



The Agreement between the Fagerström Test for Nicotine Dependence and the Heaviness of Smoking Index among Iranian Male Smokers

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Abstract

Background: Nicotine dependence is one of the most significant barriers to smoking cessation. Therefore, measuring this dependence is crucial for effective smoking cessation interventions. The current study aimed to evaluate the degree of agreement between the Fagerström Test for Nicotine Dependence (FTND) and the Heaviness of Smoking Index (HSI) among Iranian smokers. **Methods:** We analyzed the data obtained from two previous studies among 580 daily smokers in Iran. Data were collected using the FTND scale. Cohen's kappa was utilized to assess the degree of agreement between HSI and FTND.

Findings: The HSI showed significant agreement with FTND (Cohen's kappa=0.72) in assessing nicotine dependence, with a sensitivity of 88.6% and a specificity of 90.3%.

Conclusion: The HSI is a valid and reliable tool for measuring nicotine dependence, exhibiting significant agreement with FTND. As a result, the HSI can be considered an alternative to the FTND in both clinical and research settings, particularly for heavy smokers.

Keywords: Smoking, Nicotine dependence, Fagerström Test for Nicotine Dependence, Heaviness of Smoking Index

Citation: Pahlavanzadeh B, Charkazi A. The agreement between the Fagerström test for nicotine dependence and the heaviness of smoking index among Iranian male smokers. *Addict Health*. 2024;16(3):159–162. doi:10.34172/ahj.1493

Received: July 29, 2023, Accepted: May 1, 2024, ePublished: July 29, 2024

Introduction

The use of tobacco is a significant public health concern worldwide, and Iran is no exception. According to the Global Burden of Disease Study in 2017, tobacco use is responsible for the deaths of around eight million people.¹ According to the WHO report, the current tobacco use rate among individuals aged 15 years and older in Iran is 14.2%.² The results of a recently conducted survey among 2016 nationally representative households showed that the prevalence of current daily cigarette smoking among Iranian adults was 20.1% (19.4-20.7) in males versus 0.9% (0.8-1.1) in females.³

Nicotine dependence stands as a primary obstacle to smoking cessation. Various tools and scales have been developed and introduced over time to measure the degree of nicotine dependence among consumers. These tools include the Fagerström Test for Nicotine Dependence (FTND)⁴, the Glover-Nilsson Smoking Behavior Questionnaire (GN-SBQ)⁵, the Cigarette Dependence Scale (CDS)⁶, and the Hooked on Nicotine Checklist

(HONC).⁷

One of these tools, the FTND, comprises six items recognized as one of the leading instruments in this field. It can be readily administered without any invasive procedures. This scale has been widely employed to measure both behavioral and physiological indicators of nicotine dependence.^{6,8}

The FTND consists of six questions, with a score of 6 or higher indicating high nicotine dependence. The Heaviness of Smoking Index (HSI) is derived from the two pivotal questions of the FTND: "How soon after you wake up do you smoke your first cigarette?" and "How many cigarettes do you smoke per day?" The HSI serves as an alternative to the FTND, with scores ≥ 4 indicating high nicotine dependence.⁹⁻¹¹

Several studies have demonstrated a strong concordance between HSI and FTND, as evidenced by kappa agreements. The HSI's simplicity and ease of use have prompted suggestions to replace FTND with HSI in clinical and epidemiological research.¹¹⁻¹⁶ Given the substantial



prevalence of tobacco use in Iran, comprehending the relationship between FTND and HSI is crucial in accurately measuring tobacco dependence among users.

Objective

This article aims to explore the preference of the HSI over the FTND and discuss the implications within the context of tobacco use in Iran.

Methods

Procedure

In this cross-sectional study, we utilized the data available from previous studies focused on smoking. The studies focused on smoking behavior based on a transtheoretical model among Iranian adult male smokers from various regions of the country who were current or ex-smokers. In order to reach potential respondents, they were looked for at places such as campus coffee houses, accommodations, and city parks.¹⁷⁻²⁰ A total of 580 smokers aged 18 years and older were included in the study. Individuals who used forms of tobacco other than cigarettes, such as hookah and smokeless tobacco, were excluded from the study.

