Correlation between the Age of Smoking Initiation and Maintaining Continuous Abstinence for 5 Years After Quitting

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Abstract- Many factors affect tobacco quit rate. In this study we investigated the abstinence rate after 5 years based on the age of smoking initiation. This pre-post field trial study was conducted on 398 smokers who participated voluntarily in a smoking cessation clinic in 2005. They were followed for 5 years and their success or failure in continuous abstinence was evaluated and recorded in 2010. Three hundred and five participants (76.6%) succeeded at the end of the course. Follow up at the end of 2010 revealed that 111 (27.8%) cases were still maintaining their continuous abstinence after 5 years including 64 men and 47 women. The mean age of smoking initiation in successful and failed subjects was 21.9 and 20.7 years respectively. The age of smoking initiation could be a predictor of maintaining abstinence in the future. Starting smoking at an earlier age could have a negative effect on long-term abstinence.

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Introduction

Smoking is fatal since it is known as the risk factor for 8 main causes of mortality in the world (1). World-wide, tobacco causes approximately 1 in 10 deaths, and by 2030 this figure is expected to rise to 1 in 6, or 10 million deaths each year (2). Based on the latest reports, 15% of the Iranian populations are smokers (27.2% of males and 1% of females). Annually, 150 thousand deaths occur due to smoking (3). Smoking cessation, at any age, can result in health benefits such as decreasing the risk of stroke, cardiovascular diseases and smoking related cancers (4). Smoking cessation results depends on many factors. To develop successful smoking cessation interventions, it is important to understand predictors of smoking cessation.

Many studies evaluated the predicting factors on success and failure rate in smoking cessation programs (5,6). Results of a study showed older people, married persons and people with a medium or high socioeconomic status have higher odds for quitting, both for men and women and the age people started to smoke was inversely related with smoking cessation in women (7).

Twenty-five percent of teens who smoke daily will have nicotine dependence in their adulthood (8).

The age at which adolescents start smoking will affect their health in older ages. Early onset of smoking during elementary school ages increases the chance of adulthood smoking (9). Those started smoking at 16 years of age or less are two times more at risk of never quitting smoking in comparison with those who start later (10). In addition, nicotine addiction is more severe among those who start smoking earlier (11). The age of smoking onset has an inverse relationship with the number of days that a person smokes and the number of cigarettes consumed (12). Even evidence showed that the teens who smoke are more likely to be involved with illegal drugs and alcohol consumption, and deviant behaviors (13).

Some smokers although successfully quit but relapse after a while. Several factors are involved in decreasing

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the success rate of quitting and continuous abstinence. Knowledge about the causes of relapse and various motivations that make the smokers start smoking again can be beneficial in correcting the mistakes and increasing the efficacy of current smoking cessation programs. The correlation of tobacco consumption with demographic and cultural characteristics has been confirmed (14,15). This study aimed at evaluating the correlation between age of smoking initiation and continuous abstinence after quitting.

Materials and Methods

This pre-post field trial study was conducted on 398 smokers who attended the smoking cessation clinic of the Iranian Anti-Tobacco Association in 2005. These people had presented voluntarily to this clinic with the aim of stopping smoking and participated in a one-month course. Every course consists of 6 sessions. Combination therapy (pharmacological and behavioral therapy) was used to help them stop smoking. In the first session demographic information was collected by use a questionnaire and the level of nicotine dependency was mainly measured by standard Fagerstrom test (FT), which includes six questions. Answers were ranked from 0 to 10 points. Zero is given to the one who has no dependence, while 10 indicates to the highest level of nicotine dependence (16).

Besides, smoking status such as number of daily cigarette consumption, duration of cigarette smoking, previous quit attempts, hookah experience and history of drug addiction was obtained by using a self administrative questionnaire.

Table 1. Demographic characteristics of subjects.

Demographic characteristics	No	%
Marital status		
Married	282	72.1
Single	109	27.9
Occupation		
Businessman	144	365
Employee	78	19.8
Housewife	75	19
Retired	43	10.9
Student	18	4.6
Unemployed	18	4.6
Education status		
High school diploma	175	44
Higher than high school diploma	158	39.7
Below high school diploma	60	15.1

They stopped smoking completely from the 3rd session by using nicotine gum and behavioral therapy under supervision of trained physician. It was based on self report and was confirmed by measuring their expiratory carbon monoxide rate. Successful Participants (participants who stopped smoking completely from quit date until last session) were then followed continuously for 5 years by telephone and their success or failure in maintaining their continuous abstinence was evaluated. Success means continuing not smoking even one puff after quit date during 5 years fallow up. Demographic characteristics of subjects and variables such as age of smoking initiation that were presumed to have a role in abstinence were examined.

Participants were asked to sign a consent form, and the study protocol was approved by the ethical committee of Shahid Beheshti University of Medical Sciences.

Statistical analysis

SPSS software was used. Quantitative variables were recorded as mean and qualitative variables as percentage; t-test was used to evaluate the correlation between age, age of starting smoking and mean degree of nicotine dependence (FT), and abstinence or smoking rate after 5 years. Chi-square test was used to evaluate correlation between number of daily cigarette smoking and abstinence after 5 years. Logistic regression was used to evaluate the joint relationship of all the variables considered to have an impact on smoking cessation. $P<0.05$ was considered statistically significant.

