

Providing Free Access to Smoking Cessation Medications: Does It Have an Impact on the Treatment Adherence and Success of Smoking Cessation?

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Abstract

OBJECTIVE: Providing medications to patients free of charge is thought to be one of the factors affecting the success of smoking cessation. The aim of this study was to investigate the effect of providing free access to stop-smoking medications on the treatment adherence and short term success of quitting smoking.

MATERIAL AND METHODS: All smokers who applied to a smoking cessation outpatient clinic between September 2017 and December 2019 were included in this retrospective study. Data were collected from patients' files filled using an initial evaluation and follow-up protocol.

RESULTS: During the study period, 518 smokers applied to our polyclinic for smoking cessation counseling. Medical therapy was prescribed for 411 (85.4%) of 481 patients who were supported by behavioral therapy. The patients had a mean age of 41.2 years, and 64.7% were male. Only 22.9% of smokers prescribed stop-smoking medications were able to obtain them for free. Patients who got the medications completely free of charge were 4 times more adherent to treatment. The success rate of quitting smoking at the end of the third month was 22.2%. The strongest effect was achieved by the full treatment compliance. At the end of 3 months, the success of quitting smoking was 14.1 times higher for those who were fully adherent to treatment than non-adherents.

DISCUSSION: According to our study results, the most effective success factors in short-term smoking cessation are patient compliance to treatment and free supply of stop-smoking medications, one of the main determinants of treatment adherence.

KEYWORDS: Tobacco control, clinical problems, health policies

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INTRODUCTION

Tobacco use is one of the leading causes of many preventable diseases and death worldwide.¹ Smoking is prevalent in 29.6% of the adolescent and adult population in our country, and it is known that more than 100 000 people die prematurely every year of smoking-related diseases.^{2,3} One of the reasons for the high prevalence of smoking in our country is the low rate of quitting. One-year smoking cessation success is reported as 14.6-45.5% in the literature.^{4,5,6} According to the Global Adult Tobacco Survey data, 13.6% of daily smokers have quit smoking. However, more than 30% of current smokers plan to quit or are thinking about quitting.⁷ Social awareness, the smoking ban inside workplaces and public places, the increase in tobacco-related diseases, and economic reasons have led to the increase in demand for counseling from smokers who plan to quit and their referral to smoking cessation programs. Patients are supported with medical treatment and cognitive-behavioral therapy during smoking cessation counseling.^{4,8,9} The consensus reports published in recent years emphasize the importance of medical treatment in smoking cessation, and the World Health Organization (WHO) recommends that the stop-smoking medications should be provided free of charge by the government.¹⁰

There are several studies showing that providing free access to smoking cessation treatment is among the major factors affecting the success of smoking cessation.^{9,11,12} It has been stated that one of the reasons for the low successful quitting rate, detected in a study conducted in our outpatient clinic, may be treatment incompatibility due to the fact that the smokers have to pay a fee to get medications.¹³

The Smoking Cessation Outpatient Clinic (SCOC) within our department has been active for about 3 years. In our outpatient clinic, patients who apply for a smoking cessation counseling session consisting of a 45-minute interview are provided with cognitive behavioral therapy and pharmaceutical therapy if needed, social support, and at least one-year follow-up. The SCOC is associated with the Tobacco Addiction Treatment and Monitoring System (TÜBATİS) of the Ministry of Health, and the system is irregular in providing free access to smoking cessation medications, with mostly only one medication for each period. Therefore, depending on the management plan, the expenses for some or all of the medications may need to be covered by the patients themselves. The system has been described in detail by Karadoğan and Önal in their article published in 2019.¹⁴

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Some studies have shown the effectiveness of providing free access to smoking cessation medications worldwide.^{15,16} Although there are several Turkish studies on the factors associated with the success of quitting smoking,^{9,11,12} studies investigating the relationship between providing free access to medications and the success of smoking cessation are limited.^{14,17} In a retrospective cohort study, Karadoğan and Önal have found that providing smoking cessation medications free of charge increases the number of attempts made by smokers to quit smoking, but has no effect on treatment adherence and on quitting success.¹⁴ In another study, Salepçi and Fidan have found that although free access to medications increases treatment adherence, quitting rate at the end of 6 months is higher when patients have to pay for medications from their own pocket.¹⁷ Therefore, data from other smoking cessation outpatient clinics in Turkey are required to clarify the impact of free access to medications on smoking cessation among Turkish populations.

