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Risk Factors for Tobacco Dependence in Moroccan Smokers

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Abstract: The nicotine dependence is a physiological and psychological process. The objective of this study was to determine the risk factors of nicotine dependence among Moroccan smokers. It was a cross-sectional study conducted in 2006 on a representative sample of Moroccan smokers. The questionnaire used to collect data was adapted from an existing tobacco use questionnaire developed by the International Union against Tuberculosis and Lung Disease. The nicotine dependence was assessed using the heaviness of smoking index (HSI) which is a short form of the Fagerstrom tolerance questionnaire. Among 1651 current smokers, 91.0% were men. The average of age was 32.6 years ± 12.3. 56.2% were single and 39.9% were married; 65.6% lived in urban areas, while 20.7% lived in middle-income areas. The average of HSI was 1.97. The nicotine dependence was significantly associated to sex ($p<0.002$) men were at high risk to develop nicotine dependence in comparison with women. It is associated also with early age of smoking initiation ($p<0.005$). The age of smoking onset should be considered in the establishment of laws related to the control of tobacco sale.

Keywords: tobacco dependence, nicotine dependence, the heaviness of smoking index, socioeconomic status.

INTRODUCTION

Tobacco smoking and dependence is a complex syndrome involving physiological, psychological, and behavior process [1]. The evolution of tobacco use is described as an epidemic [2] and the nicotine dependence is responsible of several consequences for public health.

To illustrate more, tobacco smoking kills one person every 6 seconds, and a third to half of people using it on average 15 years prematurely. Moreover, tobacco smoking causes 5 millions of deaths a year, this annual death rate will increase to more than 8 million by 2030 unless urgent action is taken [3]. That said, tobacco smoking remains the most important avoidable cause of premature morbidity and mortality in the world [2].

Smoking behavior is strongly associated with socioeconomic status (SES). Indeed, it has been shown that social class differences in smoking contribute considerably to inequalities in mortality [4]. Nonetheless, the link between socioeconomic status and tobacco cessation is not well explored. In fact, Nicotine dependence, self-efficacy, and intention to quit are strong predictors of tendency to quit [5] but the association between these factors and smoking cessation has been the subject of few investigations [5]. A British study showed that a composite index of social deprivation including criteria such as having manual occupation, not having a car, living in rented housing, being unemployed, and living in crowded conditions was not associated with desire to quit in crude measure (‘‘Would you like to give up smoking altogether?’’) but was associated with dependence (for example, time to the first cigarette, the difficulty of going for a whole day without smoking, and the quantitative measure of smoke intake: plasma cotinine) [5]. To emphasize this association, an earlier study demonstrated the link between a composite index of social disadvantage and concentrations of saliva and plasma cotinine [5].

Actually, smoking behavior change is based on person’s risk awareness and access to information. Thus, the knowledge of the health side effects of

smoking is certainly one of the prerequisites for quitting and should be targeted by prevention programs [4].

The MARTA survey [6], a nationwide population survey, was undertaken to better understand the smoking phenomenon in Morocco. It is the first national survey in Morocco to examine factors related to tobacco use. This research is a part of the MARTA survey, its aim was to determine the association of income level with nicotine dependence and intention to quit.

METHODS

Population

A cross-sectional survey based on a representative sample of the Moroccan population was conducted in 2006 (the MARTA survey). The survey adopted a multistage, stratified probability-sampling design. In the first stage, seven administrative regions containing 43.75% of the total population and representative of the ethnic and sociodemographic characteristics of all of Morocco were drawn. Each region was stratified into urban and rural areas. In each urban area, three socioeconomic levels of residential districts were defined as low, middle, and high income.

In the second stage, residential districts of each socioeconomic category were selected according to the size of the population. In the third stage, all households from residential districts chosen in urban and rural areas were visited. After giving informed consent, individuals aged ≥15 years in the selected household were invited alternately between men, women, and children (aged 15–18 years) to participate in the survey. Subjects aged between 15 and 18 years were interviewed in the absence of their parents. It was estimated that to obtain sufficient numbers of smokers, ex-smokers, and nonsmokers so as to study factors related to each of these groups with an alpha error of 5%, the survey would need to recruit at least 9000 individuals. For the purpose of this study, only current smokers were selected to explore the nicotine dependence.

