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Clinical, Psychological and Socioeconomic Traits that are associated with Nicotine Dependency in Smokers

Clinical Correlates of Nicotine Dependence

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ABSTRACT:

Background: Tobacco smoking is a major public health challenge. This study assessed factors associated with nicotine dependence among smokers attending a tertiary care hospital.

Methods: A hospital-based cross-sectional study was conducted among 43 adult smokers. Nicotine dependence was assessed using the Fagerström Tolerance Questionnaire (FTQ), while psychological status, alcohol use, and socioeconomic status were evaluated using validated instruments.

Results: Moderate, high, and very high nicotine dependence were observed in 23.3%, 18.6%, and 11.6% of participants, respectively. Nicotine dependence was significantly associated with age ($p=0.031$), marital status ($p=0.002$), educational status ($p=0.003$), diabetes mellitus ($p=0.002$), alcohol dependence ($p=0.045$), and socioeconomic status ($p=0.042$).

Conclusion: Nicotine dependence is significantly associated with demographic, clinical, and socioeconomic factors, highlighting the need for comprehensive assessment to support individualized smoking cessation interventions.

INTRODUCTION

Tobacco smoking remains one of the most significant and preventable causes of premature mortality worldwide, representing a persistent public health challenge that transcends geographical, economic, and social boundaries. Despite decades of public health campaigns, legislative interventions, and medical advancements, tobacco use continues to exact an enormous toll on global health, accounting for over 8 million deaths annually and serving as a primary etiological factor in the development of lung disease, various malignancies, cerebrovascular disorders, and numerous other fatal chronic conditions [1]. The magnitude of this health crisis demands continued research, policy innovation, and clinical intervention to address the complex interplay of biological, psychological, and socioeconomic factors that sustain tobacco addiction.

The nature of tobacco smoking as a chronic disease is fundamentally maintained through a combination of acquired behavioral patterns and physiological nicotine dependence [2], creating a formidable barrier to cessation for millions of individuals worldwide. Approximately 70% of cigarette smokers express a desire to quit, yet the journey toward sustained abstinence is typically characterized by multiple failed attempts, with research indicating that smokers require an average of six quit attempts before achieving long-term success. This statistic underscores the profound addictive potential of nicotine and the necessity for evidence-based interventions that address both the physiological and psychological dimensions of tobacco dependence. Current clinical guidelines recommend a combination of behavioral counseling and pharmacotherapy, including agents such as varenicline, bupropion, or nicotine replacement therapy products, with the integrated approach demonstrating superior efficacy compared to either modality alone [3].

The global epidemiology of tobacco consumption reveals concerning trends that demand urgent attention. Approximately 20% of the world's population currently smokes cigarettes, with the total number of smokers increasing from 4.96 billion in 1980 to 5.5 billion in 2016 [1]. Projections indicate that this figure may reach 9 billion by 2025, driven largely by increased uptake in developing nations and among younger populations. The composition of cigarette smoke itself presents a complex toxicological challenge, with more than 7,000 identified substances released during combustion, many of which are known carcinogens and respiratory irritants that contribute to the pathogenesis of smoking-related diseases [4]. The chemical complexity of tobacco smoke underscores the multifaceted nature of harm associated with cigarette consumption.

The process of smoking cessation, defined as the reduction or complete elimination of tobacco use, is significantly complicated by nicotine withdrawal symptoms that emerge following cessation attempts. Nicotine, a highly addictive alkaloid, creates profound physiological dependency through its action on nicotinic acetylcholine receptors in the brain, leading to characteristic withdrawal symptoms including irritability, anxiety, cognitive impairment, and intense craving [5]. Research has consistently demonstrated associations between high smoking rates and nicotine dependence with comorbid psychiatric conditions, including significant anxiety and depression, alcohol use disorders, and elevated stress levels [6]. The assessment of physical nicotine dependency typically employs validated questionnaires such as the Fagerström Test for Nicotine Dependence, which provides a standardized measure of addiction severity and helps guide clinical decision-making in cessation interventions.

