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The effect of transtheoretical model-based individual counseling, training, and a 6-month follow-up on smoking cessation in adult women: a randomized controlled trial*

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Background/aim: This study was conducted to determine the effect of transtheoretical model (TTM)-based individual counseling, training, and a 6-month follow-up on smoking cessation in adult women.

Materials and methods: We carried out this randomized controlled trial in Konya, Turkey. Female subjects were randomly assigned into groups in a 1:1 ratio using block randomization, block size 3 × 3, divided by stages (precontemplation, contemplation, and preparation) and age (20–29, 30–39, and 40–49 years). The study was completed with 77 women (an intervention group containing 38 participants and a control group of 39 participants). The intervention group was interviewed 5 times (baseline and 1, 1.5, 2, and 6 months). Counseling and training were given to the intervention group at the first 3 interviews. The TTM scales were assessed for both groups at baseline and at 2 and 6 months.

Results: In the 6-month follow-up, the rate of smoking cessation and the rate of progress were higher in the intervention group than in the control group. All the TTM variables had differences except the cognitive processes in the intervention group over time. Analysis of variance related to time × groups indicated that all variables had significantly changed except the cognitive processes and the pros of change.

Conclusion: Results suggest that the TTM may be useful in understanding the stages individuals are at and in deciding on the appropriate treatment for smoking cessation.

Key words: Behavior change, smoking cessation, women

1. Introduction

Tobacco is the only product that annually causes the death of approximately 5,000,000 people in the world (1). The Global Adult Tobacco Survey (GATS), which was conducted in 2008–2010 in 16 countries, including Turkey, determined that 48.6% of men and 11.3% of women were tobacco users (2). According to the 2012 GATS 41.1% of men and 13.1% of women in Turkey were tobacco users (3). In addition to this, although smoking has generally been perceived as a male behavior in the past, it is now gradually becoming more widespread among young women, especially in developing countries (4). As is well known, smoking not only affects the health of both sexes but also has a more negative influence on the reproductive functions of women (5). To prevent these health problems, studies on stopping smoking should be promoted. Studies of behavioral change are generally considered more reliable than other approaches with regards to smoking cessation (6).

The transtheoretical model (TTM) was developed by Prochaska and DiClemente in 1982 (7). The TTM is the behavioral change model that is most recommended by health professionals regarding smoking cessation. It consists of 4 components as follows: stage of change (SOC: precontemplation, contemplation, preparation, action, and maintenance), which explains an individual's thoughts and behaviors regarding how to change behavior; processes of change (POC), which explains what methods are used by the individual while changing behaviors; self-efficacy (SE), which analyzes the self-confidence of the individual regarding how long she/he will be able to resist the desire to smoke; and decisional balance (DB), which explains the pros and cons of change (8,9).

* The first 2 months of this study were based on the first author's PhD thesis (Department of Obstetrics and Gynecology, Institute of Health Sciences, Hacettepe University, Ankara, Turkey). Following this, the study was completed in 6 months.

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Individuals who are trying to change their behavior need special interventions (7,10). Interventions that do not consider the stage an individual is at may lead to resistance against behavioral change (11). On the other hand, TTM interventions increase the success of behavioral change, especially of smoking cessation (12). In Turkey, the TTM has been indicated to be effective in various smoking cessation studies focusing on different populations, such as adolescents (12), high school students (13), pregnant women (14), young military recruits (15), and adults (16). However, there has been no study conducted on adult women in Turkey in which researchers have used all the TTM scales developed for adult smokers. This study was therefore conducted to determine the effect of TTM-based individual counseling, training, and a 6-month follow-up on smoking cessation in adult women.

2. Materials and methods

2.1. Study design and participation

This study was carried out with two parallel groups in a randomized controlled trial in family health centers connected to the Akşehir Health Group Administration (AHGA) in Konya, Turkey. The first randomization was carried out on 5 November 2012 and the last follow-up was done on 20 June 2013. The inclusion criteria of the study were: subjects smoked at least one cigarette a day regularly (were in the stages of precontemplation, contemplation, and preparation), were aged between 20 and 49 years, and were literate and consenting. We excluded pregnant, breastfeeding, and postmenopausal women and people participating in an ongoing cessation program. Potential participants who enrolled in family health centers were asked whether they would volunteer to participate in the study. Women who agreed to participate were randomized.

