

The Relationship between Health Literacy and Stages of Change in Smoking Behavior among Employees of Educational Health Centers of Tabriz University of Medical Sciences (2016)

Abstract

Background: Health literacy has been considered as a predictor of starting, maintaining, and stop smoking. However, such relations have not been well documented in previous texts. Therefore, the purpose of this study was to investigate the relation between health literacy and changes in the behavior of smoking in Tabriz University of Medical Sciences. **Methods:** In this correlational descriptive study, a total of 297 employees of Tabriz health centers were examined. To collect data, a demographic-social questionnaire, Iranian Health Literacy Questionnaire, and DiClemente's behavior change questionnaire were used. Besides, SPSS 13 software (significance level = 0.05) was employed to analyze the data. **Results:** The average health literacy rate of participants was 70, and most respondents had adequate health literacy. Nearly 41.1% were in the precontemplation phase which is one of the stages of behavior change. There was a positive and significant statistical relation between behavior change variable with all health literacy areas (except the scope of understanding) and total health literacy score ($P = 0.011$ and $r = 0.147$). The results of ordinal regression analysis demonstrated that there is a significant positive relationship between the score of health literacy and behavioral change ($b = 0.019$, 95% confidence interval = (0.010–0.029), $P < 0.001$). **Conclusions:** Improving the level of health literacy can lead to change people's behavior in relation to tobacco consumption. However, due to the lack of relevant texts, there is a need for further studies in this field.

Keywords: Health literacy, smoking, stages of change, transtheoretical model

Introduction

Tobacco consumption has been the most important cause of preventable death at the international level^[1] and it is also considered as one of the most important factors in increasing the overall burden of diseases.^[2] According to the World Health Organization, it is estimated that in 2010, about 12% of Iranian total population (22% of men and 1% of women) were smokers.^[3] In previous texts, several predictive factors have been identified about starting, maintaining, and stop smoking which include relaxation and pleasure of smoking,^[4] nicotine dependence, inappropriate family and social substrate,^[5] smoking friends,^[6] knowledge and understanding about the health risks of smoking,^[7] and self-efficacy.^[8] In addition, health literacy has been introduced as an effective factor in smoking tendency or stopping it.^[9]

Health literacy is a relatively new concept in health promotion^[10] and it is defined

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as the capacity to acquire, process, and understand the basic information and services required for appropriate decisions in the field of health.^[11] Low health literacy is not the only problem for patients and it is also an important challenge for health service providers.^[12]

Although the role of health literacy has not been studied well so far, it is specified that the desire to participate and do harmful behaviors are higher among people with low health literacy.^[13] They also have a low level of awareness about diseases,^[13] little desire to participate in cancer screening^[13] and less information on health promotion behaviors.^[14] It is also noted that low health literacy can have a negative effect on patient's motivation,^[15] problem-solving skills,^[16] self-efficacy, or knowledge^[17] required to perform self-care behaviors.

Regarding the impact of health literacy on the prevention of harmful health

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behaviors^[13] and the promotion of health behaviors,^[14] as well as to cope with the adverse effects of smoking, it is necessary to change the behavior of smokers, so this topic has been investigated by various models. The most practical model for the behavior change and stage model of behavior change is Prochaska and DiClemente transtheoretical model which has been successfully used in many health behaviors such as stop smoking, stopping cocaine, and weight control.^[18] According to this model, behavior change is a gradual process^[19] that people pass through a set of steps to change behavior which includes these steps: precontemplation, contemplation, preparation, action, and continued maintenance.^[20] Studies have used this model to predict the stages of people's success in giving up smoking show that people who are at the stage of contemplation and preparation are more likely to succeed in giving up smoking than those in the precontemplation stage.^[20]

Since human resources are one of the largest sources of funds and capital of each organization, unhealthy behaviors such as smoking in these people leads to waste financial resources and reduce the organizational productivity due to increased costs of treatment, absenteeism, and loss of workforce.^[21] In addition, this problem is important in health organizations due to their pattern role in health behaviors.^[22] In addition, according to the American Nurses Association and the International Council of Nurses, nurses as health-care providers, have extraordinary potential for smoking cessation interventions aimed at help to stop smoking, prevention of smoking, and promote strategies to reduce the exposure of nonsmokers exposed to cigarette.^[23] Hence, given the consequences of smoking in society and organizations and the importance of prevention and behavior change in smoking and the role of nurses in the health system, the aim of this study was to determine the relation between health literacy and change in the behavior of cigarette smoking among the staffs of Tabriz University of Medical Sciences.

