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# Factors Influencing Smoking Cessation Success in an Outpatient Clinic: A Cross-Sectional Study

# Sigara Bırakma Polikliniğinde Tedavi Başarısını Etkileyen Faktörler: Kesitsel Bir Çalışma

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## Abstract

**Objective:** Smoking remains a major global health issue, contributing to millions of preventable deaths annually. Effective smoking cessation strategies combine pharmacotherapy and behavioral support, yet real-world data on factors influencing treatment success in outpatient settings, particularly in Türkiye, are limited. The aim of this study was to evaluate the effectiveness of pharmacological treatment in a smoking cessation outpatient clinic and identify factors associated with cessation success.

**Method:** This cross-sectional observational study included 203 adult smokers initiating pharmacological treatment at a tertiary hospital in Istanbul between April and October 2023. After excluding 22 patients lost to follow-up, 181 participants were analyzed. Data were collected via face-to-face interviews, the Fagerström Test for Nicotine Dependence (FTND), and 3-month follow-up calls. Bivariate analyses and multivariate logistic regression identified predictors of cessation success.

**Results:** At 3-month follow-up, 28.6% of participants successfully quit smoking. Significant predictors of cessation included follow-up attendance (OR=0.18, p<0.001), lower nicotine dependence (OR=1.33, p=0.011), combination therapy (bupropion + nicotine replacement therapy; p=0.001), and employment status (OR=0.39, p=0.036). Age, gender, education, and income were not significantly associated with outcomes.

**Conclusion:** Pharmacotherapy, particularly combination therapy, combined with follow-up visits and tailored to nicotine dependence levels, enhances smoking cessation success. Sustained behavioral support and adherence-focused strategies are critical for optimizing outcomes in clinical practice.

**Keywords: Smoking cessation, tobacco use disorder, pharmacotherapy, treatment outcome**

## Öz

**Amaç:** Sigara kullanımı, her yıl milyonlarca önlenebilir ölüme neden olan küresel bir sağlık sorunudur. Etkili sigara bırakma stratejileri farmakoterapi ve davranışsal desteği birleştirse de, özellikle Türkiye'de ayakta tedavi ortamlarında tedavi başarısını etkileyen faktörler üzerine gerçek dünya verileri sınırlıdır. Bu çalışmanın amacı sigara bırakma polikliniğinde farmakolojik tedavinin etkinliğini değerlendirmek ve bırakma başarısı ile ilişkili faktörleri belirlemektir.

**Yöntem:** Bu kesitsel gözlemsel çalışma, Nisan-Ekim 2023 tarihleri arasında İstanbul'daki bir üçüncü basamak hastanede farmakolojik tedavi başlatan 203 yetişkin sigara içicisini içermiştir. Takipte kaybedilen 22 hasta hariç tutularak, 181 katılımcı analiz edilmiştir. Veriler yüz yüze görüşmeler, Fagerström Nikotin Bağımlılığı Testi (FTND) ve 3 aylık takip aramaları yoluyla toplanmıştır. İkili analizler ve çok değişkenli lojistik regresyon, bırakma başarısının öngörücülerini belirlemiştir.

**Bulgular:** Üç aylık takipte, katılımcıların %28,6'sı sigarayı başarıyla bırakmıştır. Bırakma başarısının anlamlı öngörücüleri arasında takip vizitlerine katılım (OR=0,18, p<0,001), düşük nikotin bağımlılığı (OR=1,33, p=0,011), kombine tedavi (bupropion + nikotin replasman tedavisi; p=0,001) ve istihdam durumu (OR=0,39, p=0,036) yer almıştır. Yaş, cinsiyet, eğitim ve gelir düzeyi ile sonuçlar arasında anlamlı bir ilişki bulunmamıştır.

**Sonuç:** Farmakoterapi, özellikle kombine tedavi, takip vizitleriyle desteklendiğinde ve nikotin bağımlılık düzeyine göre uyarlandığında sigara bırakma başarısını artırmaktadır. Sürekli davranışsal destek ve uyum odaklı stratejiler, klinik uygulamalarda sonuçları optimize etmek için kritik öneme sahiptir.