The sample size was 72 (36 in each group) for 90% power and 95% confidence coefficient, assuming that the mean successful rate of quitting was 5% in the control group and 33% in the intervention group according to Erol and Erdogan's study (12). Due to the potential rate of dropping out, we added a further 10%, approximately, to both groups, so each group was composed of 40 women. Two women in the intervention group and one woman in the control group were excluded from the study for reasons of pregnancy, refusal to participate, and moving out of the area, respectively. The study was completed with 38 women in the intervention group and 39 women in the control group. Figure 1 shows the flow diagram of the study.

Informed consent was received from the women who agreed to participate in the study, and approval was obtained from the Akşehir District Governorship, the AHGA, the owners of the TTM scales (Pro-Change Behavior Systems), and the Ethics Committee of Hacettepe University (LUT 12/07-9, 13/04/2012).

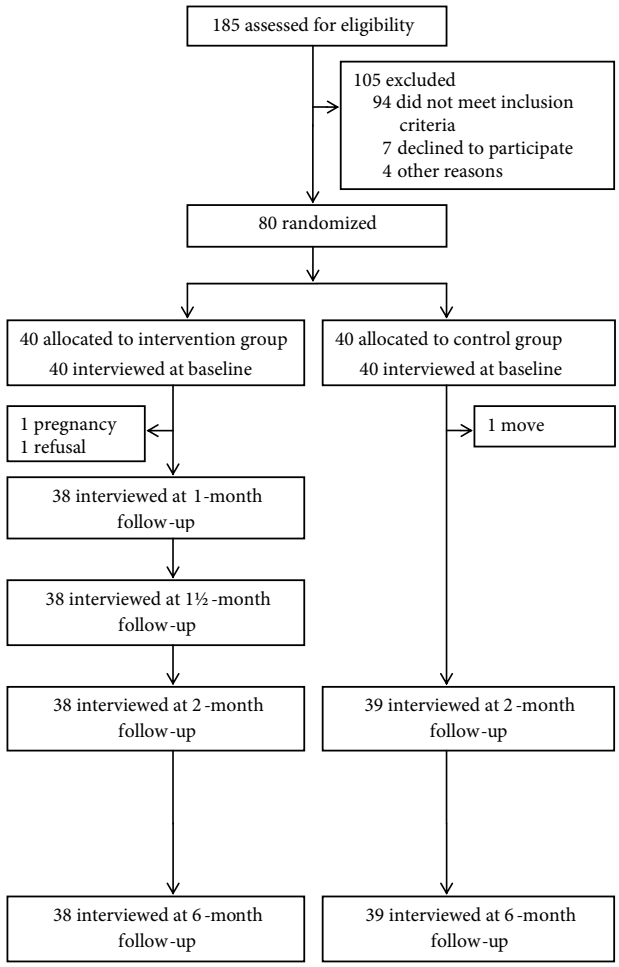

Figure 1. Flow diagram of the study.

2.2. Randomization and masking

Women who met the inclusion criteria of the study were randomized with block randomization, block size 3 × 3, and divided by stages of change (precontemplation, contemplation, and preparation) and age (20–29, 30–39, and 40–49 years) in a 1:1 ratio into the intervention group or the control group. It was not possible to mask the participants as to their allocation to the intervention or the control group.

2.3. Measures

Data were collected through the description form and the TTM Scales: SOC, POC, SE, and DB.

Description form: The form consisted of 14 questions. This form was used to assess the sociodemographic characteristics and smoking habits of the women. This form was given to both groups at the first interview. Preliminary use of the form was conducted on 10 individuals who were excluded from the study between 10 and 22 April 2012.

SOC: The stages of change were measured using the staging algorithm as previously developed by Prochaska

and DiClemente in 1983 (17) and used with Turkish samples (18). Participants were asked to choose one of the following statements: Precontemplation: "I do not plan to quit in the next 6 months"; contemplation: "I plan to quit in the next 6 month"; preparation: "I plan to quit in the next 30 days"; action: "I quit less than 6 months ago"; or maintenance: "I quit more than 6 months ago".

POC: The scale was assessed as per Prochaska et al. (19). It consists of two processes with 15 items: cognitive processes and behavioral processes. The scale assesses how often the participants have had each of these experiences in the last month on a 5-point scale ranging from 1, "never", to 5, "very often" (Pro-change Behavior Systems). According to the scale adapted to Turkish in 2014, Cronbach's alpha coefficient was between 0.54 and 0.86 (18).

SE: The scale was assessed as per Velicer et al. (9) and it contains 8 items. It assesses participants' perceptions of their ability to refrain from smoking in various situations. The degree of certainty in being able to resist smoking in each situation was rated by the respondents on a 5-point scale ranging from 1, "not at all confident", to 5, "extremely confident" (Pro-change Behavior Systems). According to the scale adapted to Turkish in 2014, Cronbach's alpha coefficient was 0.85 (18).