Results

Overall, 398 individuals were studied out of which 231 (58%) were men and 167 (42%) were women. Demographic characteristics of subjects are shown in Table 1. Mean FT score was 5.6±2.3. The mean age of starting smoking was 21.06±5.3 yrs. A total of 76.6% of subjects including 172 males (74% of men) and 133 females (79% of women) succeeded at the end of the course which means they did not smoke even one puff after the quit date. Evaluation and follow up at the end of 2010 revealed that 111 (27.5%) subjects were still maintaining their continuous abstinence after 5 years [64 (27%) men and 47 (28%) women].

The mean FT score for successful and unsuccessful cases was 5.68±2.45 and 5.61±2.27, respectively ($P=0.7$).

The mean age of smoking initiation was 22.3±6 in females and 20±4.4 in males ($P<0.001$).

Table 2: Continuation of abstinence after 5 years based on the number of cigarettes smoked daily.

Outcome after 5 years	Daily smoking			
	<10	11-20	21-30	>30
Unsuccessful	57-19.9%	124- 43.4%	76-26.6%	29-10.1
successful	23- 20.7%	51-45.9%	26-23.4%	11-9.9%

P=0.9, No statistical correlation was found between the number of cigarettes smoked daily and abstinence after 5 years.

Table 3. Logistic regression analysis.

Variables in the Equation		B	S.E.	Wald	df	*P*-value	Exp(B)
Step 1[a]	Sex (1)	-.099	0.242	0.169	1	0.681	0.905
	Marriage (1)	-0.206	0.265	0.606	1	0.436	0.814
	Education (3)	0.301	0.253	1.411	1	0.235	1.351
	Age_Start_Smoking	0.045	0.021	4.365	1	0.037	1.046
	FT	0.023	0.049	.216	1	0.642	1.023
	Constant	-2.082	0.596	12.187	1	0.000	0.125

a. Variable(s) entered on step 1: Sex, Marriage, Education, Age_Start_Smoking, FT (Fagerstrom test score).

Abbreviations: B, beta regression coefficient; SE, Standard Error; Wald, test statistics used for the determination of the meaning of variables; Significant; Exp(B), exponent; C.I.: Confidence Interval

Age of smoking initiation in those who continued their abstinence after 5 years was 21.9±5.3. This rate was 20.7±5.3 in failed cases (*P*=0.04).

The number of daily cigarettes according to cessation results after 5 years is shows in Table 2.

Discussion

According to our findings prevalence of successful abstinence was higher in those who started smoking at an older age. It means that there was a significant correlation between the age of smoking initiation and continued abstinence after 5 years. There was no significant correlation between long term abstinence and sex, marital status, number of cigarettes smoked per day and history of quit. Many studies have evaluated factors associated with successful smoking cessation. Age of starting smoking was recognized as a factor that played a role in the outcome of quit in some studies (10,15,17-19).

This study showed that by one-year increase in age of smoking initiation, success rate of quitting rises up to 5 percent. No significant correlation was observed between other factors like gender, age and number of daily cigarettes smoked, and success rate of cessation after 5 years.

Flores Mateo *et al.* showed that younger age of smoking onset predicts higher rates of relapse in a smoking cessation program. In their study, low motivation and high nicotine dependence were significant factors affecting relapse during the first year (17). Our study is different from other studies in this respect since we followed up our cases for 5 years and all of our subjects were ready to stop smoking. This study showed that age of smoking initiation can be correlated with successful long term abstinence. It seems that initiation of smoking at younger ages causes high nicotine dependence, which in turn results in continuation of smoking and makes it harder for the smoker to quit successfully.

Various factors play a role in successful abstinence and relapse in smokers who quit smoking. By increasing the number of cigarettes smoked per day success rate of quitting decreased. However, a significant correlation was not observed between the numbers of cigarettes smoked per day and successful quitting after 5 years.

Broms *et al*. revealed that starting smoking at an older age, smoking a small number of cigarettes per day, and a low level of nicotine per cigarette predicted cessation (18).

Khuder *et al.* showed that age at initiation of smoking was a significant factor for continuation of smoking and subjects who started smoking before 16

years of age had an odds ratio of 2.1 (95%, CI: 1.4–3.0) for not quitting smoking compared to those who started at an older age (10).

Boutou *et al.* could not find a significant correlation between age of smoking onset and probability of quitting (20). It shows that age of smoking onset is not always an influencing factor and may sometimes have no impact on the process of cessation and abstinence. However, our study design is different from the mentioned researches since we evaluated the smokers who attended the smoking cessation clinic.

Another important finding in our study was abstinence rate after 5 years (27.8%) which was considerable. Hymowitz *et al*. reported 20.3% cessation rate during the first 12 months after quit date (21). Owing to results, age of starting smoking in women was significantly higher than in men, but long term-quit rate was not different among them. It seems that other factors may have an influence on smoking cessation in females and further investigations are required in this respect.

Limitations of the study

Subjects voluntarily attended the smoking cessation clinic courses; therefore, they were already motivated to stop smoking. A similar study has to be done on all smokers regardless of their motivation for quitting smoking. In addition, according to the type of study we could not confirm a causative association between age of smoking initiation and quit rate and abstinence. In conclusion, starting smoking at older age could be associated with successful quit attempts and holding on to abstinence in the future. This emphasizes the importance of age of smoking onset. Further investigations are required in this respect but emphasizing on prevention programs targeted to children below 16 years of age should be an important priority in tobacco control programs.

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