. This study limitations were (1) the low number of female volunteers due to not comparable in terms of gender differences; (2) The low sample size for CFA, which generally should be about 200. Although self-report craving is the predictor of nicotine addiction treatment success,<sup>[4,21]</sup> the application of PTCQ-SF in predicting treatment outcomes of cigarette cessation programs had not been studied; therefore, the use of the PTCQ-SF in a clinical trial of smoking cessation seems to be a rational step to investigate the questionnaire validity and reliability further.

## Conclusions

Regarding the findings of this study, the PTCQ-SF has acceptable reliability and validity and can be used in studies on ongoing tobacco craving assessment.

## Acknowledgments

We express our sincere thanks and appreciation to the Shahroud University of Medical Sciences research deputy, all the patients participating in the study. Their cooperation and assistance made this research possible. The Ethics code IR.SHMU.REC.1395.162 was obtained for this Research.

## Financial support and sponsorship

The Shahroud University of Medical Sciences supported this study. (Project number: 95114).

## Conflicts of interest

There are no conflicts of interest.

**Received:** 04 Jun 18 **Accepted:** 22 Mar 19

**Published:** 05 Oct 2020

## References

1. Hughes JR, Hatsukami D. Signs and symptoms of tobacco withdrawal. *Arch Gen Psychiatry* 1986;43:289-94.
2. West R, Schneider N. Craving for cigarettes. *Br J Addict* 1987;82:407-15.
3. Killen JD, Fortmann SP. Craving is associated with smoking relapse: Findings from three prospective studies. *Exp Clin Psychopharmacol* 1997;5:137-42.
4. Shiffman S, Engberg JB, Paty JA, Perz WG, Gnys M, Kassel JD, *et al.* A day at a time: Predicting smoking lapse from daily urge. *J Abnorm Psychol* 1997;106:104-16.
5. Association, A.P., Diagnostic and statistical manual of mental disorders (DSM-5®). American Psychiatric Pub. 2013.
6. Singleton EG, Gorelick DA. Mechanisms of alcohol craving and their clinical implications. *Recent Dev Alcohol* 1998;14:177-95.
7. Drummond DC. Theories of drug craving, ancient and modern. *Addiction* 2001;96:33-46.
8. Heishman SJ, Singleton EG, Moolchan ET. Tobacco craving questionnaire: Reliability and validity of a new multifactorial instrument. *Nicotine Tob Res* 2003;5:645-54.
9. 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.
10. Albrithen AA, Singleton EG. Brief Arabic tobacco craving questionnaire: An investigation into craving and heavy smoking in Saudi Arabian males. *J Family Community Med* 2015;22:8-12.
11. Berlin I, Singleton EG, Heishman SJ. Validity of the 12-item French version of the Tobacco Craving Questionnaire in treatment-seeking smokers. *Nicotine Tob Res* 2010;12:500-7.
12. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine* 2000;25:3186-91.
13. Pedhazur E. *Multiple Regression in Behavioral Research: Explanation and Prediction*. New York, NY: Thompson Learning, Inc.;1997.
14. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström test for nicotine dependence: A revision of the Fagerstrom Tolerance Questionnaire. *Br J Addict* 1991;86:1119-27.
15. Ferguson JA, Patten CA, Schroeder DR, Offord KP, Barman KM, Hurt RD. Predictors of 6-month tobacco abstinence among 1224 cigarette smokers treated for nicotine dependence. *Addict Behave* 2003;28:1203-18.
16. Fagerström KO, Kane M, Schoberberger R, Breslau N, Hughes JR, Hurt RD, *et al.* Nicotine dependence versus smoking prevalence: Comparisons among countries and categories of smokers. *Tob Control* 1996;5:52-6.
17. Bell SL, Taylor RC, Singleton EG, Henningfield JE, Heishman SJ. Smoking after nicotine deprivation enhances cognitive performance and decreases tobacco craving in drug abusers. *Nicotine Tob Res* 1999;1:45-52.
18. Shiffman S, Paty JA, Gnys M, Kassel JD, Elash C. Nicotine withdrawal in chippers and regular smokers: Subjective and cognitive effects. *Health Psychol* 1995;14:301-9.
19. Van Den Eijnden R, Spijkerman R, Fekkes D. Craving for cigarettes among low and high dependent smokers: Impact of norharman. *Addict Biol* 2003;8:463-72.
20. Carpenter MJ, Upadhyaya HP, LaRowe SD, Saladin ME, Brady KT. Menstrual cycle phase effects on nicotine withdrawal and cigarette craving: A review. *Nicotine Tob Res* 2006;8:627-38.
21. Killen JD, Fortmann SP, Murphy GM Jr, Hayward C, Arredondo C, Cromp D, *et al.* Extended treatment with bupropion SR for cigarette smoking cessation. *J Consult Clin Psychol* 2006;74:286-94.