The imperative for comprehensive tobacco control has gained recognition at the highest levels of global health governance. The World Health Assembly's endorsement of the Framework Convention on Tobacco Control represents a landmark international treaty designed to promote coordinated programs, policies, and measures aimed at reducing and preventing tobacco use worldwide [7]. This framework has catalyzed national-level legislative action, exemplified by Vietnam's Law on Prevention of Tobacco Harm [8], which establishes smoke-free environments and implements multi-sectoral policies to reduce non-communicable disease burden. Such legislative initiatives demonstrate the recognition that tobacco control must be integrated into the public health agenda of all nations, particularly as effective interventions have the potential to save hundreds of millions of premature deaths in low- and middle-income countries.

Individual-level factors significantly influence smoking cessation outcomes, operating alongside governmental interventions such as smoke-free workplace policies, tobacco taxation, advertising prohibitions, and counseling services. Research has

identified several sociodemographic and health-related variables associated with successful quit attempts, including older age, higher educational attainment, lower levels of nicotine dependence, and perceived good or excellent health status [9]. Additionally, higher income levels have been correlated with increased likelihood of cessation, reflecting the complex socioeconomic gradient that characterizes tobacco use and cessation patterns globally. Understanding these individual determinants is essential for tailoring interventions to specific population segments and addressing health disparities in tobacco-related morbidity and mortality.

This study incorporates multiple validated assessment instruments, including the Fagerström Tolerance Questionnaire, Beck Depression Inventory, Stress Response Inventory, Alcohol Use Disorder Identification Test, and State-Trait Anxiety Inventory, to comprehensively examine the clinical, psychological, and socioeconomic factors associated with nicotine dependence among smokers. By elucidating the multidimensional nature of tobacco addiction, this research aims to orient relevant factors of smoking cessation and enhance public awareness regarding the health implications of continued tobacco use. The integration of these assessment tools provides a robust framework for understanding the complex determinants of smoking behavior and developing targeted interventions that address the diverse needs of individuals attempting to quit. This study aimed to find the association of clinical, psychological and socioeconomic characteristics with nicotine dependency in smokers.

METHODS & METHODOLOGY

4.1 Study Design and Setting

The present investigation was designed as a cross-sectional study, conducted at the Pulmonary Medicine Department of a tertiary care hospital. A cross-sectional design was selected as it allows for the simultaneous assessment of multiple clinical, psychological, and socioeconomic variables in a defined population at a single point in time. This approach is particularly well-suited for evaluating the prevalence of nicotine dependence and its associated comorbidities among current smokers. The study was carried out over a ten-month period, commencing in January 2024 and concluding in October 2024. The setting, being a tertiary care center, provided access to a diverse patient population with varying degrees of tobacco-related morbidity, thereby enriching the dataset for robust analysis.

4.2 Study Population and Sampling Criteria

The target population for this study consisted of individuals who were actively smoking cigarettes and attended the pulmonary medicine services for either outpatient consultations or inpatient care. To ensure the homogeneity and relevance of the sample, strict inclusion and exclusion criteria were applied. Patients who were current smokers, irrespective of the duration or intensity of their habit, were deemed eligible for participation. Conversely, individuals presenting with acute hypoxemic respiratory failure were excluded from the study, as their critical medical condition could confound the psychological assessments and hinder their ability to provide informed consent. Additionally, patients who expressed an unwillingness to participate in the research were strictly excluded to uphold ethical standards of voluntary involvement.

Regarding the sample size, a calculated approach was adopted to ensure statistical validity. Prior literature indicated a mean Fagerstrom Tolerance Questionnaire (FTQ) score of 3.31 with a standard deviation of 2.32 among similar populations [10]. To estimate the required sample size with a 95% confidence level ($Z = 1.96$) and an absolute precision of 0.7, the standard formula for sample size estimation, $n = (Z\sigma/E)^2$ was applied. Substituting the values yielded a calculated sample size of 43 participants. This predetermined number was considered adequate to detect significant associations and provide meaningful insights into the determinants of nicotine dependence within the study setting.

4.3 Data Collection Instruments and Assessment Tools

A battery of six standardized, validated questionnaires was administered to each participant to capture a holistic picture of their physical dependence, psychological well-being, stress levels, anxiety, alcohol consumption, and socioeconomic status. The Fagerström Test for Nicotine Dependence (FTND) was employed as the primary measure to quantify the severity of physical addiction to nicotine [11]. This widely recognized instrument consists of six items that assess crucial aspects such as the compulsion to smoke, the quantity of cigarettes consumed daily, and the timing of the first cigarette in the morning. Each item contributes a specific score, with the total composite score ranging from 0 to 10; higher scores are indicative of a more profound physiological reliance on nicotine.