Measures

Data were collected using the FTND to assess nicotine dependence. The FTND consists of 6 questions with a total score of 0 to 10. The HSI was derived from the FTND, comprising 2 questions with a score between 0 and 6. A score of ≥ 6 in the FTND and ≥ 4 in the HSI indicates high nicotine dependence. The validity and reliability of the FTND scale in the Iranian population have been confirmed in Sarbandi et al.'s study.²¹

Statistical analysis

We analyzed the data using descriptive statistics, including frequency, mean, and standard deviation, in SPSS version 18. The FTND and HSI mean scores were compared using the independent t-test and analysis of variance (ANOVA) in the subgroups based on demographic variables. Agreement between the FTND and HSI scores was assessed using Pearson's correlation coefficient, intraclass correlation coefficient (ICC), and Cohen's agreement coefficient. In addition, the normality distribution of data was assessed using the Kolmogorov-Smirnov test. The analysis was performed using SPSS software version 18 at a significant level of 0.05.

Results

The mean age of the samples was 39.70 (SD = 12.13) years, with an age range of 18 to 75 years. The participants began smoking at a mean age of 20.67 (SD = 6.65) years. On average, they smoked 16.98 (SD = 10.83) cigarettes per day. The total scores for the FTND and the HSI were 3.93 (SD = 2.73) and 2.10 (SD = 1.83), respectively.

A total of 45.9% started smoking before the age of 20.

Approximately 39.1% were married, 52.8% were in the precontemplation stage of smoking change, and 19.5% held a university degree. Table 1 presents the demographic characteristics of the participants.

The prevalence of high nicotine dependency was 28.7% (n = 149) using the FTND and 24.2% (n = 149) using the HSI. The scatterplot and Pearson's correlation coefficient revealed a strong correlation between the FTND and the HSI scores ($r = 0.919$, $P < 0.001$) (Figure 1).

In examining the agreement between the two methods, ICC was equal to 0.783 ($P < 0.001$), and Cohen's kappa coefficient was equal to 0.742 ($P < 0.001$). The HSI demonstrated a sensitivity of 88.6% and a specificity of 90.3%.

Discussion

The current study aimed to investigate the agreement levels between the HSI and FTND in Iranian daily smokers. The findings revealed a significant agreement with a Cohen's kappa agreement coefficient of 0.74, and good sensitivity (88.6%) and specificity (90.3%). Our results are consistent with most studies conducted in various parts of the world. However, our agreement, sensitivity, and specificity surpassed those reported by Lim et al.,¹⁶ Lim et al.,²² John et al.,²¹ and Pérez-Ríos et al.¹⁵ In contrast, the findings of studies by Chabrol et al.²³ and de Leon et al.²⁴ differed, demonstrating higher kappa agreements, greater specificity, but lower sensitivity. Lim et al. concluded that variation among studies could be attributed to factors such as the number of cigarettes smoked, smoking duration, and nicotine content.¹⁶

The present study has some limitations that should be considered when generalizing the results. Firstly, our study exclusively included male smokers, whereas many studies enrolled both genders and compared the outcomes. Secondly, we analyzed data that used convenience samples from different studies conducted at different times and geographical areas, potentially influencing the findings. Thirdly, the use of self-report questionnaires without biochemical confirmation might introduce bias. Lastly, Cohen's kappa index analysis could be influenced by prevalence. Future studies are required to address these

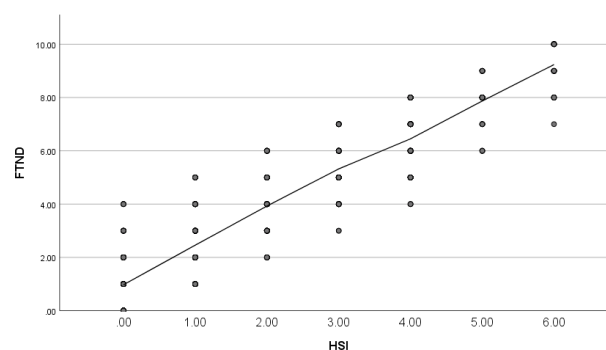


Figure 1. Scatterplot of the Fagerström Test for Nicotine Dependence and the Heaviness of Smoking Index among participants

