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Research Article

Demographic and clinical characteristics of patients applying to a smoking cessation clinic affiliated with a university hospital and factors affecting their smoking cessation status

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ABSTRACT

Objective: Smoking addiction is a serious public health problem that ranks among the leading preventable causes of death and affects all age groups. Our study aimed to examine the demographic and clinical characteristics of patients attending a smoking cessation clinic affiliated with a university hospital and the factors influencing their cessation status.

Methods: This is a retrospective, cross-sectional study. Age, gender, occupation, chronic disease status, treatments given, smoking histories, and Fagerstrom scores of patients who applied to the smoking cessation clinic affiliated to Samsun Training and Research Hospital between August 01, 2020 and August 31, 2024 were obtained using the hospital automation system without sharing their personal information. The data were analyzed using the SPSS package program.

Results: A total of 399 patients were included in the study. 63.66% (n=275) of the patients were male. The average Fagerstrom score of the patients was calculated as 5.66±2.43. The patients were interviewed an average of 2.21±1.28 times per person. The average smoking duration of the patients was calculated as 27.38±16.57 pack-years. Combined treatment was initiated in 35.19% of the patients (n=141). As combined treatment, 88.15% of the patients (n=134) were started on a combination of Bupropion and Nicotine Replacement Therapy (NRT). As a result of treatment, 34.09% of patients (n=136) quit smoking. Monotherapy with Bupropion was found to be the least effective drug for smoking cessation (p=0.01). The smoking cessation rate among patients receiving combination therapy was found to be higher than that of other treatment options (p<0.001). Patients who quit smoking had a significantly lower Fagerstrom score (p=0.024) than those who did not quit, while the number of individual consultations per patient (p<0.001) was significantly higher. The proportion of patients who quit smoking and had other smokers in their household was lower than those who did not quit (p=0.003).

Conclusion: It was observed that approximately one third of the patients quit smoking. The smoking cessation rate of patients who used combined treatment was found to be higher than other treatment options.

Keywords: bupropion, nicotine replesman therapy, smoking cessation, cytisine, varenicline

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Introduction

Tobacco addiction is a major public health problem affecting all age groups and remains one of the leading preventable causes of death worldwide.[1] It accounts for nearly 80% of premature deaths in low- and middle-income countries.[2,3] According to the Global Adult Tobacco Survey Turkey 2016, the prevalence of smoking is 44.1% among men and 19.2% among women.[4]

The individual's decision, attitudes, and behaviors play a decisive role in smoking cessation. Structured treatment greatly enhances the chances of quitting when professional help is necessary.[5] However, providing smoking cessation counseling is as complex and challenging as nicotine addiction itself. In Turkey, more than 500 smoking cessation clinics are providing services, and over 2.5 million individuals have applied to receive smoking cessation counseling.[6] The quit rates of individuals applying to smoking cessation clinics in Turkey range between 20% and 50%.[7]

In Turkey, many factors influence smoking cessation success, including low nicotine dependence, regular follow-up by healthcare professionals, adherence to pharmacological treatment, and strong social support.[8,9]

Treatment strategies consist of both behavioral approaches and pharmacotherapy. The Health Belief Model, Health Locus of Control, Diffusion of Innovations Model, Pender's Health Promotion Model, and the Transtheoretical Model are among the commonly applied behavior change models.[10,11] Pharmacotherapy primarily consists of nicotine replacement therapy (NRT – transdermal patches, gum, nasal spray, inhaler, sublingual tablets, and lozenges), bupropion, and varenicline. Cytisine has recently been introduced as an additional option for pharmacotherapy.[12] When administering pharmacotherapy, it should ideally be supported by behavioral interventions, and combination therapies should be considered when necessary.[5]

In this study, we aimed to evaluate the impact of combined therapy and close follow-up on smoking cessation success among individuals attending a university hospital smoking cessation clinic. By analyzing the characteristics of these patients and the factors affecting cessation outcomes, we aim to provide evidence that can guide treatment decisions for future applicants

Materials and Methods

Study design and population

This study was designed as a cross-sectional, retrospective analysis. The study population consisted of 432 patients aged ≥18 years who smoked and voluntarily presented to the Smoking Cessation Outpatient Clinic of Samsun Training and Research Hospital between August 1, 2020, and August 31, 2024. As all available patient records were included, no sample size calculation was performed.