Data Collection and Variables

The questionnaire was adapted from an existing tobacco use questionnaire developed by the International Union against Tuberculosis and Lung Disease. The questionnaire was translated from French to Arabic dialect; the translation was done by a team who spoke both languages. The questionnaire was pilot tested on a random sample of 500 individuals in the Diagnosis Center of the CHU Hassan II in Fez, and the wording of some of the questions was modified for the survey. The questionnaire was administered face-to-face to one person per household according to inclusion criteria.

Sociodemographic characteristics: age, gender, education, marital status, residency status and income. Family income was reported in Moroccan dirhams (MAD) in these categories: under 1000, 1000–2000, 2000–4000, 4000–6000, and 6000 and over.

Current smoking status: Respondents were asked to report personal smoking status and were classified as current smokers (daily and occasional smokers) if they had smoked more than 100 cigarettes in their lifetime and were smoking at the time of the survey or had stopped smoking for less than 3 months.

Nicotine dependence: assessed using the heaviness of smoking index (HSI) [7], a short form of the Fagerstrom tolerance questionnaire [8]. HSI scores range from 0–6 and are calculated by summing the points for time to first cigarette after waking and number of cigarettes smoked per day. Time to first cigarette is scored: <5 mins = 3 points; 6–30 mins = 2 points; 31–60 mins = 1 point; and >60 mins = 0. Respondents were asked: ‘‘on average, how many cigarettes do you smoke each day, including both factory-made and roll-your own cigarettes?’’ Cigarettes per day is scored: 1–10 = 0 points; 11–20 = 1 point; 21–30 = 2 points; and 31 = 3 points. Higher HSI scores indicate more dependence on nicotine.

Statistical analysis

A p value of<0.05 was considered significant. All the analyses were performed using the Epi-info software (version 3.3.2) elaborated by the United States Centers for Disease Control. An Analysis of Variance was used to compare means of HSI test for nicotine dependence scores according to sociodemographic and other smoking characteristics. In multivariate analysis, a multiple linear regression was performed.

RESULTS

A total of 1 651 current smokers were identified and their nicotine dependence status was studied. In our study, 91.0% of respondents were men. The age of the study population ranged from 15 to 81 years, with a mean (standard deviation) age of 32.6 ± 12.3 years; 56.2% were single, 39.9% were married and 2.2% widowed; 65.6% lived in urban areas, while 20.7% lived in middle-income areas.

Among the males, 81.8% were daily smokers and 18.2% occasional smokers. Among the females, 66.0% were daily smokers. Mean number of cigarettes smoked per day by male daily smokers and occasional smokers were 15.8±8.9 and 6.1±5.3, respectively. Corresponding figures for females were 15.0±9.3 and 6.0±5.5. We report the sociodemographic characteristics in Table1.

Table-1: Socio-demographic characteristics

Variables	**N**	**%**
Age mean (SD*)	32.58(12.30)	
Sex		
Male	1503	91.3
Female	144	8.7
Household Income (MAD)**		
<1000	159	10.1
1000-2000	358	22.7
2000-4000	370	23.5
4000-6000	147	9.3
>6000	234	14.9
Residence area		
Low	373	22.8
Middle	339	20.7
High	345	21.1
Rural	580	35.4
Educational level		
Illiterate	228	14.0
Koranic	100	6.1
Primary	399	24.5
Secondary	554	34.1
High	343	21.1
Marital status		
Single	915	56.2
Married	650	39.9
Separated/divorced	64	3.9
HSI** mean (SD)	2.5(1.27)	
*Standard deviation **Moroccan Dirham ***heaviness of smoking index		

Dependence: HSI

The average HSI score 2.5. Among the males, the daily smokers had a significantly higher HSI score (2.25) than the occasional smokers (0.79) (P <0 .01).

An indicator of nicotine dependence is smoking the first cigarette of the day within 30 min of awakening. This was reported by 47.7% of daily smokers and 14.9% of occasional smokers.

Table-2 shows the results of our ANOVA of mean HSI scores pertaining to respondent sociodemographic and smoking characteristics. HSI scores largely increased with age and tended to vary inversely with education and income. Earlier smoking initiation was associated with higher nicotine dependence. Being male was associated with higher levels of HSI.

