Original Article

Water-pipe Smoking Addiction in Iran; Evaluation of Reliability and Validity of Lebanon Water-pipe Dependence Scale Among Iranian Water-pipe Tobacco Smokers

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Abstract

Background: Water-pipe smoking is increasing around the world. However, there is no comprehensive information on nicotine addiction in water-pipe smokers. This study was carried out to translate and validate the Lebanon Water-pipe Dependence Scale- into Persian language; besides, tobacco dependence was evaluated in Iranian water-pipe smokers. **Methods:** A forward-backward translation procedure was done to provide the Iranian version of the questionnaire. Our subjects were current water-pipe smokers who were known in prevalence study that conducted in Tehran. Psychometric properties of the instrument including validity (content, face and construct validity) and reliability (internal consistency and test-retest analysis), were evaluated. **Results:** A total of 465 participants took part in this study, of whom 298 (64%) were male. The mean age was 30 (standard deviation 10.2). Fifty three percent of subjects got score more than 10 on LWDS questionnaire that indicating dependence. The internal consistency of the LWDS (Persian Version) was 0.85. The physiologic dependence, psychological craving, and negative reinforcement domains had acceptable reliability (Cronbach's alpha was 0.94, 0.81, 0.77 respectively), but reliability was low (alpha = 0.45) in the positive reinforcement domain. External consistency of the LWDS was assessed by test retest. Intra class correlation (ICC) was calculated for all items (n = 20) and ICC for all of them was >0.7 and the mean ICC was 0.9. Content validity was acceptable; all of obtained content validity indexes (CVIs) were above 80%. The result of goodness of fit shows an adequate model (Comparative Fit Index (CFI = 0.94), Root Mean Square Error of approximation (RMSE) = 0.08). **Conclusions:** The study revealed strong documents for the reliability and validity of the LWDS for use in Iran. However, further study may be required to improve the reliability results in the positive reinforcement domain.

Keywords: *Psychometrics, smoking water-pipes, substance-related disorders*

Introduction

Water-pipe, also known as hookah, shisha or narghile, is an old form of tobacco smoking which originated in the Eastern Mediterranean region and North Africa.[1] Despite the harmful effects, the prevalence of water-pipe smoking is increasing around the world, especially among the young.[2]

The duration of one water-pipe smoking session is usually longer than the duration of one cigarette smoking, as a result of which more volume of smoke gets inhaled. Following one session of water-pipe smoking, the volume of inhaled toxic substances is equal to smoking 100 cigarettes.[3] In addition, the smoke inhaled by the water-pipe smoker contains carcinogens and other metals and toxic substances, which are also found in cigarette smoke.[4]

Despite the belief of many water-pipe smokers concerning the lower intensity of tobacco addiction comparing to cigarette smoking,[5,6] the water-pipe smoke contains more nicotine that enters the body of consumer and acts pharmacologically.[7]

The results of a study indicated that in water-pipe smoking, the nicotine absorption was equivalent to the daily intake of 10 cigarettes per day.[8] Many water-pipe consumers' behaviors confirm dependency on nicotine. For example, the repetition of consumption despite being aware of its complications, adaptive behaviors to ensure access to water-pipe, and failure to quit.[9]

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Some studies have shown that the nicotine volume produced by water-pipe smoking can be even more than cigarette smoking,[10] considering the consumption duration, the smoke topography and chemical properties of water-pipe smoke.[11] Therefore water-pipe smoking is a kind of tobacco addiction. The symptoms of nicotine withdrawal syndrome in water-pipe smokers are similar to those in cigarette smokers (craving, fatigue, irritability...). These symptoms decrease with water-pipe consumption.[12,13]

Nicotine addiction occurs due to the ability of this substance to stimulate the brain's reward system.[14] Behavioral, cognitive and social issues also play roles in the addiction phenomenon.[15] A study conducted by AUF and colleagues in 2011, the purpose of this study was to determine the status of tobacco addiction in hookahs who did not consume cigarettes. The conclusion was that water-pipe smokers would experience nicotine addiction symptoms like cigarette smokers.[16]

Despite the increased prevalence of water-pipe smoking in Iranian society, there is not enough evidence on water-pipe addiction. On the other hand, there isn't any valid instrument to measure water-pipe dependence in Iran. The aim of this study was to provide a valid Persian translation of LWDS-11 Consistent with Iranian culture and evaluates its reliability and validity. In other words the purpose of this study was to prepare a standardized and validated questionnaire for assessing hookah addiction in Iran.