**Anahtar kelimeler: Sigara bırakma, tütün kullanım bozukluğu, farmakoterapi, tedavi sonucu**

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# Introduction

Tobacco use represents a significant global public health concern. It is estimated that 7 million deaths per annum are attributable to active tobacco use, with a further 1.3 million deaths resulting from exposure to secondhand smoke (1). The most prevalent tobacco product is cigarettes. It is well-documented that smoking constitutes a major risk factor for a range of respiratory diseases, most notably Chronic Obstructive Pulmonary Disease (COPD), cardiovascular diseases, and various forms of cancer. It is estimated that if smoking rates were to be reduced, there would be a significant decrease in the number of deaths from these preventable diseases (2). The addictive nature of nicotine, a substance present in tobacco, has been well-documented, with its impact on the brain's reward system being a key factor in the development of dependency. Despite the established harms of tobacco products, their continued use is a matter of concern (3).

It is imperative to acknowledge smoking as a persistent and recurrent health concern. Nevertheless, effective treatment options are available for many cases. A comprehensive approach to smoking cessation entails the integration of pharmacological interventions with non-pharmacological methods. A long-term strategy that requires close cooperation between the patient and the clinician should be adopted in the smoking cessation process (4).

Motivation emerges as a key determinant of treatment success in the smoking cessation process. It is a fundamental psychological factor that influences individuals' willingness to quit smoking and plays a crucial role in their adherence to treatment and the attainment of sustainable outcomes. Therefore, behavioral interventions are an essential component of comprehensive smoking cessation strategies (5). Tobacco dependence is recognized as a multidimensional disorder, involving physiological, psychological, social, and behavioral factors (6). Accordingly, interventions such as motivational interviewing, individual counseling, cognitive-behavioral therapy, and structured follow-up sessions aim to enhance patients' intrinsic motivation, support behavioral change, and strengthen self-efficacy. Motivational interviewing, in particular, is a patient-centered, directive method designed to explore and resolve ambivalence toward quitting. It has been shown to improve treatment adherence and promote long-term abstinence when integrated into cessation programs. A meta-analysis of 31 randomized controlled trials with 9,485 participants demonstrated that motivational interviewing increases the odds of quitting by 45% compared to control conditions (7).

Numerous studies have highlighted that the combination of pharmacotherapy and behavioral support—rather than either approach alone—results in higher quit rates or better treatment outcomes (8). Therefore, effective smoking cessation should be considered a biopsychosocial process that requires both medical treatment and personalized psychological support tailored to individual needs. A significant proportion of smokers attempt to quit without seeking assistance and often fail, underscoring the importance of structured, evidence-based interventions. The efficacy of motivation-based supportive therapy, particularly when combined with pharmacological treatment, has been consistently demonstrated in the literature.

Among pharmacological options, three agents are most commonly used (9): bupropion, a norepinephrine-dopamine reuptake inhibitor that reduces withdrawal symptoms and the rewarding effects of nicotine; varenicline, a partial agonist at $\alpha 4\beta 2$ nicotinic receptors that both alleviates cravings and blocks nicotine-induced reinforcement; and nicotine replacement therapy (NRT), which provides controlled doses of nicotine to ease the transition to abstinence and mitigate withdrawal symptoms.

These medications have shown significant superiority over placebo in terms of increasing smoking cessation rates. For instance, varenicline has been associated with higher quit rates compared to bupropion at both 12-week (OR=1.79) and 52-week (OR=1.60) follow-up points (10). Bupropion has been found to increase the odds of quitting approximately 1.6-fold compared to placebo (11), while NRT increases quit chances by 50–60% (12).

Importantly, combined pharmacotherapy, such as bupropion plus NRT or varenicline plus NRT, has shown even greater effectiveness than monotherapy, especially among individuals with high nicotine dependence.

Systematic reviews and meta-analyses confirm that pairing pharmacological treatment with behavioral interventions significantly improves long-term abstinence outcomes compared to either approach alone (13).

Despite their proven efficacy, these pharmacological agents may present limitations in real-world settings. For instance, varenicline has been associated with neuropsychiatric adverse events in a subset of patients, including mood changes, agitation, and vivid dreams (14). Bupropion, while effective, may lower the seizure threshold, particularly at higher doses or in individuals with predisposing factors (15). NRT, though generally well tolerated, often requires frequent dosing and strong patient adherence, which can limit its effectiveness (12). Additionally, cost, side-effect profiles, and access to medications may influence treatment choice. Therefore, cessation strategies should be personalized, balancing efficacy with tolerability and individual patient characteristics.