DB: The decisional balance scale was assessed as per Velicer et al. (20). Two decisional balance measures with 6 items, the pros and the cons, have become critical constructs in the TTM. They indicate the cognitive and motivational aspects of human decision-making. Subjects rated their agreement with each item on a 5-point scale ranging from 1, "not at all important", to 5, "extremely important" (Pro-change Behavior Systems). According to the scale adapted to Turkish in 2014, Cronbach's alpha coefficient was between 0.82 and 0.88 (18).

2.4. Procedures

Following the randomization, primary results were collected from the two groups about demographic details and smoking habits, i.e. age, education, marital status, employment status, smoking history, number of cigarettes smoked per day, duration of smoking, and the TTM components (SOC, POC, DB, SE). Secondary results were assessed in the two groups at 2 and 6 months, i.e. number of cigarettes smoked per day and TTM components (SOC, POC, DB, and SE). The time and place of the interviews were determined by getting in contact with the women involved.

The intervention group was interviewed face to face 5 times: the baseline interview, and then at 1, 1.5, 2, and 6 months. Three intervention types were used as follows: 1) TTM-based training, 2) TTM-based individual counseling, and 3) TTM-based self-help material, i.e. the Smoking Cessation Guide (SCG). Prepared by researchers, the SCG was distributed after the primary results were collected. The SCG, which consists of 130 pages, is a stage-based manual to help all adult smokers. The TTM-based training and counseling were given at the first three interviews. The TTM-based smoking cessation strategies and interventions are shown in Figure 2. Secondary results were assessed at the last two interviews.

The control group was interviewed face to face three times: the baseline interview and then at 2 and 6 months. After secondary results were collected in the last interviews, the SCG was distributed.

While counseling and training interviews in the intervention group lasted for about 45–60 min, the collection of the primary and secondary results lasted for about 15–20 min.

2.5. Data assessment

Data were analyzed using SPSS 18.0 for Windows. The statistical significance level was accepted as $P < 0.05$. Descriptive statistics of variables were computed as mean ± SD, count, and percentage. Student's t-test was used to compare age, number of cigarettes per day, and duration of smoking between the intervention group and the control group. The chi-square test (χ^2) was used to compare

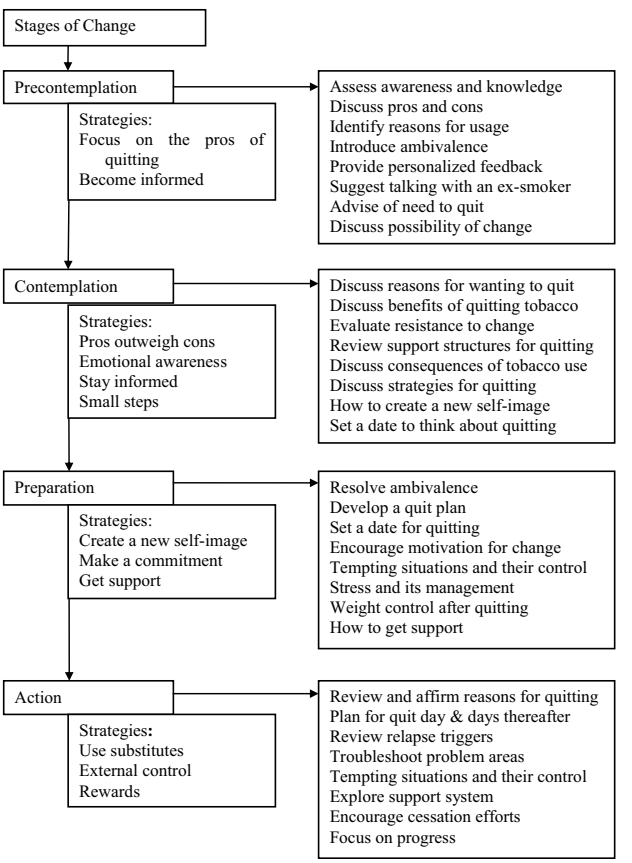

Figure 2. The transtheoretical model-based smoking cessation strategies and interventions.

demographic details and smoking habits between the same two groups. Repeated measures one-way ANOVA was used to compare the means of the TTM scales and cigarettes per day in a group at 3 different times: baseline and 2, and 6 months. Repeated measures two-way ANOVA was used to compare the means of the TTM scales and cigarettes per day between the two groups at the same times.