To evaluate the affective state of the participants, the Beck Depression Inventory (BDI) was utilized. This 21-question, multiple-choice, self-report instrument was designed by Dr. Aaron T. Beck to gauge the severity of depressive symptomatology [12]. Participants responded to items reflecting their mood and outlook over the preceding week, with each question offering at least four response options graded from 0 to 3 based on symptom intensity. The aggregate score allowed for the classification of depression into distinct categories: scores from 0 to 9 signify minimal depression, 10 to 18 indicate mild depression, 19 to 29 point to moderate depression, and scores ranging from 30 to 63 are consistent with severe depression. This differentiation is critical, given the well-documented comorbidity between depressive disorders and smoking behavior.

The Stress Response Inventory (SRI) was incorporated to systematically measure the multifaceted responses to stress. This scale extends beyond simple emotional reactions by capturing behavioral, physical, and cognitive dimensions of stress, thereby providing a comprehensive framework for understanding how stress precipitates or perpetuates smoking habits. Concurrently, the State-Trait Anxiety Inventory (STAI) was administered to distinguish between transient anxiety states and enduring anxiety traits. The STAI comprises 40 items in total, evenly divided between state anxiety (current feelings of apprehension) and trait anxiety (stable predispositions to perceive situations as threatening). Items such as "I feel calm and secure" or "I worry too much over something that really does not matter" are rated on a 4-point Likert scale, and higher cumulative scores denote elevated anxiety levels, which are often pivotal in smoking relapse [13].

Given the high prevalence of polysubstance use among smokers, the Alcohol Use Disorder Identification Test (AUDIT) was included as a screening tool. Developed by the World Health Organization, this 10-item instrument effectively detects hazardous and harmful alcohol consumption patterns [14]. Its utility is well-established across diverse gender and ethnic demographics, making it a reliable indicator of alcohol-related problems that may interact synergistically with nicotine addiction. Finally, the Modified Kuppuswamy Scale was applied to stratify the participants according to their socioeconomic standing [15]. This scale integrates three pivotal variables, the total monthly family income, the occupation of the head of the family, and the educational attainment of the head of the family. Scores on this scale range from 3 to 29, which correspond to classifications of upper, upper middle, lower middle, upper lower, and lower socioeconomic strata. Understanding the socioeconomic gradient is essential, as it profoundly influences access to healthcare and cessation resources.

4.4 Data Collection Procedure

The procedure for data collection followed a systematic and standardized protocol to minimize bias and ensure consistency across all participants. All current smokers who attended the Pulmonary Medicine Outpatient and Inpatient departments for smoking cessation counseling or treatment were initially screened for eligibility based on the predetermined inclusion and exclusion criteria. Following the verification of eligibility, the study's objectives and the nature of the questionnaires were explained to the potential participants, and only those who provided their explicit consent were enrolled. A total of 43 eligible patients were subsequently recruited into the study.

Once enrolled, each participant was administered the six validated questionnaires in a structured manner. To ensure accuracy and prevent fatigue, the assessment was often conducted in multiple sittings or at a comfortable pace, with researchers available to clarify any queries regarding the items. The data collected from these instruments covering nicotine dependence, depression, stress responses, anxiety, alcohol use, and socioeconomic parameters were meticulously compiled into a master data sheet. This systematic compilation facilitated the subsequent comparison, correlation, and analytical evaluation of the results.

4.5 Statistical Analysis

Upon completion of the data collection phase, the gathered information was subjected to rigorous statistical evaluation. Quantitative variables, such as the continuous scores from the BDI, STAI, and FTND, were summarized using descriptive statistics, specifically the mean and standard deviation, to provide a central tendency and dispersion of the data. Conversely, qualitative or categorical variables, including socioeconomic classifications and the prevalence of specific withdrawal symptoms, were expressed in terms of frequencies and percentages. To investigate the potential associations between two categorical variables (for instance, the relationship between socioeconomic status and smoking intensity, or the link between gender and anxiety levels), the Chi-square test or Fischer Exact test was applied. The threshold for statistical significance was

established at a p-value of less than or equal to 0.05, ensuring that any observed associations were robust and unlikely to be attributable to random chance.