The present study aims to evaluate the effectiveness of pharmacological treatment in patients who initiated it in the smoking cessation clinic and to determine the factors affecting its success. This study primarily hypothesized that the type of pharmacological treatment would significantly impact smoking cessation outcomes, alongside other clinical and demographic factors such as nicotine dependence and follow-up adherence. Although several studies have investigated factors related to cessation outcomes, few have evaluated the real-world effectiveness of pharmacotherapy in routine outpatient settings in Türkiye, where treatment access, adherence, and behavioral support may vary (15, 16). By analyzing data from a single-center smoking cessation clinic, this study aims to contribute novel insights from a clinical sample and to inform future practice and policy.

# Methods

The present study was conducted as an observational cross-sectional study in the Family Medicine Department Smoking Cessation outpatient clinic of a tertiary hospital in Istanbul between 15/04/2023 and 15/10/2023.

## Sample

A total of 181 patients who were over 18 years of age, active smokers, and willing to participate in the study were included. Individuals who did not participate in the study, individuals under 18 years of age, individuals with conditions that prevented active communication, individuals with an emergency, individuals who were pregnant, and individuals who could not be contacted by phone for a check-up in the third month of treatment were excluded from the study.

## Procedure

The study was approved by the İstanbul Medeniyet University Goztepe Education and Research Hospital ethics committee (decision number 2023/0246 dated 12/04/2023). The patients participating in the study were informed about it, and their written consent was obtained. The Helsinki Declaration was adhered to in all stages of the study. Patients applying to the smoking cessation clinic are evaluated, and their pharmacological treatments are decided in consultation with the patient. Following the commencement of treatment, patients are informed that they should continue their treatment for eight weeks and are recommended to attend a follow-up appointment at the end of the first month.

The initial application form for the smoking cessation clinic was completed by the physician who initiated the treatment, with the patient being interviewed face-to-face. The initial application form for the smoking cessation clinic solicits information regarding the patient's age, gender, marital status, employment status, income level, chronic diseases, the primary motivation for desiring to cease smoking, and whether they have received a physician's recommendation. Participants were asked to indicate their main reasons for attempting to quit smoking through open-ended responses. These responses were analyzed using frequency counts without thematic reclassification, in order to preserve the individual nature of motivational factors.

In addition, the patients completed a 23-question questionnaire in the outpatient clinic, which included questions about smoking history, previous quitting experiences, whether they had received pharmacological treatment before if they had been able to quit smoking, and how long they had not smoked.

The patients included in the study were contacted via telephone three months after the commencement of treatment. Patients who were not contactable were excluded from the study. During these follow-up calls, the participants were asked a series of questions, which were documented in the Control Follow-up Form. The control follow-up form inquired about the initiation of recommended treatments, the duration of their use, smoking status, attendance for check-ups, and the occurrence of treatment side effects.

Participants were divided into two groups, Group 1 (those who had successfully ceased smoking) and Group 2 (those who had not), based on their smoking status at the third-month check-up.

## Measure

### Fagerström Nicotine Dependence Test (FNDT)

The patients' nicotine dependence level was determined using the Fagerström Nicotine Dependence Test (FNDT). Scores on the FNDT range from 0 to 10 points and are classified as follows: extremely low (0-2 points), low (3-4 points), moderate (5 points), high (6-7 points), or very high (8-10 points) (18). This test, which is widely used to measure addiction levels, has a Turkish reliability study (Crohnbach alpha: 0.56) (19). FTND was used to assess nicotine dependence. In our sample, the internal consistency of the scale was relatively low, which may limit the reliability of the scale in this context.

## Statistical Analysis

The study data were analyzed using SPSS (Version 23.0) with descriptive statistics (number, percentage, mean, and standard deviation). The distribution of continuous data was assessed for normality using the Kolmogorov-Smirnov, Shapiro-Wilk, and Levene tests. The independent sample T-test was used for comparisons between two groups when conditions were met; otherwise, the Mann-Whitney U test was applied. For comparisons of more than two groups, One-Way ANOVA or Kruskal-Wallis tests were used, depending on the conditions. The chi-square test was employed for categorical data, with Bonferroni correction in post-hoc analyses. A multivariate binary logistic regression analysis was conducted to identify independent predictors of smoking cessation success. The model included clinically relevant variables and those significant in bivariate analyses model fit assessed via likelihood ratio chi-square and explained variance reported using Nagelkerke $R^2$; odds ratios (OR) with 95% confidence intervals (CI) were calculated to determine association strengths. A p-value $<0.05$ was considered statistically significant in all analyses.