Data collection

Demographic and clinical data, including age, sex, occupation, alcohol use, presence of chronic diseases, treatment modalities, and smoking history (pack-years), were extracted from patients' medical records. Each patient had an individual file documenting data from the first consultation and subsequent follow- up sessions. Smoking cessation counseling was provided by physicians certified in smoking cessation therapy and by trained resident physicians.

At the first visit, nicotine dependence was assessed using the Fagerström Test for Nicotine Dependence (FTND). Scores of 0–2 were classified as low dependence, 3–7 as moderate dependence, and 8–10 as high dependence.[13] The Turkish validity and reliability study of the FTND was conducted by Uysal et al. in 2004, with a reported Cronbach's alpha of 0.56.[14]

Treatment strategies were individualized according to FTND scores, chronic disease status, concurrent medications, contraindications for pharmacotherapy, and patient adherence. Patients received either behavioral therapy alone, monotherapy (varenicline, bupropion, cytisine, nicotine replacement therapy [NRT]), or combination therapy (bupropion+NRT, varenicline+NRT, cytisine+NRT, or triple therapy). In accordance with Ministry of Health policies, NRT and cytisine were provided free of charge during certain periods. Follow-up visits were recorded in patient files.

Although 432 patient files were available, complete data were accessible for 399 patients and included in the final analysis. Patients who had not completed at least one year of follow-up as of August 31, 2024, and those who failed to quit smoking were excluded from the analysis. For patients who missed their annual control visits, follow-up information was obtained via remote consultations conducted by resident physicians.

Ethical considerations

Ethics Committee approval for the study protocol was obtained from the Faculty of Medicine of Samsun University (Approval No: 2023/18/10, date: October 4, 2023). Written informed consent was obtained from all patients at their initial presentation.

Statistical analysis

Statistical analyses were performed using SPSS version 25.0. Normality of distribution was assessed using histogram plots and the Kolmogorov–Smirnov test. Descriptive statistics were presented as mean ± standard deviation, median, and minimum–maximum values. Categorical variables were compared using the chi-square test. Non-normally distributed continuous variables were analyzed using the Mann–Whitney U test for two-group comparisons and the Kruskal–Wallis test for comparisons of more than two groups. A p-value <0.05 was considered statistically significant. Post-hoc pairwise comparisons for significant results were performed using Duncan's test. Binary logistic regression analysis was conducted to assess the impact of treatment modalities on smoking cessation outcomes, with Bonferroni correction applied (adjusted significance level: $p<0.003$).

Results

A total of 399 patients were included in the analysis. The mean age of participants was 44.69 ± 12.05 years, with a median age of 44 years (range: 18–74). The sociodemographic characteristics of the study population are presented in Table 1. Comparisons between sociodemographic characteristics and smoking cessation status are shown in Table 2. The presence of another smoker in the household was significantly associated with a lower likelihood of successful cessation ($p = 0.003$). Similarly, participants reporting smoking-related complaints had lower quit rates ($p = 0.026$).

According to the Fagerström Test for Nicotine Dependence (FTND) scores, 13.19% (n = 57) had low, 61.34% (n = 265) had moderate, and 25.46% (n = 110) had high nicotine dependence. The majority of participants (75.69%, n = 327) had previously attempted to quit smoking, and 49.85% of them (n = 163) had received professional support during these attempts. A total of 7.19% of patients (n = 31) reported using tobacco products other than cigarettes; these included e-cigarettes (3.70%, n = 16), hookah (3.94%, n = 17), cigars (1.39%, n = 6), and other tobacco products.