This is a comprehensive questionnaire and all hookah related aspects have been respected. Moreover, due to the prevalence of hookah smoking in Lebanon since a long time, extensive studies have been conducted in this country, and this questionnaire has been used to assess water-pipe addiction in many countries. It seems this questionnaire will be a useful instrument for evaluating tobacco dependence in Iranian water-pipe smokers.

Methods

Participants

Participants were current water-pipe smokers who were identified through a survey on the prevalence of water-pipe consumption in Tehran[17] by using water-pipe model of GATS.[18] According to the definition of the World Health Organization (WHO), water-pipe smokers are those who consume water-pipe daily or those who have consumed less than a daily water-pipe, but have had a history of consumption in the past month.[18]

They were evaluated for water-pipe addiction via face to face interview by using the Lebanon Water-pipe Dependence Scale (LWDS-11).

Inclusion criteria

Data was collected by trained persons under supervision of Tobacco Prevention and Control Research Center. After obtaining verbal consent from the participants, they were asked to answer the questions of LWDS-11. Sample collection method was described in the prevalence study.[17]

Questionnaire

The Lebanon Water-pipe Dependence Scale (LWDS-11) questionnaire contains 11 questions, each of which awarded between 0 to 3 points. Since each question had 0-3 points, the original total scale yielded a score of 0-33.[19] Those that score below 10 are not addicted and a score over 10 means water-pipe addiction. The scores from 10 to 16 mean moderate addiction and the scores over 16 mean severe addiction. As mentioned before this questionnaire contains 11 questions, which includes 4 domains related to hookah consumption (4 questions for physiological dependence, 2 questions for Positive emotions, 2 question for negative reinforcement, and 3 questions for psychological domain).

Physiological domain's questions include the number of serving water-pipe a week (7 servings or more), stopping water-pipe smoking for 7 days, the percentage of income that spends on water-pipe and the ability to spend a few days without water-pipe smoking. Positive and negative emotions include consumption for pleasure, consumption for the satisfaction of others, consumption for relaxation and mood improvement. Questions of the psychiatric craving enthusiasm investigate the consumption of water-pipe during illness, replacing water-pipe smoking instead of eating and smoking water-pipe alone.

Translation and back translation

Firstly, the original version was translated into Persian by a fluent person in English and Persian. Then, the Persian version was back translated into English by another person who was fluent in both English and Persian. After comparing two English versions by a native speaker and editing the questionnaire according to his comments, the final version was translated into Persian by a fluent person in both Farsi and English who was not aware of the project.

Statistical analysis

Descriptive statistics was performed to report participants' characteristics. All analysis was performed using EQS and SPSS 20; and P value <0.05 was considered as the significant level.

Face and content validity

One of the important components of a valid questionnaire is using adequate and easy understandable questions for the aimed sample. Thus, after doing back translation and revising the Persian translation, LWDS-11 was read by 5 water-pipe smokers to evaluate face validity. Moreover, in order to assess the content validity, the questionnaire was investigated by 10 experts in the related

field. They scored (from 1-4) each question whether it was related, simple or clear. Afterwards, content validity index (CVI) was calculated for all questions. CVI is the proportion of experts that judge an item as content validity. CVI >80% was considered as acceptable content validity.[20]

Construct validity

To assess construct validity, confirmatory factor analysis (CFA) was used. Three important indexes: comparative fit index (CFI), root mean square error of approximation (RMSE), and Chi-square test were considered to evaluate the goodness of fit of confirmatory factor analysis (CFA). CFI >0.9, RMSE <0.08, and non-significant Chi-square showed adequate fit.[21]

Reliability

Internal and external consistency

For each domain of LWDS-11, Cronbach's alpha was measured and Cronbach's alpha >0.7 was considered as good internal consistency. Also, test-retest was performed to assess external consistency for 20 participants (duration between test and retest was about two weeks) and then intra class correlation (ICC) was measured. ICC >0.7 was considered acceptable.

Results

A total of 465 participants took part in this study, of whom 298 (64%) were male. The mean age was 30 years (standard deviation 10.2).

32 (6.8%) participants were in age group of 15-17 years old; 124 (26.3%) subjects were in group of 18-24 years; 243 subjects (51.6%) were in age group of 25-39; 57 participants (12.1%) were in age group of 40-54; and 14 subjects (3%) were in age group of >55 years.