# Results

Our study included 203 patients who visited the Smoking Cessation clinic and initiated pharmacological treatment. However, 22 individuals who could not be reached during the follow-up interviews were excluded from the study. Comparisons between the groups were made based on smoking cessation outcomes at the 3rd-month follow-up, with 58 participants successfully quitting and 123 participants not quitting.

Table 1 compares the descriptive characteristics of the participants. The findings reveal that factors such as gender, marital status, education level, monthly income, doctor's advice to quit smoking, alcohol and substance use, and smoking at work did not demonstrate a significant difference in the participants' ability to quit smoking. However, a statistically significant disparity was observed in the rates of smoking cessation among those who were employed and those who were not. Specifically, 38% of employed participants and 23.7% of unemployed participants successfully quit smoking (p=0.04). Furthermore, it was observed that individuals suffering from chronic diseases were more likely to quit smoking than those without chronic diseases (42.9% vs. 24%, p=0.007). In addition, the analysis revealed a significant association between smoking cessation and the absence of smoking in the home environment, with 39.5% of participants who

did not live with smokers successfully quitting, in contrast to the 25.3% who resided with a smoker and were able to quit (p=0.04). The study revealed that 58% (n=35) of patients who attended follow-ups successfully quit smoking, in contrast to the 19% (n=23) who did not attend follow-ups and were able to quit smoking. The finding that patients who attended follow-ups were more likely to successfully quit smoking was found to be statistically significant (p<0.001).

**Table 1. Smoking cessation status according to sociodemographic variables.**

| Variables | Successful Quitters (Group 1) | | Unsuccessful Quitters (Group 2) | | p |
|---|---|---|---|---|---|
| | N | % | N | % | |
| Gender | | | | | |
| Female (n=90) | 24 | 26.7 | 66 | 73.3 | 0.123 |
| Male (n=91) | 34 | 37.4 | 57 | 62.6 | |
| Marital Status | | | | | |
| Single (n=76) | 22 | 28.9 | 54 | 71.1 | 0.447 |
| Married (n=105) | 36 | 34.3 | 69 | 65.7 | |
| Educational Status | | | | | |
| Illiterate (n=3) | 2 | 66.7 | 1 | 33.3 | 0.377 |
| Primary School (n=52) | 18 | 34.6 | 34 | 65.4 | |
| Highschool (n= 52) | 13 | 25 | 39 | 75 | |
| University and Above (n=74) | 25 | 33.8 | 49 | 66.2 | |
| Working Status | | | | | |
| Employed (n=105) | 40 | 38.1 | 65 | 61.9 | 0.040 |
| Unemployed (n=76) | 18 | 23.7 | 58 | 76.3 | |
| Average Monthly Income (TRY)** | | | | | |
| 0-10.000 (n=79) | 24 | 30.4 | 55 | 69.6 | 0.594 |
| 10.000-20.000 (n=63) | 18 | 28.6 | 45 | 71.4 | |
| 20.000-30.000 (n=27) | 11 | 40.7 | 16 | 59.3 | |
| 30.000 and Above (n=12) | 5 | 41.7 | 7 | 58.3 | |
| Chronic Diseases Absence | | | | | |
| No (n=104) | 25 | 24 | 79 | 76 | 0.007 |
| Yes (n=77) | 33 | 42.9 | 44 | 57.1 | |
| Smoking Cessation Advice from a Doctor | | | | | |
| No (n=100) | 27 | 27 | 73 | 73 | 0.106 |
| Yes (n=81) | 31 | 38.3 | 50 | 61.7 | |
| Alcohol Using | | | | | |
| Regularly (n=48) | 13 | 27.1 | 35 | 72.9 | 0.661 |
| Rarely (n=5) | 2 | 40 | 3 | 60 | |
| Does not Use (n=128) | 43 | 33.6 | 85 | 66.4 | |
| Substance Use | | | | | |
| No (n=177) | 0 | 0 | 4 | 100 | 0.165 |
| Yes (n=4) | 58 | 32.8 | 119 | 67.2 | |
| Is Smoking Allowed in the Workplace? | | | | | |
| Yes (n=74) | 24 | 32.4 | 50 | 67.6 | 0.926 |
| No (n=107) | 34 | 31.8 | 73 | 68.2 | |
| Is There Anyone Else Smoking in the House? | | | | | |
| Yes (n=95) | 24 | 25.3 | 71 | 74.7 | 0.040 |
| No (n=86) | 34 | 39.5 | 52 | 60.5 | |
| Has she/he come to her/his follow-up appointment at the smoking cessation clinic? | | | | | |
| Yes (n=60) | 35 | 58.3 | 25 | 41.7 | <0.001 |
| No (n=121) | 23 | 19 | 98 | 81 | |