Table-2: Analysis of variance of HSI test for nicotine dependence scores for Moroccan population across sociodemographic and other smoking characteristics

	Mean of HSI	***p***
Age		
15-30	1.67	
31-45	2.06	0.001
46-81	2.15	
Sex		0.0004
Male	1.92	
Female	1.47	
Household Income (MAD)		
<1000	2.26	0.001
1000-2000	1.99	
2000-4000	1.88	
4000-6000	1.93	
>6000	1.83	
Residence area		
Urban	2.01	0.74
Rural	1.91	
Educational level		
Illiterate	2.05	0.16
Koranic	1.86	
Primary	1.95	
Secondary	1.81	
High	1.79	
Marital status		
Single	1.75	0.001
Married	2.05	
Separated/divorced	2.11	

In simple linear regression, the age at smoking initiation had significant association with the HSI average score (Table 3). In multiple linear regression, only the age at smoking initiation and the sex were statistically associated with nicotine dependence (Table 4). Nicotine dependence was higher in men than women (p<0.002), the HSI increases as age of smoking initiation decreases (p<0.013).

Table-3: Association between Age and Heaviness of smoking index (HSI): Simple Linear Regression

	Coefficient β	**95.0% Confidence Interval**		***p* value**
Age at initiation	-0.027	-0.047	-0.008	0.006

Table-4: Risk factors for nicotine dependence (Multiple Linear Regression*)

	Standard β**	*P* value
Age at initiation	-0.025	0.013
Female gender	-0.485	0.002

*After adjusting on age, household income and marital status

**Regression coefficient

DISCUSSION

The present study focuses on the determination of factors leading to nicotine dependence, using data from a population-based study conducted in Morocco.

The results of this study suggested that nicotine dependence was associated to both gender and age of smoking initiation. Being men as well as early smoking initiation were risk factors for nicotine dependence.

Nicotine dependence was assessed with HSI, a small version of FTND which is a good measure of physical and psychological nicotine dependence [9].

In our study, 91.3% of smokers were men; sex was strongly associated to nicotine dependence (p=0.002). The possible explanation of this observation is that, in the Moroccan context, it is known that men smoke more frequently than women. In the majority of cases, women are occasional smokers and given our culture, they don't feel comfortable with smoking in public area as men are. The average score of the item related to the time to the first cigarette after waking is higher in men as they are morning smokers, not as women who don't necessarily need the cigarette of morning and smoke occasionally.

This funding does not match with other studies. This might be explained by the fact that in non-Muslim countries, where they were conducted, the context is widely different than Morocco. To illustrate, the custom of smoking in these countries is common for both men and women. Indeed, the situation is changing in Muslim countries in the sense that we see young women smoking increasingly. But still we have men representing the majority of smokers [10–13].

In addition to the observed sex-associated patterns, the present study showed that early smoking initiation is significant risk factor for nicotine dependence. Actually, previous epidemiological studies have revealed the strong association between early smoking initiation and nicotine dependence [14-16].

Individuals who started smoking at an early age tend to have greater physical dependence on nicotine. Previous studies have demonstrated a significant association between nicotine dependence score and cotinine levels [8].

Hence, the biological accumulation of nicotine over time may substantially lead to physical dependence which increases as age of smoking initiation decreases [8, 17, 18].

Strengths and limitations:

The major strengths of this study were that the sample of smokers was representative of the Moroccan population and its size was large.

However, some limitations should be considered in discussing the findings of this study; the information on tobacco use was self-reported and not based on bio-chemical validation. Consequently, there might be a reporting bias in our study. Similarly, the responses to the items of the HSI could be biased since there are based on estimations and self, for example, the number of cigarettes smoked per day.

Additionally, even though a significant association between sex as well as age of smoking initiation and nicotine dependence was notified, the relationship between these factors could not be considered as causal since cross sectional data were used to obtain the results.

CONCLUSION

With the evidences from our findings and other studies about the relation between age of smoking initiation and nicotine dependence. Our study supports the public health significance of delaying smoking onset. The sale of cigarettes should be controlled and reduced not only for adolescents but also for young adults.