The distribution of treatment methods applied at the smoking cessation clinic is presented in Table 3. The number of face-to-face consultations per patient ranged from 1 to 8. Patients who failed to quit smoking attended significantly fewer sessions compared with those who successfully quit ($p < 0.001$) and had significantly higher FTND

Table 1. Sociodemographic characteristics of participants

Characteristic	Category	n	%
Gender	Female	145	(36.34)
	Male	254	(63.66)
Age Group (years)	<25	20	(5.01)
	26-44	182	(45.61)
	45-60	147	(36.84)
	61-75	50	(12.54)
Marital Status	Married	327	(81.96)
	Single/Never Married	51	(12.78)
	Widowed	21	(5.26)
Educational Status	Primary Education	95	(23.81)
	Secondary Education	131	(32.83)
	Higher Education	173	(43.36)
Place of Residence	City Center	343	(85.96)
	Rural/Out-of-city	56	(14.04)
Employment Status	Civil Servant	135	(33.83)
	Unemployed/Homemaker/Retired/Student	137	(34.34)
	Laborer	50	(12.53)
	Private Sector	77	(19.30)
Presence of Other Smokers in the Household	Yes	158	(39.60)
	No	241	(60.40)
Total		399	100.00

scores (p = 0.024). Detailed comparisons between smoking

characteristics, treatment approaches, and cessation outcomes are presented in Table 4.

Combination therapy was associated with the highest quit rates, significantly outperforming all other treatment options (p < 0.001). The comparison of treatment types and smoking cessation outcomes is presented in Table 5, with monotherapy bupropion used as the reference category. Although the likelihood of quitting among patients who did not receive pharmacological treatment was 2.76 times higher compared to those treated with bupropion, this difference was not statistically significant (p = 0.075). Logistic regression analysis revealed that the presence of another smoker in the household significantly reduced the odds of quitting (p = 0.003), with absence of household smoking nearly doubling the likelihood of cessation (Exp(B)= 1.953). FTND score was a significant negative predictor of cessation success (B = −0.022, p = 0.023), indicating that higher nicotine dependence was associated with lower quit rates. The absence of smoking-related complaints was positively associated with cessation success (B = 0.489, p = 0.026), corresponding to a 1.63-fold higher likelihood of quitting compared with those who reported complaints. Advanced analyses are presented in Table 6.

Discussion

In this study, we analyzed the characteristics of individuals presenting to a smoking cessation clinic and investigated factors influencing cessation success. Our findings demonstrate that varenicline, cytisine, nicotine replacement therapy (NRT), and combination therapies significantly improved quit

Table 2. Comparison of smoking cessation outcomes by patients' sociodemographic characteristics

	Unsuccessful n (%)	Successful n (%)	p
Gender			0.331
Female	100 (68.97)	45 (31.03)	
Male	163 (64.18)	91 (35.82)	
Age Group			0.587
<25	15 (75.00)	5 (25.00)	
26–44	115 (63.20)	67 (36.80)	
45–60	101 (68.70)	46 (31.30)	
61–75	32 (64.00)	18 (36.00)	
Marital Status			0.614
Married	219 (67.20)	107 (32.80)	
Single/Never Married	31 (60.78)	20 (39.22)	
Widowed	13 (61.90)	8 (38.10)	
Educational Status			0.632
Primary Education	66 (69.47)	29 (30.53)	
Secondary Education	83 (63.36)	48 (36.64)	
Higher Education	114 (65.93)	59 (34.07)	
Place of Residence			0.169
City Center	220 (64.17)	123 (35.83)	
Rural/Out-of-city	43 (76.79)	13 (23.21)	
Employment Status			0.719
Civil Servant	87 (64.44)	48 (35.56)	
Unemployed/Homemaker/Retired/Student	88 (64.23)	49 (35.77)	
Laborer	33 (66.00)	17 (34.00)	
Private Sector	55 (71.43)	22 (28.57)	
Other Smokers in Household			0.003
No	145 (60.16)	96 (39.84)	
Yes	118 (74.68)	40 (25.32)	
Alcohol Consumption			0.273

rates compared to bupropion monotherapy, which was the least effective option. Lower FTND scores and the absence of smokers in the household were associated with greater cessation success.