Our research questioned the effect of providing stop-smoking medications, free or paid, on treatment compliance during the smoking cessation process, and the effect of provision of medications and the compliance with the treatment during the smoking cessation process on the short-term success of quitting. Therefore, in this study, it was aimed to investigate the effect of providing stop-smoking medication on treatment adherence and short-term success of smoking cessation.

MATERIAL AND METHODS

The target population of this retrospective analytic study included all smokers who applied for stop-smoking counseling to the University Hospital Smoking Cessation Outpatient Clinic between September 1, 2017 and December 31, 2019.

An initial evaluation and follow-up protocol is used in our clinic for patients who apply for smoking cessation support. In the first interview within the framework of this protocol, general evaluation (sociodemographic characteristics and behavioral characteristics related to tobacco use) and physical examination are performed and the Fagerström

Nicotine Addiction Test is administered to determine the level of nicotine addiction.^{18,19} In addition, the smokers' status regarding other addictive substance use, the status of chronic illness and use of related medication, family history of smoking-related illness, the reason for the application to our clinic, and the method of access are determined. In our outpatient clinic, a cognitive-behavioral approach to smoking cessation and appropriate pharmacological treatment are provided, and patients are followed-up with support interviews on the day of smoking cessation, and 1 week, 2 weeks, 3 weeks, 1 month, 3 months, 6 months and 1 year after quitting. Patients are also asked for routine laboratory examinations (pulmonary function test, posteroanterior chest X-ray).

The smoking cessation counseling service, which we started in the Family Medicine Outpatient Clinic, has been continuing at the Ministry of Health licensed smoking cessation outpatient clinic since October 2018. Since connecting to the TÜBATİS system of the Ministry of Health, our patients can obtain some medications free of charge.

Since our primary outcome was the effect of how medications are provided—for free or on payment—on treatment compliance and the success of smoking cessation, the non-smoking status at the end of the first 3 months was considered as the dependent variable of the study.

The data were analyzed using IBM SPSS 18.0 statistics program. In addition to the descriptive statistical methods *t*-test, Mann–Whitney U-test, the chi-square test, and Kendall's tau-b correlation tests were used for statistical evaluations. Stepwise forward logistic regression (LR) analysis was used to determine the effect of confounding variables on treatment adherence and quitting success. The normality of the distribution of numerical variables was tested with the Shapiro–Wilk test. The statistical significance level was accepted as $P < .05$.

RESULTS

During the study period, 518 smokers applied to our polyclinic for smoking cessation counseling. Of these smokers, 385 (74.3%) were at the “preparation” stage according to the transtheoretic model, with 50 smokers (9.7%) at the stage of “action.” A motivational interview for getting over the stage was conducted with 83 (16.0%) patients who were not thinking (“pre-contemplation”) or thinking about quitting smoking (“contemplation”). Since 37 smokers (7.1%) were not ready to quit yet, the process of quitting smoking was not initiated with them. In total, 481 patients given smoking cessation support were included in the study. The population of the study is given in the flow chart (Figure 1).

Of the patients in the study group, 64.7% were male with a mean age of 41.2 ± 14.0 years (15–77) years. The women mostly lived in urban areas, and the proportion of them who worked actively in an income-generating job was less than

Main Points

- Providing medications to patients free of charge is thought to be one of the factors affecting the success of smoking cessation.
- In our study, patients who got the medications completely free of charge were 4 times more adherent to treatment. At the end of 3 months, the success of quitting smoking was 14.1 times higher for those who were fully adherent to treatment than non-adherents.
- According to our study results, the most effective factor on short-term smoking cessation success is patient compliance to treatment, and free supply of the stop-smoking medications is one of the main determinants of treatment adherence.

Table 1. Genderwise Distribution of Sociodemographic Characteristics of the Patients Included in the Study