The mean age of initiating water-pipe smoking was 21.4 years (SD: 6.9). In terms of marital status, 256 (56.3%) subjects were married, 198 (42%) subjects were single, and 8 (17%) participants were divorced. With regard to educational status, 129 (27%) participants didn't get their high school diploma, 183 (38.4%) subjects had high school diploma, and 164 (34.4%) participants had academic education. The mean score of LWDS was 11.58 (standard deviation 7.44). Demographic information shows in Table 1.

53% of subjects got scores of more than 10 on LWDS questionnaire that indicated dependency. Subjects who scored more than 10 were divided into two groups: between 10-16 and above 16 [Table 2].

Validity

To evaluate the validity of the Persian version of LWDS, face validity, content validity and construct validity were assessed.

Face validity

After doing translation and back translation, 5 water-pipe smokers read the questionnaire and commented about understandability and adequacy of the questions and afterwards questions were modified in accordance with useful comments.

Content validity

To assess content validity, the questions were investigated by 10 experts in the related field. The mean CVI of items were 92%, 98% and 97% concerning whether they were related, simple and clear, respectively. All the obtained CVIs were above 80%, hence the content validity was acceptable. Table 3 depicts the details of items.

Construct validity

Confirmatory factor analysis was used for assessing construct validity of LWDS. It was carried out to confirm

Table 1: Demographic information of participants

		Frequency (%)
Age group	15-17	32 (7.4%)
	18-24	124 (27.2%)
	25-39	243 (53.3%)
	40-54	57 (12.1%)
Gender	Male	298 (26.3%)
	Female	167 (73.7%)
Marital status	Married	256 (55.4%)
	Single	198 (42.9%)
	Divorce	8 (1.7%)
Educational level	Under high school diploma	127 (27.3%)
	high school diploma	178 (38.3%)
	Academic education	160 (34.4%)

Table 2: Frequency of LWDS score >10

LWDS score	Frequency	Percentage
10-16	103	42
>16	143	58

Table 3: The obtained results for evaluating content validity by CVI

Question	CVI (Being related)	CVI (Being simple)	CVI (Being clear)
1	100%	100%	100%
2	80%	100%	100%
3	80%	100%	100%
4	100%	100%	70%
5	100%	100%	100%
6	70%	100%	100%
7	80%	80%	100%
8	100%	100%	100%
9	100%	100%	100%
10	100%	100%	100%
11	100%	100%	100%
Total	92%	98%	97%

good fit of data. The result of goodness of fit showed an adequate model (CFI = 0.94, RMSE = 0.08), but Chi-square test was significant. Appropriate CFI and RMSE suggested that the significant Chi-square was due to the large sample size. In Table 3, the effect of each question on related domain is shown. Question 3 was the most related item to physiological nicotine dependence domain. Both questions 5 and 7 had the most effects on psychological craving domain. In negative reinforcement and positive reinforcement domains, questions 9 and 10 were more related, respectively [Table 4].

Reliability

Internal consistency

For evaluating internal consistency, the Cronbach's alpha was calculated for 4 dimensions. Cronbach's alpha was 0.94, 0.81, 0.77, and 0.45 for physiological nicotine dependence, psychological craving, negative reinforcement, and positive reinforcement, respectively.

External consistency

The relationship between the scores obtained from test-retest after 14 days was calculated by spearman's correlation. Interclass correlation (ICC) was calculated for all items and it was >0.7 for all of them, while the mean of ICC was 0.9.

Discussion

LWDS-11 is designed to investigate water-pipe addiction in Lebanon.[19] In the present study, the validity and reliability of the Persian version of this questionnaire was studied in an Iranian population of over 15 years old.

Reliability and validity are the minimum prerequisites for accepting a translated questionnaire. Based on the results of this study, Persian version of LWDS-11 is suitable for Iranian society. The results of other similar studies regarding the validity and reliability of this questionnaire were similar to those of our study and the use of this questionnaire for assessing water-pipe addiction has been accepted, including the studies conducted in UK[22] and Jordan.[23] In the UK study, 180 water-pipe tobacco smokers were selected from water-pipe cafés in central London, England and interviewed. Based on the results of this study, the Lebanese questionnaire (LWDS-11) was strong and acceptable, and 47% of participants scored above 10 indicating dependency.[22]

Face validity was evaluated by 5 water-pipe smokers and comprehensiveness and simplicity were also approved. Content validity was reviewed by 10 experts in the field of tobacco control. They scored each question in terms of simplicity, clarity and relevance. Content validity index was above 0.8 in all of these cases and content validity was confirmed. In order to investigate the construct validity, a confirmatory factor analysis was performed, which showed that the construct validity was appropriate.