Specifically, varenicline monotherapy was found to increase the likelihood of smoking cessation approximately fourfold compared to bupropion ($p = 0.010$). This finding is consistent with large-scale meta-analyses and randomized controlled trials (RCTs) in the literature demonstrating the superior efficacy of varenicline over bupropion and single-agent NRT.[15] It is thought that varenicline's partial agonist activity at the α4β2 nicotinic acetylcholine receptor reduces nicotine craving and withdrawal symptoms while simultaneously attenuating the rewarding effects of nicotine, thereby increasing cessation rates.[16]

Similarly, cytisine and NRT monotherapy increased the likelihood of cessation approximately threefold compared with bupropion. Cytisine, a cost-effective partial agonist with a mechanism of action similar to varenicline, is widely used in Eastern and Central Europe. Evidence from clinical trials has confirmed cytisine's superiority over

Table 3. Treatment options used by participants

Treatment category	Specific treatment	n	%
Monotherapy	Varenicline Monotherapy	18	(4.51)
	Bupropion Monotherapy	109	(27.32)
	Cytisine Monotherapy	34	(8.52)
	NRT Monotherapy	80	(20.05)
Pharmacological	Combined Therapy	141	(35.34)
Non-Pharmacological	Non-Pharmacological Treatment	17	(4.26)
Total Participants		399	(100.00)
Specific Combined Treatment Options (Total n=141)		n	%
	Bupropion + NRT	125	(88.65)
	Varenicline + NRT	14	(9.93)
	Cytisine + NRT	1	(0.71)
	Varenicline + Bupropion + NRT	1	(0.71)

Table 4. Comparison of specific smoking and treatment parameters with smoking cessation status

Characteristic	Cessation status	Mean ± SD	Median (Min-Max)	p-value
Number of Interviews	Unsuccessful	1.96±1.17	2 (1–6)	<0.001
	Successful	2.83±1.33	3 (1–8)	
FTND Score	Unsuccessful	5.85±2.40	6 (0–10)	24
	Successful	5.26±2.52	5 (0–10)	
Smoking Consumption (Pack-Years)	Unsuccessful	28.12±17.43	26.5 (1.5–100)	550
	Successful	26.66±15.25	24 (1–72)	

Table 5. Comparison of treatment modalities with smoking cessation status

Treatment modality	Cessation status	Unsuccessful n (%)	Successful n (%)	p-value
Monotherapy	Varenicline	10 (55.55)	8 (44.45)	<0.001
	Bupropion	91 (83.48)	18 (16.52)	
	Cytisine	22 (64.70)	12 (35.30)	
	NRT	50 (62.50)	30 (37.50)	
Combined Therapy	Combined Treatment	79 (56.02)	62 (43.98)	
No Pharmacological Treatment	Non-Pharmacological Treatment Only	11 (64.70)	6 (35.30)	

*Chi-Square Test was used for comparison across all treatment groups.

placebo and comparable efficacy to NRT.[17] Our findings support cytisine as a viable alternative to bupropion. The highest quit rates were observed among patients receiving combination therapy, whose likelihood of cessation was nearly fourfold higher than that of the bupropion group. This finding reinforces current clinical guidelines recommending combination regimens—such as long-acting NRT (patch) plus short- acting NRT (gum or lozenge) or varenicline in combination with bupropion—when monotherapy fails or dependence is severe.[18-20] Combination approaches act through complementary mechanisms, maintain more stable nicotine levels, and help manage acute cravings more effectively. Our results are in agreement with Benli et al., who reported that patients receiving varenicline had higher quit rates than those receiving bupropion

Table 6. Advanced analysis of treatment modalities and associated features predicting smoking cessation status (logistic regression)

Variable	Category	B (Coefficient)	S.E. (Standard error)	Wald $\chi 2$	p-value	Exp(B) (Odds ratio)
Treatment Modality (Reference: Bupropion Monotherapy)						
	Varenicline Monotherapy	1.397	540	6.697	0,010	4.044
	Cytisine Monotherapy	1.014	442	5.267	0,022	2.758
	NRT Monotherapy	1.110	346	10.272	0,001	3.033
	Combined Therapy	1.378	309	19.924	<0.001	3.968
	No Pharmacological Treatment	1.014	569	3.174	0,075	2.758
Other Smokers in Household (Reference: Yes)						
	No other smoker in household	669	225	8.823	0,003	1.953
Smoking-Related Complaint (Reference: Presence)						
	No smoking-related complaint	489	220	4.932	0,026	1.630

at weeks 1 and 2 and at months 1, 3, and 6, although no significant difference was observed at 12 months.[21] Recent large-scale Australian studies have compared cytisine and varenicline and reported that cytisine demonstrates similar efficacy while offering a lower incidence of side effects and lower cost; this makes cytisine a suitable option in resource-limited settings.[22] Rigotti and colleagues demonstrated in their randomized clinical trial of 810 participants that cytisine provided significantly higher cessation rates compared to placebo.[23]