Methods

This descriptive-correlation study was conducted among the staffs in educational and therapeutic centers of Tabriz in the year 2016. The statistical population was all the employees in educational and medical centers of Tabriz. Inclusion criteria included smoking history (Average daily consumption was at least one cigarette) and being employed in hospitals of Tabriz. The multistage cluster sampling method was used due to the size of the statistical population. In this regard, at first, 11 hospitals were randomly selected from 33 public and private hospitals, and in the second stage, various units of selected hospitals are classified into five domains, including service unit, therapeutic unit, administrative unit, education unit, and management unit. In the third stage, given the lack of a clear statistical population of smokers in these hospitals, sampling was done as an available sample among the

employees in each of these centers. The minimum sample size was calculated 191 people based on the lowest correlation between health literacy variables, steps to change the behavior of smoking ($r = 0.15$) and with a 95% confidence level, 80% test power, two sequences test and using the G-Power software. Then, according to the multistage sampling plan and determining the effect of the project, one-fifth of the minimum required sample size was estimated at 287 items. In this study, change in smoking behavior was examined as dependent variable and health literacy score as independent variable. For data collection, a self-made demographic-social questionnaire, the standardized Iranian Health Literacy Questionnaire,^[24] and Prochaska and DiClemente's Stages of Change Model Questionnaire^[25] were used. The health literacy questionnaire has 33 items in five access domains (6 items), reading skills (4 items), understanding (7 items), evaluation (7 items) and decision-making and use of health information (12 items).^[24] The scores ranging between 0 and 59, 60–74, and 75–100 were assumed to represent, respectively, inadequate, borderline, and adequate.^[26] The Prochaska and DiClemente's Stages of Change questionnaire has five items which determines each step of behavior change that precontemplation, contemplation, preparation, action, and maintenance.^[25] In this study, to use this questionnaire, the English version of the questionnaire was translated and reverse translated by two experts of English literature. Then, the validity of the questionnaire was verified by ten faculty members of Tabriz University of Medical Sciences and some slight changes were made according to the comments of these experts. Then, the reliability of the questionnaire was calculated 0.86 using internal correlation and Cronbach's alpha coefficient after conducting a guideline study on 30 persons with eligible criteria for study. To collect data, the study was first approved by the Regional Committee of Ethics in Research of Tabriz University of Medical Sciences. Then, sampling permission was obtained from the management of the centers where sampling was performed. The researchers referred to the centers during the study and identified the employees were eligible for study and they provided them with the necessary information about the study. Conscious written consents were taken from all of the participants based on the Ethics Committee's instructions. The data collection process for participants with low literacy was completed by private interviewing.

Statistical analysis of the data was performed using SPSS 13 software (SPSS inc, IL, Chicago, USA). The percentage was used to describe qualitative variables from abundance and mean and standard deviation were used to describe quantitative variables. Normality of quantitative variables was investigated by K-S test. The study of the individual relation between behavioral change and health literacy variables was performed through Pearson correlation

analysis. Linear regression analysis was conducted for behavior change variables and health literacy scores and modeling was done for the present study. The significance level was considered to be 0.05 in all tests.

Results

Some of the demographic characteristics associated with study participants are shown in [Table 1]. As seen in the table, most of the participants were male, married, and with high school education, and their jobs were related to health. Most participants had a history of more than 20 years of smoking, and they had experienced their first smoking in the age-span of 16–20 years. The average number of cigarettes smoked per day varied from 11 to 15. The majority of participants (36%) had not tried to stop smoking in the past year.