REFERENCES

1. Shadel WG, Shiffman S, Niaura R, Nichter M, Abrams DB. Current models of nicotine dependence: what is known and what is needed to advance understanding of tobacco etiology among youth. Drug Alcohol Depend. 2000 May 1;59 Suppl 1:S9-22.
2. mpower_report_full_2008.pdf [Internet]. [cited 2016 Jul 4]. Available from: http://www.who.int/tobacco/mpower/mpower_report_full_2008.pdf
3. mpower_report_tobacco_crisis_2008.pdf [Internet]. [cited 2016 Jul 4]. Available from: http://www.who.int/tobacco/mpower/mpower_report_tobacco_crisis_2008.pdf
4. Siahpush M, McNeill A, Hammond D, Fong GT. Socioeconomic and country variations in knowledge of health risks of tobacco smoking and toxic constituents of smoke: results from the 2002 International Tobacco Control (ITC) Four Country Survey. Tob Control. 2006 Jun;15 Suppl 3:iii65-70.
5. Siahpush M, McNeill A, Borland R, Fong GT. Socioeconomic variations in nicotine dependence, self-efficacy, and intention to quit across four countries: findings from the International Tobacco Control (ITC) Four Country Survey. Tob Control. 2006 Jun;15 Suppl 3:iii71-75.
6. Berraho M, Serhier Z, Tachfouti N, Elfakir S, El Rhazi K, Slama K. Burden of smoking in Moroccan rural areas. East Mediterr Health J Rev Santé Méditerranée Orient Al-Majallah Al-Ṣiḥḥīyah Li-Sharq Al-Mutawassiṭ. 2010 Jun;16(6):677–83.
7. Borland R, Yong HH, O'Connor RJ, Hyland A, Thompson ME. The reliability and predictive validity of the Heaviness of Smoking Index and its two components: findings from the International Tobacco Control Four Country study. Nicotine Tob Res Off J Soc Res Nicotine Tob. 2010 Oct;12 Suppl:S45-50.
8. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström Test for Nicotine Dependence: a revision of the Fagerström

Tolerance Questionnaire. Br J Addict. 1991 Sep;86(9):1119–27.
9. Dijkstra A, Tromp D. Is the FTND a measure of physical as well as psychological tobacco dependence? J Subst Abuse Treat. 2002 Dec;23(4):367–74.
10. Park SM, Son KY, Lee YJ, Lee H-CS, Kang JH, Lee YJ. A preliminary investigation of early smoking initiation and nicotine dependence in Korean adults. Drug Alcohol Depend. 2004 May 10;74(2):197–203.
11. Hu MC, Davies M, Kandel DB. Epidemiology and correlates of daily smoking and nicotine dependence among young adults in the United States. Am J Public Health. 2006 Feb; 96(2):299–308.
12. Torchalla I, Strehlau V, Okoli CTC, Li K, Schuetz C, Krausz M. Smoking and predictors of nicotine dependence in a homeless population. Nicotine Tob Res Off J Soc Res Nicotine Tob. 2011 Oct; 13(10):934–42.
13. Schmidt A, Neumann M, Wirtz M, Ernstmann N, Staratschek-Jox A, Stoelben E. The influence of occupational stress factors on the nicotine dependence: a cross sectional study. Tob Induc Dis. 2010;8(1):6.
14. Kandel DB, Chen K. Extent of smoking and nicotine dependence in the United States: 1991-1993. Nicotine Tob Res Off J Soc Res Nicotine Tob. 2000 Aug;2(3):263–74.
15. Park S, Lee JY, Song TM, Cho SI. Age-associated changes in nicotine dependence. Public Health. 2012 Jun; 126(6):482–9.
16. Yang T, Shiffman S, Rockett IRH, Cui X, Cao R. Nicotine dependence among Chinese city dwellers: a population-based cross-sectional study. Nicotine Tob Res off J Soc Res Nicotine Tob. 2011 Jul;13(7):556–64.
17. Payne TJ, Smith PO, McCracken LM, McSherry WC, Antony MM. Assessing nicotine dependence: a comparison of the Fagerström Tolerance Questionnaire (FTQ) with the Fagerström Test for Nicotine Dependence (FTND) in a clinical sample. Addict Behav. 1994 Jun;19(3):307–17.
18. Pomerleau CS, Carton SM, Lutzke ML, Flessland KA, Pomerleau OF. Reliability of the Fagerstrom Tolerance Questionnaire and the Fagerstrom Test for Nicotine Dependence. Addict Behav. 1994 Feb;19(1):33–9.