Note: Parity at the time of analysis: 1 USD=32.25 TRY

**Table 2. Smoking cessation status according to continuous variables**

| Variables | Successful Quitters (Group 1) | | Unsuccessful Quitters (Group 2) | | F | p |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | | |
| Age (years) | 43.62 | 13.23 | 39.47 | 12.85 | 0.27 | 0.047 |
| Age of starting smoking (years) | 18.96 | 5.98 | 18.20 | 4.87 | 2.49 | 0.363 |
| Duration of smoking (years) | 23.34 | 12.84 | 20.38 | 11.94 | 0.50 | 0.130 |
| Cigarettes smoked in a day (pack) | 1.21 | 0.54 | 1.31 | 0.53 | 0.67 | 0.232 |
| Number of visits for follow-ups | 0.64 | 0.58 | 0.21 | 0.45 | 15.71 | <0.001 |

Note: 1 pack=20 pieces; SD: Standard Deviation.

Table 2 presents a comparison of the continuous data belonging to the participants. The mean age of individuals who had successfully ceased smoking was found to be considerably higher than those who had not (p=0.047). Furthermore, a significant difference was observed in the number of times patients attended follow-up appointments, contingent on their respective quit statuses (p<0.001). However, the age at which smoking was initiated, the duration of smoking, and the number of cigarettes smoked per day did not differ significantly from the quit status.

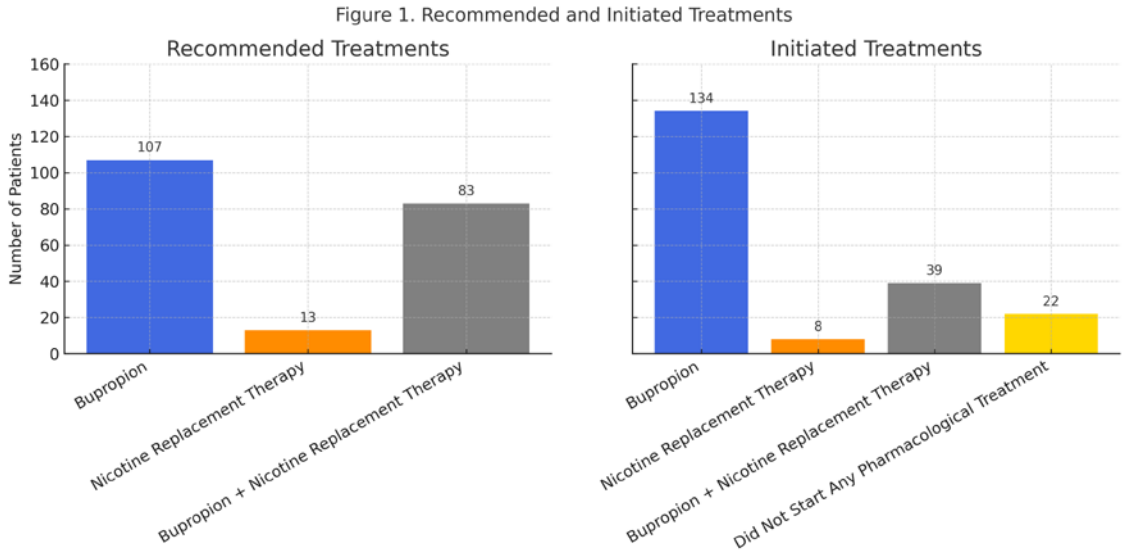


**Figure 1. Recommended and initiated treatments**

Among the participants, 52.7% (n=107) were recommended bupropion, 6.4% (n=13) were recommended NRT, and 40.9% (n=83) were advised to initiate combination therapy with both bupropion and NRT. Of the 203 participants who received a pharmacological recommendation, 10.8% (n=22) did not initiate any pharmacological treatment. Among those who did, 66% (n=134) started bupropion alone, 4% (n=8) started NRT alone, and 19.2% (n=39) began combination therapy. Notably, several participants who were advised to use both bupropion and NRT opted to use bupropion alone. The numbers regarding the pharmacological treatments recommended to the participants and used by the participants can be found in Figure 1. Ultimately, analyses were conducted on the treatments used by the participants, not the treatments recommended to them.