RESULTS:

Table 1. Baseline Sociodemographic and Clinical Characteristics of Smokers (n = 43)

Variable	Category	n (%)
Age (years)	<20	5 (11.6)
	21–40	15 (34.9)
	41–60	11 (25.6)
	61–80	8 (18.6)
	>80	4 (9.3)
BMI (kg/m ²)	<18.5	3 (7.0)
	18.5–24.9	23 (53.5)
	25–29.9	13 (30.2)
	≥30	4 (9.3)
Marital Status	Single	18 (41.9)
	Married	25 (58.1)
Education	Illiterate	7 (16.3)
	Literate	36 (83.7)
Diabetes Mellitus	Yes	22 (51.2)
	No	21 (48.8)

Among the 43 smokers, the majority were aged 21–40 years (15, 34.9%), followed by 41–60 years (11, 25.6%). Most participants had a normal BMI (23, 53.5%), while 13 (30.2%) were overweight and 4 (9.3%) were obese. More than half of the participants were married (25, 58.1%), 36 (83.7%) were literate, and 22 (51.2%) had diabetes mellitus.

Table 2. Distribution of Nicotine Dependence and Psychological Profile (n = 43)

Variable	Category	n (%)
FTND	Very low	8 (18.6)
	Low	12 (27.9)
	Moderate	10 (23.3)
	High	8 (18.6)
	Very high	5 (11.6)
BDI	Normal	6 (14.0)
	Mild	6 (14.0)
	Borderline	6 (14.0)
	Moderate	12 (27.9)
	Severe	13 (30.2)

According to the Fagerström Test for Nicotine Dependence, 22 (51.2%) smokers had moderate-to-very high nicotine dependence, including 10 (23.3%) with moderate, 8 (18.6%) with high, and 5 (11.6%) with very high dependence. Depression assessment using the Beck Depression Inventory showed that 25 (58.1%) participants had moderate or severe depressive symptoms, while 18 (41.9%) had normal, mild, or borderline depression.

Table 3. Distribution of Stress, Anxiety and Alcohol Dependence (n = 43)

Variable	Category	n (%)
Stress (SRI)	Mild	7 (16.3)
	Moderate	19 (44.2)
	High	17 (39.5)
Anxiety (STAI)	Mild	5 (11.6)
	Moderate	21 (48.8)
	High	17 (39.5)
Alcohol Dependence (AUDIT)	Low	9 (20.9)
	Moderate	17 (39.5)
	High	17 (39.5)

Stress assessment showed that 36 (83.7%) smokers experienced moderate-to-high stress, while anxiety assessment revealed that 38 (88.4%) had moderate or high anxiety. Alcohol dependence was also common, with 34 (79.1%) participants demonstrating moderate or high AUDIT scores, suggesting a substantial coexistence of nicotine dependence with psychological distress and alcohol use.

Table 4. Association of Sociodemographic, Clinical, and Psychological Factors with Nicotine Dependency among Smokers (n = 43)

Variable	Very Low n (%)	Low n (%)	Moderate n (%)	High n (%)	Very High n (%)	Total n (%)	p-value
Age (years)							
<20	1 (20.0)	3 (60.0)	0 (0.0)	0 (0.0)	1 (20.0)	5 (100.0)	0.031*
21–40	5 (33.3)	6 (40.0)	2 (13.3)	1 (6.7)	1 (6.7)	15 (100.0)	
41–60	1 (9.1)	2 (18.2)	5 (45.5)	3 (27.3)	0 (0.0)	11 (100.0)	
61–80	0 (0.0)	1 (12.5)	2 (25.0)	2 (25.0)	3 (37.5)	8 (100.0)	
>80	1 (25.0)	0 (0.0)	1 (25.0)	2 (50.0)	0 (0.0)	4 (100.0)	
BMI (kg/m²)							
<18.5	1 (33.3)	1 (33.3)	0 (0.0)	0 (0.0)	1 (33.3)	3 (100.0)	0.063
18.5–24.9	5 (21.7)	7 (30.4)	8 (34.8)	3 (13.0)	0 (0.0)	23 (100.0)	
25–29.9	2 (15.4)	4 (30.8)	1 (7.7)	4 (30.8)	2 (15.4)	13 (100.0)	
≥30	0 (0.0)	0 (0.0)	1 (25.0)	1 (25.0)	2 (50.0)	4 (100.0)	
Marital status							