Sociodemographic Features	Gender		Total	Statistics*
	Female, n (%)	Male, n (%)		
Age groups				
15-24 years	21 (12.4)	40 (12.9)	61 (12.7)	$P > .05$
25-44 years	87 (51.2)	147 (47.3)	234 (48.6)	
45-64 years	57 (33.5)	99 (31.8)	156 (32.4)	
65 years and over	5 (2.9)	25 (8.0)	30 (6.3)	
Total	170 (35.3)	311 (64.7)	481 (100)	
Marital status				
Other	61 (35.9)	88 (28.4)	149 (31.0)	$P > .05$
Married	109 (64.1)	222 (71.6)	331 (69.0)	
Total	170 (35.4)	310 (64.6)	480 (100)	
Education status				
Less than 9 years	46 (29.3)	92 (32.2)	138 (31.1)	$P > .05$
9-12 years	46 (29.3)	82 (28.6)	128 (28.9)	
More than 12 years	65 (40.4)	112 (39.2)	177 (40.0)	
Total	157 (35.4)	286 (64.6)	443 (100)	
Working status				
Not working	103 (60.9)	93 (29.9)	196 (40.8)	$\chi^2 = 43.676$
Working	66 (39.1)	218 (70.1)	284 (59.2)	$P = .000$
Total	169 (35.2)	311 (64.8)	480 (100)	
Income status (monthly)				
< 1500 TL	25 (15.4)	44 (14.6)	69 (14.9)	
1500-4500 TL	98 (60.1)	188 (62.9)	286 (61.9)	
> 4500 TL	40 (24.5)	67 (22.4)	107 (23.2)	$P > .05$
Total	163 (35.3)	299 (64.7)	462 (100)	
Residential region				
Rural	5 (3.0)	43 (14.2)	48 (10.2)	$\chi^2 = 14.853$
Urban	163 (97.0)	260 (85.8)	423 (89.8)	$P = .000$
Total	168 (35.7)	303 (64.3)	471 (100)	

*Pearson χ^2 test.

men ($P < .05$). The sociodemographic characteristics of the patients included in the study are shown in Table 1.

The mean age of smokers when they started smoking was 16.9 ± 4.9 (median 16; interquartile 14-19), with the average number of cigarettes smoked daily at 22.9 ± 11.5 (median 20; interquartile 15-30), and total smoking burden of 27.2 ± 23.1 (median 20; interquartile 11.75-37) package/years. The participants' mean score of the Fagerström nicotine addiction test was 5.7 ± 2.5 (median 6; interquartile 4-8), and 57.6% were at high and very high levels of nicotine addiction.

Treatment Compliance and Related Factors

Medical therapy was prescribed for 411 (85.4%) of 481 patients who were given supportive therapy with a

cognitive-behavioral approach. The most commonly prescribed medical treatments were nicotine replacement therapy (NRT) alone (35.8%) and a combination of NRT and varenicline (27.7%), followed by a combination of NRT and bupropion at 21.9%, varenicline alone at 10.2%, and bupropion alone at 4.4%.

Only 22.9% of smokers were able to obtain stop-smoking medications free of charge; 44.8% paid completely from their own pockets. Of those who started the smoking cessation process, 42.1% never used the prescribed medication. While 16.5% of the participants used the medication partially and/or irregularly, the rate of those, who used it fully and regularly was 41.4%. Those who did not pay from their pocket for the medications were more compatible with treatment ($r = 0.161$; $P = .000$). The relationship between treatment

Table 2. Relationship Between Provision of Medications (Free of Charge or Paid) and Patients' Compliance with Drug Treatment.

	Medication supply			Total, n (%)
	Paid, n (%)	Partly Free, n (%)	Free, n (%)	
Medication use				
Not used, n (%)	92 (50.0)	47 (35.3)	34 (36.2)	173 (42.1)
Partially used, n (%)	35 (19.0)	24 (18.0)	9 (9.5)	68 (16.5)
Used, n (%)	57 (31.0)	62 (46.7)	51 (54.3)	170 (41.4)
Total, n (%)	184 (44.8)	133 (32.4)	94 (22.9)	411 (100)

* Kendall's tau-b correlation test, $r = 0.161$; $P = .000$

compliance and the provision of medications (free or paid) is shown in Table 2.

In univariate analyses, the only variable affecting the compliance with the treatment other than medication supply was the education level of smokers ($P < .05$). Apart from these variables, sociodemographic characteristics, reasons for starting smoking, smoking intensity and nicotine addiction level, factors triggering smoking, previous smoking cessation experience, reasons for smoking cessation, and treatment alternatives given had no effect on treatment compliance ($P > .05$).

Multiple logistic regression analysis was performed to determine the true effect and degree of effect of the independent variables on treatment compliance. Both variables entered the model. Treatment compliance of the patients with less than 9 years of education was 3 times greater than those who were trained between 9-12 years, and patients who were able to get the medications completely free of charge were 4 times more adherent than those who had to obtain all of them for a fee. The final regression model is shown in Table 3.

The Success of Quitting Smoking and Related Factors

Stop-smoking medications are routinely given to smokers in our outpatient clinic for 3 months. Therefore, the success of smoking cessation at the end of 3 months was evaluated for the purpose of our study. Of the 481 smokers included in the study, 107 (22.2%) did not smoke at the end of the third month. The number of patients followed-up and smoking cessation rates gradually decreased as the monitoring progressed

through the first day of smoking cessation, and 1 week, 1 month, and 3 months later. Considering those who could not be followed up regularly as unsuccessful, non-smoking rates were 52.2%, 47.0%, 33.1%, and 22.2%, respectively. The non-smoking rates of the follow-up patients according to whether the medications were provided free of charge or paid are shown in Table 4.