Of the patients used bupropion, 28% (n=37) successfully ceased smoking, while 72% (n=97) were unable to do so. A similar trend was observed in the group receiving a combination of bupropion and NRT, with 49% (n=19) successfully quitting smoking, while 51% (n=20) did not achieve this outcome. Among the 8 patients receiving NRT, 2 (25%) successfully ceased smoking, while 6 (75%) could not. Of all patients, 58

of them (32%) ceased smoking. The difference between these two groups was not statistically significant (p=0.596).

**Table 3. Smoking cessation status according to nicotine dependence level in patients using Bupropion treatment.**

| Variables | FNDT | Successful Quitters (Group 1) | | Unsuccessful Quitters (Group 2) | | p |
|---|---|---|---|---|---|---|
| | | N | % | N | % | 0.006 |
| Very low addiction (n:1) | 0-2 | 0 | 0 | 1 | 100 | |
| Low addiction (n:30) | 2-4 | 14 | 46.7 | 16 | 53.3 | |
| Moderate addiction (n:28) | 5 | 8 | 28.6 | 20 | 71.4 | |
| High addiction (n:37) | 6-7 | 12 | 32.4 | 25 | 67.6 | |
| Very high addiction (n:40) | 8-10 | 3 | 7.5 | 37 | 92.5 | |

FNDT: Fagerström Nicotine Dependence Test score

The patients' degree of nicotine addiction was measured using the FNDT. The results indicated that 33% (n=67) of the participants exhibited very high addiction, 30% (n=61) demonstrated high addiction, 19.7% (n=40) displayed low addiction, 16.7% (n=34) exhibited moderate addiction, and 0.5% (n=1) showed very low addiction. The mean FNDT score was found to be 6.39 ± 2.04. The participant with the lowest score received 2 points, while the patient with the highest score received 10 points. Upon examination of the comparison between the groups, no significant difference was observed between the addiction status and smoking cessation status. However, a distinction was identified among patients who initiated bupropion treatment (p=0.006) (Table 3). A post-hoc analysis, employing the Bonferroni method ($p<0.05$), revealed a statistically significant difference between participants with low addiction and those with very high addiction.

**Table 4. Smoking cessation status according to the reason for deciding to quit smoking.**

| Variables | Successful Quitters (Group 1) | | Unsuccessful Quitters (Group 2) | | p |
|---|---|---|---|---|---|
| | N | % | N | % | 0.775 |
| Worrying about having a disease | 15 | 38.5 | 24 | 61.5 | |
| Economic reasons | 3 | 37.5 | 5 | 62.5 | |
| Due to existing diseases | 6 | 35.3 | 11 | 64.7 | |
| Suggestions and encouragement of their relatives | 5 | 22.7 | 17 | 77.3 | |
| Doctor's recommendation | 5 | 29.4 | 12 | 70.6 | |
| Due to respiratory complaints | 12 | 30.8 | 27 | 69.2 | |
| Due to discomfort caused by the smell | 5 | 31.3 | 11 | 68.7 | |
| Worrying about people around them getting sick | 1 | 16.7 | 5 | 83.3 | |
| Those who quit smoking set an example | 0 | 0 | 3 | 100 | |
| Because it's boring | 2 | 50 | 2 | 50 | |
| Desire for life change | 1 | 25 | 3 | 75 | |
| Concerns about skin health | 1 | 25 | 3 | 75 | |

Table 4 shows the effect of the main reasons that influenced individuals' decision to attempt quitting on their cessation status. These were analyzed and presented as reported, without thematic grouping. Among those who successfully quit smoking, the most commonly reported motivations were concern about contracting illness, respiratory symptoms, and the presence of a current disease. Similarly, among those who were not successful in quitting, respiratory symptoms, concern about illness, and encouragement from relatives were reported as leading motivations for their quit attempts. However, despite these motivations, their quit attempts were not successful. A subsequent comparison between the two groups revealed no statistically significant difference (p=0.775). Furthermore, an analysis of the impact of prior smoking cessation attempts,

previous pharmacological treatment for smoking cessation, and previous use of bupropion, varenicline, and NRT on smoking cessation success revealed no significant differences between the groups (Table 5).