Single	6 (33.3)	8 (44.4)	3 (16.7)	0 (0.0)	1 (5.6)	18 (100.0)	0.002*
Married	2 (8.0)	4 (16.0)	7 (28.0)	8 (32.0)	4 (16.0)	25 (100.0)	
Education							
Illiterate	0 (0.0)	2 (28.6)	0 (0.0)	1 (14.3)	4 (57.1)	7 (100.0)	0.003*
Literate	8 (22.2)	10 (27.8)	10 (27.8)	7 (19.4)	1 (2.8)	36 (100.0)	
Diabetes mellitus							
No	6 (28.6)	7 (33.3)	4 (19.0)	1 (4.8)	3 (14.3)	21 (100.0)	0.002*
Yes	2 (9.1)	5 (22.7)	6 (27.3)	7 (31.8)	2 (9.1)	22 (100.0)	
BDI score							
Normal	2 (33.3)	2 (33.3)	1 (16.7)	1 (16.7)	0 (0.0)	6 (100.0)	0.081
Mild	2 (33.3)	3 (50.0)	0 (0.0)	1 (16.7)	0 (0.0)	6 (100.0)	
Borderline	1 (16.7)	3 (50.0)	1 (16.7)	1 (16.7)	0 (0.0)	6 (100.0)	
Moderate	0 (0.0)	3 (25.0)	4 (33.3)	4 (33.3)	1 (8.3)	12 (100.0)	
Severe	3 (33.3)	0 (0.0)	3 (33.3)	1 (11.1)	2 (22.2)	9 (100.0)	
Stress Response Inventory (SRI)							
Mild	2 (28.6)	4 (57.1)	0 (0.0)	0 (0.0)	1 (14.3)	7 (100.0)	0.110
Moderate	3 (15.8)	2 (10.5)	7 (36.8)	5 (26.3)	2 (10.5)	19 (100.0)	
High	3 (17.6)	6 (35.3)	3 (17.6)	3 (17.6)	2 (11.8)	17 (100.0)	
STAI score							
Mild	1 (20.0)	3 (60.0)	0 (0.0)	0 (0.0)	1 (20.0)	5 (100.0)	0.243
Moderate	3 (14.3)	3 (14.3)	7 (33.3)	5 (23.8)	3 (14.3)	21 (100.0)	
High	4 (23.5)	6 (35.3)	3 (17.6)	3 (17.6)	1 (5.9)	17 (100.0)	
AUDIT score							
Low	3 (33.3)	4 (44.4)	0 (0.0)	1 (11.1)	1 (11.1)	9 (100.0)	0.045*
Moderate	5 (29.4)	3 (17.6)	5 (29.4)	3 (17.6)	1 (5.9)	17 (100.0)	
High	0 (0.0)	5 (29.4)	5 (29.4)	4 (23.5)	3 (17.6)	17 (100.0)	
Socioeconomic status							
Upper	3 (27.3)	4 (36.4)	1 (9.1)	3 (27.3)	0 (0.0)	11 (100.0)	0.042*
Upper middle	5 (33.3)	2 (13.3)	3 (20.0)	2 (13.3)	3 (20.0)	15 (100.0)	
Lower middle	0 (0.0)	3 (25.0)	6 (50.0)	2 (16.7)	1 (8.3)	12 (100.0)	
Upper lower	0 (0.0)	3 (75.0)	0 (0.0)	1 (25.0)	0 (0.0)	4 (100.0)	
Lower	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	

*Data are presented as n (%). P-values were calculated using the Chi-square/Fischer exact test. Statistically significant ($p < 0.05$).