The questionnaire had four domains. The impact of the questions related to each domain was examined in the confirmatory factor analysis. The question of "How many days did you not get water-pipe at all?" had the greatest impact on the physiological addiction domain. Considering the nature and structure of water-pipe, it was logical that the fewer number of days was positively associated with more physical addiction. The questions of "Do you smoke water-pipe when you are ill?" and "Can you smoke water-pipe instead of eating something?" had the higher impact on psychological craving domain. The impact of the question "Do you smoke water-pipe for relaxation?" was more than others on the negative reinforcement domain. Apart from that, "Do you smoke water-pipe for pleasure?" was the most important question in positive reinforcement domain. The internal consistency of the Persian

Table 4: The confirmatory factor analysis for assessing the effect of each question on its related domain

Domains	Coefficients	s.e
Physiological nicotine dependence		
1. Number of water-pipes you usually smoke per week?	0.65	0.76
2. How many times did not smoke water-pipe more than 7 days?	0.85	0.52
3. How many days you did not smoke Water-pipe at all	0.88	0.47
4. What percentage of your monthly income do you spend for water-pipe smoking?	0.59	0.81
Psychological craving		
5. Do you smoke water-pipe when you are ill?	0.76	0.65
6. Do you smoke water-pipe alone?	0.68	0.73
7. Can you smoke water-pipe instead of eating something?	0.76	0.66
Negative reinforcement		
8. Do you smoke water-pipe to improve your mood?	0.7	0.71
9. Do you smoke water-pipe for relaxation?	0.78	0.62
Positive reinforcement		
10. Do you smoke water-pipe for pleasure?	0.66	0.55
11. Do you smoke water-pipe for the others' fun?	0.65	0.91

questionnaire was 0.85. The physiologic dependence, psychological craving and negative reinforcement domains had acceptable reliability (Cronbach's alpha was 0.94, 0.81, 0.77, respectively), but the reliability was low (alpha = 0.45) in the positive reinforcement domain. This could be due to posing the question of "Have you smoked water-pipe for the pleasure of others?" in this domain. According to the Iranian culture, smoking water-pipe to satisfy the others does not lead to the smokers' pleasure, but it may distract him from unpleasant feeling. More studies are needed in this regard. For testing the external stability, test-retest was performed with a 14-day interval. The mean of interclass correlation was 0.9, which indicated that external stability was acceptable.

Conclusions

It was the first study in Iran that translated a standard questionnaire on water-pipe addiction and then its reliability and validity have been investigated. This study was the first to apply the LWDS-11 for Persian language population. As previously mentioned, having a specific questionnaire for water-pipe addiction was required based on the culture of the surveyed community.

On the other hand, the questionnaire has been standardized and translated in other countries. Considering the nature of water-pipe consumption and its differences with cigarettes smoking, the items of questionnaire considered all aspects of water-pipe dependency, and in fact it was a strong questionnaire. The sample size was appropriate and sufficient in the present study.

According to the results of this study, Persian version of the questionnaire was in accordance with the original one and had 4 domains with appropriate items. In terms of the structure, LWDS in the studied population was almost similar to the population studied in Lebanon. The obtained data and information suggested a questionnaire with 4 domains and 11 items. Questions of all 4 domains remained in our study.

Utilization: The results of this study can be used in future researches on water-pipe use in Iran. Furthermore, due to the growing trend of water-pipe smoking and the need for water-pipe cessation services, this questionnaire can be used to investigate the status of water-pipe smokers addiction volunteering to quit. It is important to know the addiction intensity in treatment planning, especially for pharmacotherapy. As mentioned before, there is a growing need for water-pipe-specific measures of dependence that are validated for use in other populations where water-pipe smoking is common.

Limitation

The sampling method was based on questionnaires, which can cause response bias. It is possible that participants especially women are hiding their water-pipe smoking status due to cultural issues. The water-pipe smoking status was based on consumer remarks and due to the limited financial resources of the project, it was not possible to conduct the relevant tests.

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Conflicts of interest

There are no conflicts of interest.

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