**Table 5. Smoking cessation status according to smoking cessation attempts**

| Variables | Successful Quitters (Group 1) | | Unsuccessful Quitters (Group 2) | | p |
|---|---|---|---|---|---|
| | N | % | N | % | |
| Has he/she tried to quit smoking before? | | | | | |
| No | 15 | 36.6 | 26 | 63.4 | 0.479 |
| Yes | 43 | 30.7 | 97 | 69.3 | |
| Has he/she ever received pharmacological treatment to quit smoking? | | | | | |
| No | 34 | 30.6 | 77 | 69.4 | 0.608 |
| Yes | 24 | 34.3 | 46 | 65.7 | |
| Has he/she used Bupropion before to quit smoking? | | | | | |
| No | 53 | 32.5 | 110 | 67.5 | 0.683 |
| Yes | 5 | 27.8 | 13 | 72.2 | |
| Has he/she used Varenicline to quit smoking before? | | | | | |
| No | 41 | 30.6 | 93 | 69.4 | 0.481 |
| Yes | 17 | 36.2 | 30 | 63.8 | |
| Have you ever used Nicotine Replacement Therapies to quit smoking? | | | | | |
| No | 47 | 30.5 | 107 | 69.5 | 0.294 |
| Yes | 11 | 40.7 | 16 | 59.3 | |

As showed in Table 6, a multivariate logistic regression analysis was performed to identify the factors associated with smoking cessation success. The full model, including age, FTND score, employment status, used treatment, attendance to follow-up, presence of chronic disease, and having someone smoke in the house, showed a significant improvement over the null model ($\Delta X^2=53.986$, $p<0.001$). The model explained approximately 37% of the variance in cessation outcomes (Nagelkerke $R^2=0.371$). Significant predictors included higher nicotine dependence (OR=1.33, p=0.011), attending follow-up visits (OR=0.18, $p<0.001$), combination treatment (p=0.001), and being unemployed (OR=0.39, p=0.036). Age (p=0.073) and having someone smoke in the house (p=0.059) approached significance.

**Table 6. Logistic regression analysis of smoking cessation success**

| Variable | Estimate | Std. Error | Wald Statistic | p |
|---|---|---|---|---|
| Intercept | 1.689 | 1.108 | 2.325 | 0.127 |
| Age | -0.031 | 0.017 | 3.211 | 0.073 |
| FTND | 0.287 | 0.113 | 6.5 | 0.011 |
| Unemployed | -0.944 | 0.451 | 4.384 | 0.036 |
| Employed | 11.322 | 882.744 | 0.0 | 0.99 |
| NRT | 0.154 | 0.975 | 0.025 | 0.874 |
| Bupropion+NRT | -1.71 | 0.529 | 10.463 | 0.001 |
| Follow-up attendance | -1.715 | 0.404 | 18.011 | 0.0 |
| Presence of chronic diseases | -0.287 | 0.427 | 0.451 | 0.502 |
| Having someone smoke in the house | 0.766 | 0.406 | 3.563 | 0.059 |

## Discussion

This study explored multiple factors influencing the success of pharmacological smoking cessation treatment. Our findings suggest that variables such as age, employment status, presence of chronic illness, cohabitation with other smokers, follow-up visit attendance, and nicotine dependence level were associated with treatment outcomes. The results shown that, no significant association between gender and smoking cessation success, which is consistent with previous research (20, 21). Similarly, marital status was not significantly related to cessation outcomes, although studies in Türkiye, the USA, and Japan have reported higher quit rates among married individuals (22, 23). This discrepancy may stem from the limited sample size and cross-sectional design. Education level also did not show a significant association with cessation success, possibly due to the high educational attainment and lack of variability in our sample (24, 25).

Employed participants had higher quit rates compared to unemployed individuals, aligning with findings that associate unemployment with higher smoking prevalence (25-27). Although income level was not significantly associated with cessation success, prior studies suggest higher income supports quitting, while some research in Türkiye links increasing income to higher cigarette consumption (28-30). The narrow income range in the sample may explain the lack of significance.