Health literacy scores of study participants with respect to the five abovementioned domains are given in [Table 2]. The results indicates that the mean score of health literacy was 70 in the study population (standard deviation = ± 23). While 25.6% of respondents had inadequate health literacy, 20.9% had adequate health literacy, and 53.5% were in the borderline level. In terms of the change process, as viewed based on the transtheoretical model, most of the participants (41.1%) were in the precontemplation stage.

In addition, due to the nonnormality of variables, we used Spearman's test to assess the correlation between health literacy and stages of changing smoking behavior. Spearman correlation is the method used to test between behavioral change (categorical variable) and health literacy score (continuous variable) base on consultation with the study statistician.^[27] Accordingly, it was found that there is a significant positive relationship between the variable of behavioral change and all areas of health literacy (other than the domain of understanding) as well as the total score of health literacy [Table 3].

In addition, the results of regression analysis show that before adjusting the variables, there is a significant and positive correlation between change in behavior with health literacy variable and some demographic variables such as gender, education, job type, duration of smoking, the age of smoking, and the number of attempts to give up smoking with stages of behavior change. While after adjusting the demographic and background variables, there was only a positive and significant relation between the level of education and the total score of health literacy with the stages of change [Table 4].

Discussion

In this study, the relation between health literacy and stages of behavior change in cigarette smoking were studied. The results showed that there is a positive and significant relation between behavioral change and health literacy.

Table 1: Some of the sociodemographic characteristics of the employees of health centers of Tabriz University of Medical Sciences

Variable	Groups	Frequency (%)
Gender	Male	294 (98.99)
	Female	3 (1.01)
Age group	38 and below	113 (38.04)
	39-44	91 (30.63)
	45 and above	93 (31.33)
Education	Illiterate	18 (6.4)
	Primary school	43 (14.4)
	Secondary school	29 (9.4)
	High school	90 (30.5)
	Associate degree	28 (9.2)
	Bachelor degree	53 (17.6)
Profession	Higher degrees	36 (12.5)
	Servicing	86 (28.45)
	Treatment	120 (40.40)
	Administrative	58 (19.05)
	Educational	15 (5.1)
Marital status	Managerial	18 (6.1)
	Married	266 (89.6)
Smoking history (years)	Single/widowed/divorced	31 (10.4)
	<5	35 (11.78)
	6-10	53 (17.84)
	11-15	70 (23.56)
	16-20	67 (22.58)
Age of smoking onset (years)	>20	72 (24.24)
	<15	38 (12.80)
	16-20	98 (33.00)
	21-25	79 (26.60)
	26-30	57 (19.19)
The number of cigarettes smoked per day in the past month	>30	25 (8.41)
	0 or 1	45 (15.16)
	1-5	32 (10.77)
	6-10	61 (20.54)
	11-15	88 (29.63)
The number of attempts to quit smoking in the past year	>20	71 (23.90)
	Never	107 (36.02)
	Once	86 (28.95)
	Twice	74 (24.92)
Stage of behavioral change	3 times or more	30 (10.11)
	Maintenance	20 (6.73)
	Action	20 (6.73)
	Preparation	35 (11.78)
	Contemplation	100 (33.66)
	Precontemplation	122 (41.1)

One of the important findings of this study was that 54% of the participants had satisfactory health literacy. In this field, studies have been conducted in different countries. Results of the National Census of American Health Literacy showed that 36% of adults in the United States had not sufficient health literacy.^[28] In addition, a study in eight different European countries showed that <12% of the

participants had inappropriate health literacy and about 47% of respondents had limited (inappropriate and problematic) health literacy.^[29] In addition, in a study conducted in England and Japan, respectively 11.4 and 15.5% of the participants had low health literacy.^[30,31] In this regard, studies have also shown that health literacy is inadequate and borderline in Iran.^[32-35] The reason for the difference in the results of this study and the previous foreign and domestic studies is that most of the participants in the study were health care staff or they were working at medical institutions which are effective on the findings of the study.