3. Results

3.1. Demographic details

The demographic profiles and smoking habits of the participants are shown in Table 1. There was no statistically significant difference between the intervention group and the control group with regard to sociodemographic characteristics and smoking habits (except for duration of smoking) at baseline ($P > 0.05$).

3.2. Smoking cessation rate

There were no statistically significant differences in the stages of change between the intervention group and the control group at baseline ($P > 0.05$) (Table 2). However, based on self-reports with regard to the smoking cessation rate, no people in the control group were in the 'action' stage at the 2-month follow-up, but this rate was 13.2% in intervention group ($P < 0.05$). The smoking cessation rates were 2.6% in the control group and 23.7% in the intervention group at the 6-month follow-up ($P < 0.05$).

The progression, constant, and regression situations of the participants at the 2 and 6 months follow-ups are reported in Table 3. The total rates of progression were 44.7% in intervention group and 17.9% in control group at the 6-month follow-up.

3.3. TTM components

The TTM component scores of the groups at baseline and at 2 and 6 months are shown in Table 4. According to repeated measure analysis of variance (one-way ANOVA), all components had significant differences except the cognitive processes in the intervention group at the 6-month follow-up ($P < 0.05$). However, these variables were not significantly different from the baseline in the control group at the 6-month follow-up ($P > 0.05$). There was no statistically significant difference in the cognitive processes of both groups ($P > 0.05$). However, the use of behavioral processes increased in the intervention group over time ($P < 0.05$). The pros of change increased and the cons of change decreased in the intervention group over time ($P < 0.05$), but there were no significant differences in these components from the control group ($P > 0.05$). Self-efficacy increased in the intervention group over time ($P < 0.05$).

Tests of repeated measure analysis of variance related to time × groups (two-way ANOVA) indicated that there were statistically significant differences among the

Table 1. Defining characteristics and smoking habits at baseline of the groups.

Variables	Intervention (n = 40)	Control (n = 40)	Statistics	P
Age (mean ± SD)	33.3 ± 7.7	34.0 ± 7.7	t = –0.361	0.719
Number of cigarettes per day (mean ± SD)	12.0 ± 9.7	15.8 ± 9.3	t = –1.763	0.082
Duration of smoking (mean ± SD)	10.8 ± 7.0	18.8 ± 5.6	t = –5.611	0.000
Marital status				
Married	21 (52.5%)	15 (37.5%)	$\chi^2 = 1.818$	0.178
Single	19 (47.5%)	25 (62.5%)		
Educational level				
Primary	3 (7.5%)	5 (12.5%)		
High School	12 (30%)	11 (27.5%)	$\chi^2 = 0.732$	0.866
University	19 (47.5%)	17 (42.5%)		
Postgraduate	6 (15%)	7 (17.5%)		
Employment status				
Employed	23 (57.5%)	24 (60%)	$\chi^2 = 0.052$	0.820
Unemployed	17 (42.5%)	16 (40%)		

SD = Standard deviation.

Table 2. The stages of the groups at baseline and 2 and 6 months of follow-up.

	Baseline		2 months		6 months	
Stages	I (n = 40)	C (n = 40)	I (n = 38)	C (n = 39)	I (n = 38)	C (n = 39)
Precontemplation	14 (35%)	15 (37.5%)	6 (15. 8%)	17 (43.6%)	9 (23.7%)	15 (38.5%)
Contemplation	14 (35%)	14 (35%)	15 (39.5%)	13 (33.3%)	14 (36.8%)	15 (38.5%)
Preparation	12 (30%)	11 (27.5%)	12 (31.5%)	9 (23.1%)	6 (15.8%)	8 (20.4%)
Action	-	-	5 (13.2%)	-	9 (23.7%)	1 (2.6%)
Statistics	$\chi^2 = 0.078$ P = 0.962		$\chi^2 = 10.821$ P = 0.013		$\chi^2 = 8.209$ P = 0.042	

I = Intervention, C = Control.

Table 3. Progression, constant, and regression situations of the groups at 2 and 6 months of follow-up.

Situations	2 months		6 months	
	Intervention (n = 38)	Control (n = 39)	Intervention (n = 38)	Control (n = 39)
Regression	5 (13.2%)	6 (15.4%)	8 (21.1%)	9 (23.1%)
Constant	14 (36.8%)	30 (76.9%)	13 (34.2%)	23 (59%)
Progression	19 (50%)	3 (7.7%)	17 (44.7%)	7 (17.9%)
Statistics	$\chi^2 = 17.535$	P < 0.001	$\chi^2 = 6.991$	P = 0.030

behavioral processes, cons of change, and self-efficacy between the intervention and control groups (P < 0.05). However, there was no statistically significant difference between the cognitive processes and pros of change (P > 0.05) (Table 4).