Another important finding is the effect of behavioral support. The number of face-to-face counseling sessions was found to be significantly associated with cessation success, with patients attending more sessions achieving higher cessation rates ($p < 0.001$). This observation is consistent with previous studies showing that more frequent follow-up visits improve outcomes.[24,25] In our cohort, the mean number of counseling sessions per patient was 2.21 ± 1.28, a finding that supports the view that intensive behavioral support is critically important for sustainable cessation.

A particularly noteworthy observation was that the presence of another smoker in the household significantly reduced cessation success, while the absence of smokers in the household nearly doubled the likelihood of cessation. This finding emphasizes the importance of social and environmental factors in the cessation process. The literature demonstrates that smoking by a spouse or household members functions both as a trigger and as a barrier to motivation, thereby reducing cessation success rates.[26]

The severity of nicotine dependence as measured by FTND was also a significant predictor of cessation outcomes, consistent with previous studies reporting an average score of approximately 5 among treatment-seeking smokers.[27] In our cohort, the mean FTND score was 5.66 ± 2.43, and higher scores were negatively

associated with cessation success; this highlights the need for more intensive pharmacological and behavioral interventions for highly dependent individuals.[28-30]

Interestingly, participants without smoking-related complaints were found to have a 1.63 times greater likelihood of cessation compared to those with symptoms. While this may appear counterintuitive given that health concerns are often cited as the primary source of motivation for cessation, a possible explanation is that asymptomatic individuals may have a more proactive, intrinsic cessation motivation driven by long-term health protection rather than immediate reactive fear. Autonomous motivation has been shown to result in more sustainable behavior change compared to externally motivated attempts.[31] Another possible explanation is that individuals with chronic illness or symptoms may use smoking as a coping mechanism, which could make cessation more difficult.

Finally, although our study did not examine the results in detail according to whether medications were provided free of charge, previous research has shown that providing pharmacotherapy free of charge increases treatment adherence and smoking cessation success.[32] The absence of cost-related data in our analysis may represent a potential confounding factor.

Limitations

Several limitations should be considered when interpreting these findings. First, interruptions in patient compliance may have occurred due to the turnover of resident physicians conducting patient interviews—a necessity resulting from rotations between training programs—and this situation may have affected the accuracy of self-reported smoking cessation status for some participants. Second, reliance on telephone interviews and patient self-reporting to record missing data in addition to the standard filing system constitutes a limitation in terms of data completeness and objectivity. Finally, the unavailability of varenicline (due to its withdrawal from the market) and the subsequent introduction of cytisine significantly influenced the therapeutic medication selection process during the study period.

Strengths

This study presents a noteworthy strength as it is, to our knowledge, the first accessible thesis study addressing smoking cessation treatment using cytisine. Furthermore, its comprehensive structure, encompassing results obtained from various treatment modalities including bupropion, varenicline, cytisine, and Nicotine Replacement Therapy (NRT), makes this study a valuable contribution to the field.

Conclusion and Recommendations

Smoking cessation rates were found to be higher in patients receiving combination therapy compared to those using monotherapy or other treatment options. A positive correlation was observed between increased treatment adherence and higher cessation rates. In this regard, it is recommended that efforts be intensified to enhance patients' smoking cessation motivation during treatment sessions.

Ethical approval

The study protocol was approved by the Ethics Committee of Samsun University Faculty of Medicine (Approval No: 2023/18/10, dated October 4, 2023). Written informed consent was obtained from all patients at their initial visit.

Author contribution

The authors declare contribution to the paper as follows: Study conception and design: OÖ, Data collection: EC, analiysis and interpretation of

results: EC, draft manuscript prepation: AG, OÖ, EC. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest to disclose.

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