In addition, the results of this study showed that in terms of the stages of behavior change 41% of the participants in the study are in the precontemplation stage. That means they have not decided yet to give up smoking or stop smoking in the coming months and only 12% of participants were in the action-continuity and maintenance phases. A study results in Turkey showed that 56.3% of participants were in the precontemplation stage and 3.8% of the samples were in the action phase.^[36] Gunes *et al.* observed that 31%, 9.3%, and 0% of the study population were in the precontemplation, maintenance, and action stages, respectively.^[37] In addition, in a study in the United States, the majority of participants of the study were in the thinking phase and least people were at preparation and action stages.^[38] Furthermore, in Iran, a study results showed that 50% of participants were in the precontemplation stage,^[39] and in another study, 39% of participants were in the precontemplation stage and 5.5% were in action stage.^[40] In addition, the results of this study are in line with the results of Tawafiyani^[39] and Pickett and Bains^[41] and Hassani's *et al.* studies^[42] for the majority of contributors in the contemplation stage.

In addition, the results of the study showed that there is a positive and significant relation between health

literacy (except understanding scope) and the stages of behavior change in smoking and the overall health literacy score increased by changing the smoking behavior from the precontemplation stage to the maintenance stage. Therefore, the health literacy score of people who are at the stages of continuity and maintenance is higher than those who are at precontemplation level. Behavior change, especially the change in the behavior of smoking, is a gradual process rather than a momentary and immediate change.^[19] When moving to any decision, they evaluate the good aspects and its benefits and the less good aspects and its barriers to behavior for making changes in people's cognitive skills and then they change their behavior.^[25] Health literacy helps people gaining, processing, and understanding health information and after that, they get good health decisions.^[11] While the relation between low health literacy, unhealthy behaviors, and poor health outcomes has already been documented.^[13]

Few studies have examined the potential relation between smoking and health literacy. For example, the results of Baker *et al.*^[43] and Berkman *et al.*^[13] studies showed that among those who have low health literacy, willingness to participate, and behaviors deleterious such as smoking are more. In addition, these people have less information about health promotion behaviors and they are more likely to smoke.^[14] In addition, the results of Stewart *et al.* studies showed that health literacy has a significant relation with the prevalence and stop smoking. Hence, it seems that health literacy can independently act as a known predictor of smoking cessation. In addition, the results of this study showed that less health literacy is associated with low knowledge about dangers of smoking on health and low-risk perception among smokers.^[9] Another study showed that there was no relation between health literacy and smoking status among low-income pregnant women. However, this study showed that low health literacy is associated with lower knowledge about dangers of smoking and less negative attitudes toward smoking.^[44]

Sudore *et al.*^[45] reported that older people with lower health literacy more like being approved and supported about current status of their smoking; however, Baker *et al.*^[46] did not found any relation between the various samples in the elderly. In the study of Varekojis *et al.* in the United States, the results showed that there was no meaningful relation between health literacy and smoking cessation results among participants in the study.^[47] It is

Table 2: Levels of health literacy score among the staff of educational health centers of Tabriz University of Medical Sciences (out of 100)

Level of health literacy	Mean±SD	Maximum score	Minimum score
Availability	71±30	100	0
Reading skill	65±32	100	0
Understanding	75±28	100	0
Assessment	67±32	100	0
Decision-making	70±20	100	15
Information application	70±17	100	0
Total	70±23	100	9.85

SD=Standard deviation

Table 3: Analyzing the correlation between health literacy variable and domains of behavioral change

BC	HL						
	Availability	Reading skill	Understanding	Assessment	Decision-making	Information application	Total score of health literacy
R	0.122	0.147	-0.100	0.145	0.130	0.170	0.147
P	0.035	0.011	0.087	0.012	0.025	0.003	0.011

HL=Health literacy, BC=Behavioral change

Table 4: Results of ordinal regression analysis of behavioral change with health literacy and background variables