4. Discussion

This study was conducted to determine the effect of TTM-based individual counseling, training, and 6-month follow-up on smoking cessation in adult women. TTM-based interventions have been found to be effective for the cessation of smoking.

There are some limitations of this study related to its generalization. First, the smoking cessation rate was based on the participants' self-reports and not verified biochemically. Second, an inclusion criterion of the study was that only smokers who were in the precontemplation, contemplation, and preparation stages were involved. Third, it had a small sample size and a follow-up of only 6 months.

The intervention group was given the TTM-based interventions 3 times and was interviewed 5 times during the 6-month follow-up. While 23.7% of the intervention group had quit by the time of the 6-month follow-up, this rate was 2.6% in the control group. This difference was found to be statistically significant between the 2 groups. Erol and Erdogan, in 2008, provided TTM-based smoking cessation intervention once in their study concerning adolescents who were at the contemplation and preparation stages (12). Smoking cessation rates were determined as 18.3% at the 3-month follow-up and 33.3% at the 6-month follow-up. We thought that this result was caused by participants' short period of dependency. Pantaewan et al., in 2012, applied counseling once in their TTM-based smoking cessation study of soldiers at the preparation stage (21). Evaluation was carried out 6 months after the counseling. It was determined that 4.5% of the soldiers had ceased smoking. These studies have shown not only the effect of TTM upon behavioral change but also the change in smoking cessation rates according to individuals' stages of change and intervention number. According to Bridle et al., the number of TTM-based interventions increases the abstinence rate in smokers, especially those who were at the preparation stage (22).

This study showed that the intervention group used more behavioral processes, as did Sharifirad et al.'s study (23). In accordance with the TTM, smokers who are at the early stages apply more cognitive processes, but when they

Table 4. The transtheoretical model component scores of the groups at baseline and 2 and 6 months of follow-up.

Components	Group	Follow-up			One-way ANOVA		Two-way ANOVA	
		Baseline	2 months	6 months	F	P	F	P
Cognitive processes	Intervention	44.5 ± 10.7	45.6 ± 8.5	48.9 ± 10.2	1.867	0.162	1.185	0.311
	Control	50.0 ± 10.5	48.3 ± 10.3	48.6 ± 10.3	0.267	0.767		
Behavioral processes	Intervention	38.0 ± 11.4	42.9 ± 8.3	45.8 ± 7.8	6.834	0.002	3.360	0.040
	Control	39.0 ± 8.8	40.2 ± 6.2	38.8 ± 5.3	0.428	0.653		
Pros of change	Intervention	24.2 ± 5.4	22.5 ± 4.8	25.5 ± 3.3	4.568	0.013	2.165	0.122
	Control	24.3 ± 5.2	22.3 ± 5.1	22.7 ± 3.7	1.791	0.174		
Cons of change	Intervention	19.0 ± 4.6	17.3 ± 4.7	16.1 ± 4.0	4.181	0.019	3.917	0.024
	Control	17.5 ± 5.4	18.8 ± 4.4	18.6 ± 3.8	0.965	0.386		
Self-efficacy	Intervention	18.2 ± 5.4	18.6 ± 6.6	24.0 ± 7.8	9.065	0.000	5.651	0.005
	Control	19.7 ± 6.0	21.4 ± 6.6	20.0 ± 3.6	1.242	0.294		

start to quit and move to later stages they use behavioral processes more (19). While the use of behavioral processes decreases in the precontemplation stage, it increases in the completion and preparation stages and attains its highest level at the action stage (24). Our control group reported more regress, less progress, and little sense of self-efficacy in ceasing smoking. However, the pros of change were higher and the cons of quitting were lower in the intervention group. Our findings are similar to the outcomes of Sharifirad et al.'s study (23) and Fang et al.'s study (24). They reported that their interventions resulted in a greater self-efficacy, and greater pros of quitting in intervention groups over time. They noted that the cons of change were high at the baseline in both control and treatment groups, and that this did not change after the baseline. Furthermore, self-efficacy increased in the intervention group over time in our study. Nigg determined that the self-efficacy of individuals increases as the stages of change advance (25).

TTM-based individual counseling, training, and follow-up for smoking cessation were found to be effective in this study. The results suggest that the TTM may be useful in understanding the stages individuals are at regarding smoking cessation. These stages provide the opportunity of deciding on an appropriate treatment plan for the individual and increase success in quitting smoking. For these reasons, we suggest that the TTM be used in smoking cessation studies that are carried out with larger populations and for a longer period.

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