The effect of independent variables on the success of smoking cessation at the end of 3 months was evaluated by univariate analysis. According to this, a high income level ($P = .041$), not working actively in a revenue-generating job ($P = .043$), being married ($P = .019$), not using alcohol ($P = .007$), not having another smoker in the family ($P = .024$), the absence of a chronic illness ($P = .021$), low nicotine dependence level ($P = .002$), availability of medications free of charge ($P = .034$) and full treatment compliance ($P = .000$) increased the success of smoking cessation. Apart from these, other sociodemographic features, reasons for starting smoking, smoking intensity, factors triggering smoking, previous smoking cessation experiences, reasons for smoking cessation, and treatment alternatives given did not affect smoking cessation success ($P > .05$).

Multiple logistic regression analysis was performed to determine the true effect and degree of influence of the independent variables on the success of smoking cessation at the end of 3 months. The medication supply variable was excluded from the analysis because it was highly correlated with the treatment compliance variable. Three independent variables entered the model. The strongest effect was achieved by full treatment compliance. At the end of 3 months, the success in quitting smoking was 14.1 times higher for those who were fully adherent to treatment than non-adherents, 2.8 times higher for smokers with high-income level than those with low income, and 1.9 times higher for those with low nicotine dependence than higher addicts. The final regression model is shown in Table 5.

DISCUSSION

Due to the physiological, psychological, social, behavioral, and cognitive dimensions of cigarette addiction, there are various barriers to quitting smoking.²⁰ Success in quitting smoking is very low despite many factors known to be effective in smoking cessation.⁷ Recurrences and relapses are frequent during the action and maintenance stages.²¹ Our study basically aimed to determine the effect that providing medications on a paid or free basis has on compliance with the treatment and hence on the success of quitting smoking. According to our study results, the strongest factor in not

Table 3. Variables Included in the Final Model in Regression Analysis for Treatment Compliance

Dependent variable: Treatment Compliance					
Independent Variables	Beta	Standard Error	P	Odds	95% CI
Less than 9 years of education	1.083	0.365	.003	2.953	1.444-6.037
Provision of medications free of charge	1.396	0.375	0	4.039	1.938-8.419
Constant	-1.519	0.323	0	0.219	

Table 4. Smoking Cessation Success Rates Until the End of the Third Month According to the Supply of Medications

Smoking Cessation Success During Follow-up	Medication Supply			Total	Statistics* (P)
	Paid, n (%)	Partly free, n (%)	Free, n (%)		
First day	97 (61.4)	89 (81.7)	65 (85.5)	251 (73.2)	0
After 1 week	81 (51.3)	83 (77.6)	62 (82.7)	226 (66.5)	0
After 1 month	55 (36.7)	60 (65.9)	44 (68.8)	159 (52.2)	0
After 3 months	48 (32.9)	31 (44.3)	28 (51.9)	107 (39.6)	.034

*Pearson χ^2 test.

smoking after the first 3 months of medication treatment is the patient's compliance to treatment, and the main determinant of treatment compliance is the provision of medications free of charge.

Patients applying for smoking cessation counseling are mostly young and more educated adults who work actively in a revenue-generating job. Although they start smoking at an early age, the smokers start to think of quitting smoking soon and make several attempts. The demographical profile of smokers applying for smoking cessation could be explained by the reasons mostly stated by smokers to quit smoking, such as beginning to have health problems or health related concerns, family pressure mostly by children, and the emergence of economic difficulties faced by individuals starting a family. They are also seeking help because most of them have high or very high levels of nicotine addiction.

Although many independent variables that may have an impact on the main outcome are evaluated, medication and non-medication treatment options have not been taken into account, since the study design is not based on the effectiveness of medications.

Clinics that are licensed to give smoking counseling in our country are connected to the Tobacco Addiction Treatment and Monitoring System (TÜBATİS) of the Ministry of Health, and medication can be given free of charge to smokers who want to stop smoking, according to their availability in the system. However, the supply of free medication from the system is very irregular, and when available, is generally limited to a single medication. It is noteworthy that very few of the smokers who applied to our center for consultancy were able to obtain the medications completely free of charge. According to our results, those who do not pay anything for medications are more compatible with the treatment. WHO

cares about how medications are provided in smoking cessation programs and recommends that all member states' governments be provided with cost-free medications that are effective in quitting smoking.¹⁰ Our study results are supportive of this recommendation by WHO.