Covariates	Unadjusted estimates			Adjusted estimates ^s				
	B	95% CI		P	B	95% CI		P
		Lower bound	Upper bound			Lower bound	Upper bound	
Sex								
Male	-3.024	-5.255	-0.794	0.008	-2.192	-5.455	1.071	0.188
Female	Referent	-	-	-	Referent	-	-	-
Age category (years)								
38 and below	0.711	0.194	1.228	0.007	0.290	-0.630	1.209	0.537
39-44	0.701	0.159	1.244	0.011	0.050	-0.776	0.876	0.905
45 and above	Referent	-	-	-	Referent	-	-	-
Education								
Illiterate	-0.175	-1.296	0.946	0.760	1.733	-0.357	3.823	0.104
Primary school	-0.447	-1.340	0.447	0.327	1.363	-0.465	3.191	0.144
Secondary school	0.916	-0.006	1.838	0.052	1.381	-0.236	2.998	0.094
High school	1.023	0.280	1.767	0.007	1.600	0.358	2.843	0.012
Associate degree	1.085	0.156	2.014	0.022	1.701	0.352	3.050	0.013
Bachelor degree	1.224	0.417	2.032	0.003	1.098	-0.072	2.269	0.066
Higher degrees	Referent	-	-	-	Referent	-	-	-
Profession								
Servicing	0.409	-0.735	1.553	0.483	-0.488	-2.278	1.303	0.593
Treatment	1.332	0.214	2.451	0.020	-0.090	-1.647	1.467	0.910
Administrative	1.725	0.554	2.895	0.004	0.322	-1.325	1.968	0.702
Educational	2.403	1.040	3.765	0.001	0.700	-1.025	2.425	0.426
Managerial	Referent	-	-	-	Referent	-	-	-
Marital status								
Married	0.112	-0.574	0.799	0.749	-1.244	-3.457	0.969	0.271
Single/widowed/divorced	Referent	-	-	-	Referent	-	-	-
Smoking history (years)								
<5	1.548	0.768	2.329	<0.001	0.597	-0.772	1.967	0.393
6-10	1.572	0.874	2.270	<0.001	0.821	-0.374	2.016	0.178
11-15	1.475	0.820	2.129	<0.001	0.410	-0.625	1.444	0.438
16-20	1.247	0.587	1.907	<0.001	-0.467	-1.411	0.477	0.333
>20	Referent	-	-	-	Referent	-	-	-
Age of smoking onset (years)								
<15	-1.294	-2.245	-0.342	0.008	-0.255	-1.679	1.169	0.725
16-20	-0.870	-1.673	-0.067	0.034	-0.057	-1.292	1.178	0.928
21-25	-0.108	-0.919	0.703	0.794	0.676	-0.544	1.896	0.277
26-30	-0.336	-1.187	0.515	0.438	-0.274	-1.401	0.853	0.634
>30	Referent	-	-	-	Referent	-	-	-
The number of attempts to quit smoking in the past year								
Never	-0.653	-1.422	0.117	0.096	-0.830	-1.822	0.162	0.101
Once	0.762	-0.011	1.535	0.053	0.177	-0.793	1.148	0.720
Twice	0.928	0.139	1.717	0.021	0.333	-0.650	1.315	0.507
3 times or more	Referent	-	-	-	Referent	-	-	-
Health literacy score	0.019	0.010	0.029	<0.001	0.018	0.127	-0.005	0.042

^sAdjusted for sex, age. CI=Confidence interval

noteworthy that in this study, the sample size is small and most of the participants had a good education and good health.

In general, it should be noted that given the overview of the extensive texts done with the selected keywords, a similar study about investigating the relation between health literacy and the stages of behavior change was not

found. Therefore, it is not possible to directly compare the results of this study with other studies.

This study had limitations. Sampling was made after selecting hospitals available as a sample and through the introduction of smokers' partners because the statistical population of the smokers was not available. In addition, due to some considerations, individuals may not say any

information about tobacco use. At the end, the low number of women consuming cigarettes has caused to be difficult to make a relation between health literacy and their smoking changes. Therefore, it is recommended that studies should be conducted with better methods of sampling and collecting data as well as studies in relation to women.

Conclusions

The results of this study showed that a high percentage of participants were in the precontemplation phase to give up smoking and they had adequate health literacy. In addition, the results show that there is a significant and positive relation between health literacy and the stages of behavior change. Therefore, by improving health literacy, people can be helped to change their behavior from precontemplation stage to the continuation and maintenance stages. Of course, the confirmation of these results requires further studies due to the lack of texts.

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Conflicts of interest

There are no conflicts of interest.

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