Participants with chronic illness exhibited higher cessation success. While this is consistent with some reports, others suggest chronic conditions may complicate cessation efforts (6, 31, 32). The prevalence of health-related motivations and the receipt of physician advice (45.3%) likely contributed to this finding (6). Workplace smoking policies did not significantly influence outcomes, unlike the U.S. studies showing restrictive policies improve quit rates (33). The impact may have been obscured by the high proportion of participants living with other smokers. Indeed, cohabitation with another smoker was associated with lower success, consistent with literature indicating the benefits of smoke-free home environments (34).

In our study, the smoking cessation rate was higher among individuals who used a combination of bupropion and nicotine replacement therapy (NRT) compared to those who used bupropion alone (48% vs. 28%). The average FTND score was also higher in the combined therapy group (7.92 ± 1.38) than in the bupropion-only group (6.12 ± 1.98), suggesting that more heavily dependent individuals were prescribed combination therapy. These findings are consistent with previous studies from Türkiye and the USA, which have shown that pharmacological treatment success is enhanced by combination therapies involving NRT (35–39).

Although no statistically significant association was found between FTND scores and cessation success in the overall sample, a significant relationship was observed in the bupropion group, where higher nicotine dependence was associated with lower cessation rates. This aligns with prior research indicating that higher dependence reduces the likelihood of quitting (40–43). These findings also draw attention to the limitations of the FTND, which in our sample demonstrated suboptimal internal consistency, and may not fully capture the multifaceted nature of nicotine addiction. Despite these limitations, FTND remained a significant predictor in our multivariate logistic regression model, indicating its relevance in the context of other variables. Importantly, nicotine dependence is a modifiable risk factor; it can be addressed through behavioral strategies and pharmacologic intensification, particularly combination therapies, to improve treatment outcomes in highly dependent individuals.

The study, the reasons influencing the decision to quit smoking were examined, yet no statistically significant differences were found between groups in terms of cessation outcomes. The highest cessation rate was observed among individuals citing health concerns as their primary motivation. This is consistent with findings by Halpern et al., who reported that individuals motivated by health concerns or the desire to set a positive example for their children had greater success in quitting (44). Another study similarly showed that those with health-related motivations were more likely to achieve abstinence (45). However, in our study, motivation was assessed through open-ended responses rather than a validated scale which may have limited our ability to quantitatively evaluate the role of motivation in cessation outcomes.

Moreover, while some participants achieved abstinence at the 3-month follow-up, the long-term sustainability of cessation remains uncertain, as no extended follow-up was conducted. Considering the chronic and relapsing nature of nicotine dependence, long-term success often requires ongoing behavioral support and relapse prevention strategies, including counseling, coping-skills training, and booster interventions (8). Future studies should include validated motivation measures, incorporate long-term follow-up assessments, and evaluate the effectiveness of tailored interventions aimed at managing high levels of nicotine dependence and reducing relapse risk.

This study has several limitations. Firstly, its cross-sectional design limits the ability to draw causal inferences between the factors affecting smoking cessation and treatment success. A longitudinal study design could provide more insights into the long-term effects of pharmacological treatments and their interaction with individual characteristics. Second, the study was conducted in a single center with a relatively homogenous patient population, which may limit the generalizability of the findings to broader populations with diverse cultural and socioeconomic backgrounds. Third, smoking cessation success was assessed based on self-reported abstinence at the 3-month follow-up via telephone interviews. No biochemical verification (e.g., exhaled carbon monoxide or cotinine levels) was performed due to logistical limitations, which may lead to overestimation of abstinence rates. Fourth, although the FTND is widely used, its internal consistency in this sample was relatively low, potentially affecting the reliability of nicotine dependence assessment. Finally, the study did not include a validated instrument to assess motivation to quit smoking, which restricts interpretation of the motivational dimension of cessation success.

This study demonstrates that successful smoking cessation in outpatient clinical practice is influenced by a combination of individual and treatment-related factors. Attendance at follow-up visits, use of combination pharmacotherapy, lower nicotine dependence, and employment status emerged as significant predictors of cessation success. While motivations to quit were primarily health-related, the lack of standardized tools to assess motivation limited the interpretation of their effect.

Given the chronic and relapsing nature of nicotine dependence, long-term success requires not only appropriate pharmacological treatment but also sustained behavioral support and relapse prevention strategies. Integrating follow-up systems, addressing individual treatment adherence, and using validated tools to assess motivation and dependence are essential steps to enhance cessation outcomes in clinical settings. Future studies should investigate long-term effectiveness and explore psychosocial determinants with standardized measures.

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