Table 1. Demographic characteristics of participants

	No. (%)	FTND Mean (SD)	P value	HSI Mean (SD)	P value
Age onset			<0.001		<0.001
<20	269 (46.4)	4.45 (2.77)		2.46 (1.88)	
≥20	311 (53.6)	3.47 (2.62)		1.78 (1.74)	
Marital status			0.031		0.070
Single/divorced/widowed	353 (60.9)	3.73 (2.70)		1.98 (1.81)	
Married	227 (39.1)	4.23 (2.76)		2.27 (1.86)	
Age			<0.001		<0.001
18-29	132 (22.8)	3.15 (2.43)		1.49 (1.61)	
30-39	166 (28.6)	3.80 (2.73)		2.04 (1.80)	
40-49	151 (26.0)	4.25 (2.75)		2.37 (1.85)	
50-59	88 (15.2)	4.12 (2.73)		2.21 (1.80)	
≥60	43 (7.4)	5.30 (2.97)		2.97 (2.06)	
Education			0.002		0.008
Primary school	123 (21.2)	4.48 (2.82)		2.44 (1.93)	
Secondary school	120 (20.7)	3.82 (2.60)		2.00 (1.74)	
High school dropout	71 (12.2)	4.61 (2.96)		2.53 (1.99)	
High school diploma	148 (25.5)	3.32 (2.45)		1.78 (1.64)	
University degree	118 (20.3)	3.81 (2.83)		1.97 (1.88)	
Smoking stage of change			0.252		0.398
Precontemplation	300 (51.7)	3.95 (2.68)		2.10 (1.82)	
Contemplation	99 (17.1)	3.54 (2.38)		1.88 (1.65)	
Preparation	181 (31.2)	4.11 (2.99)		2.10 (1.83)	

FTND: The Fagerström Test for Nicotine Dependence, HSI: The Heaviness of Smoking Index.

limitations to generalize the research findings within the Iranian population of smokers.

Conclusion

In conclusion, the findings of this study affirm that the HSI is a valid tool for assessing nicotine dependence and serves as a credible alternative to the FTND in both clinical and epidemiological contexts. The substantial agreement between the two tools indicates the reliability of the HSI as a measure of nicotine addiction, particularly for heavy smokers. Moreover, the HSI high sensitivity and specificity further underscore its validity in identifying high levels of nicotine dependence.

Acknowledgments

The authors express their gratitude to the participants of this study.

Authors' Contribution

Conceptualization: Abdurrahman Charkazi, Bagher Pahlavanzadeh.

Data Curation: Abdurrahman Charkazi.

Formal analysis: Bagher Pahlavanzadeh.

Investigation: Abdurrahman Charkazi, Abdurrahman Charkazi.

Methodology: Abdurrahman Charkazi, Bagher Pahlavanzadeh.

Project administration: Abdurrahman Charkazi.

Resource: Abdurrahman Charkazi.

Software: Bagher Pahlavanzadeh.

Supervision: Abdurrahman Charkazi, Bagher Pahlavanzadeh.

Validation: Bagher Pahlavanzadeh.

Visualization: Abdurrahman Charkazi.

Writing—original draft: Abdurrahman Charkazi.

Writing—review & editing: Abdurrahman Charkazi, Bagher Pahlavanzadeh.

Competing Interests

The authors declared no conflict of interest.

Ethical Approval

The study was approved by the Ethics Committee of Golestan University of Medical Sciences and Isfahan University of Medical Sciences (Grant numbers: 291053, 289014, and 2679).

Funding

None.

Informed Consent

Participants consented to take part in the study verbally.

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