Insufficiency of the follow-ups in our smoking cessation outpatient clinic was one of the limitations of the study. We observe that there are 2 main factors associated with this. First, our center is also an educational unit for medical students before and after graduation, and they work in the smoking cessation outpatient clinic as trainees on a rotational basis in a given order. This can lead to disruptions in follow-up. The second and more frequently observed factor is the inadequate patient compliance to face-to-face interview appointments despite frequent telephone reminders. Accessibility is also an important problem during telephone monitoring. The most important reason of this patient-induced communication problem may be that patients who have problems in maintaining their non-smoker status or who have abandoned the process do not respond to phone calls. For this reason, we did not limit the analyses of compliance and noncompliance to the patients who were fully followed-up at the end of 3 months; we also accepted the patients who could not be contacted as unsuccessful and added them to the analyses. Although this approach seems to have reduced our success rates, it has made our results more realistic.

According to our results, the rate of non-smoking decreases as it moves towards the end of the 3-month medication treatment period. In univariate analyses, 9 independent variables have been found to be effective on smoking status after 3 months, but in multiple analyses only 3 of them have entered the model. The greatest effect is achieved by compliance with treatment. In addition,

Table 5. Variables Included in the Final Model in Regression Analysis for the Success of Smoking Cessation

Dependent Variable: Success of Smoking Cessation					
Independent Variables	Beta	Standard Error	P	Odds	95% CI
Treatment compliance	2.647	0.457	.000	14.112	5.762-34.563
High income	1.018	0.424	.017	2.766	1.204-6.356
High addiction†	0.619	0.295	.036	1.857	1.042-3.308
Constant	-0.374	0.411	.364	0.688	

† Those with a Fagerstrom score of 6 or higher.

those with high income and low nicotine dependence are more successful.

There are other studies from our country having similar results and reporting that compliance with treatment plays a key role in smoking cessation success.^{9,11,20,22,23} However, in Turkey, our study, as we know, is the first one providing evidence that the provision of free access to smoking cessation medications increases the treatment adherence, and therefore, success rate of quitting smoking. The free supply of the medications leads to longer treatment and thus higher success rate.²⁴ Two previous studies from Turkey have investigated the relationship between providing smoking cessation medications free of charge and successful smoking cessation. One of them has found no relationship between providing smoking cessation medications free of charge and treatment adherence and quitting success.¹⁴ On the contrary, in the other study, Salepçi and Fidan have found a higher quitting rate at the end of 6 months when patients have to pay for medications from their own pocket.¹⁷

The cost-effectiveness of providing medications for smoking cessation free of charge has also been studied. Trapero-Bertran et al. conducted a large study in the Spanish society using the EQUIPTMOD model (European study on Quantifying Utility of Investment in Protection from Tobacco MODel) and have proven that various smoking cessation methods and free delivery of smoking cessation medications are more cost effective than the treatment of smoking-related diseases.²⁵ In the study conducted by Cadier et al. in France, the Markov simulation model has been used in 1000 smokers and it has been shown that giving medications free of charge is effective.²⁶ In a meta-analysis conducted by van den Brand et al., it has been revealed that state coverage of medications used in smoking cessation treatment increases smoking cessation applications, compliance to treatment, and success in quitting.²⁷ In conclusion, in addition to providing medications free of charge, it is emphasized that we need to review our counseling performance and provide appropriate information to patients about the mechanism of action of medications, possible side effects, and the importance of completion of treatment.^{28,29}

Our results are related to the non-smoking status after 3 months. The situation may be different when the success rates at the end of the 6 months or 1 year by which time the smoker is generally considered to quit smoking are considered. Factors affecting short-term success, especially compliance with the treatment, may lose their effect in the long term, while other variables related to the counseling process may become more effective. Indeed, in some studies, it has been found that giving free medication is not effective on long-term smoking cessation success.^{14,17} There is a need for prospective studies investigating the effects of the way medications are provided on long-term smoking cessation success and the effectiveness of treatment options.

As a conclusion, the most effective factor in short-term smoking cessation success is patient adherence to treatment, and free supply of the stop-smoking medications is one of the main determinants of treatment adherence.

Ethics Committee Approval: This study was approved by Ethics committee of Adnan Menderes University , (Approval No: 2020/65, 27 April 2020).

Informed Consent: Written informed consent was obtained from the patients before recording their medical data.

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