Among the 43 smokers, nicotine dependence showed significant associations with several demographic and clinical characteristics. Age was significantly associated with nicotine dependence ($p = 0.031$), with smokers aged 61–80 years (8/43; 18.6%) demonstrating the highest proportion of very high nicotine dependence, while younger smokers (<20 years; 5/43, 11.6%) predominantly had low dependence. Married individuals (25/43; 58.1%) exhibited significantly higher nicotine dependence than single participants (18/43; 41.9%) ($p = 0.002$). Illiterate smokers (7/43; 16.3%) had significantly greater nicotine dependence than literate smokers (36/43; 83.7%) ($p = 0.003$). Similarly, smokers with diabetes mellitus (22/43; 51.2%) demonstrated higher nicotine dependence than non-diabetic smokers (21/43; 48.8%) ($p = 0.002$). Alcohol consumption assessed using the AUDIT score was also significantly associated with nicotine dependence ($p = 0.045$), with higher AUDIT scores corresponding to greater nicotine dependence. Socioeconomic status showed a significant association ($p = 0.042$), whereas BMI ($p = 0.063$), depressive symptoms assessed using the Beck Depression Inventory ($p = 0.081$), perceived stress measured by the Stress Response Inventory ($p = 0.110$), and anxiety assessed using the State-Trait Anxiety Inventory ($p = 0.243$) were not significantly associated with nicotine dependence.

DISCUSSION

Tobacco smoking remains one of the leading preventable causes of morbidity and mortality worldwide, accounting for nearly 8 million deaths annually and substantially increasing the risk of cardiovascular disease, cerebrovascular disease, chronic respiratory disease, malignancy, and several other non-communicable diseases.[1] Nicotine dependence is a complex phenomenon influenced by biological, psychological, social, and behavioral factors, making smoking cessation particularly challenging among individuals with high levels of dependence. The present study evaluated the association of clinical characteristics, socioeconomic factors, and psychological parameters with nicotine dependence among smokers using validated assessment tools, including the FTQ, BDI, SRI, STAI, AUDIT, and Modified Kuppuswamy Socioeconomic Scale. Of the 43 smokers included in the study, 10 (23.3%) had moderate nicotine dependence, 8 (18.6%) had high dependence, and 5 (11.6%) had very high dependence, indicating that more than half of the smokers (23, 53.5%) had clinically significant nicotine addiction requiring intensive smoking cessation interventions.

The present study demonstrated that nicotine dependence was significantly associated with several demographic and clinical variables, including increasing age, marital status, educational status, diabetes mellitus, alcohol dependence, and socioeconomic status. Older smokers exhibited greater nicotine dependence than younger smokers, with individuals aged 61–80 years showing the highest proportion of very high dependence. These findings suggest that prolonged duration of smoking and cumulative nicotine exposure contribute to progressive dependence over time. Although Shahwan et al. reported a greater prevalence of nicotine dependence among younger smokers, differences in study populations, cultural influences, and smoking duration may explain the contrasting observations [16]. The findings of the present study highlight the need for targeted smoking cessation interventions among older adults, who may have developed stronger physiological and behavioral dependence due to long-term tobacco use.

BMI did not demonstrate a statistically significant association with nicotine dependence in the present study, although smokers with overweight and obesity tended to have higher proportions of severe nicotine dependence. Previous Mendelian randomization studies have suggested that increased BMI may causally influence smoking initiation, smoking intensity, and prolonged smoking behavior, indicating a complex bidirectional relationship between obesity and tobacco use [17]. Although statistical significance was not achieved in our study, the observed trend suggests that metabolic factors may contribute to nicotine addiction and warrants further evaluation in larger cohorts.

Diabetes mellitus emerged as a significant clinical correlate of nicotine dependence. Smokers with diabetes demonstrated substantially higher levels of nicotine dependence than non-diabetic smokers, supporting previous evidence that smoking is highly prevalent among individuals with diabetes and contributes to poorer glycemic control, increased vascular complications, and reduced treatment adherence [18]. Given the established adverse effects of smoking on diabetes-related outcomes, routine assessment of nicotine dependence should form an integral component of diabetes management programs, enabling early identification of smokers who may benefit from intensive cessation support.

Sociodemographic characteristics also played an important role in determining nicotine dependence. Married participants exhibited significantly higher nicotine dependence than unmarried individuals, while illiterate smokers demonstrated the highest proportion of very high nicotine dependence. These findings are consistent with previous studies showing that lower educational attainment is associated with greater nicotine addiction, poorer awareness regarding smoking-related health risks,

and reduced access to smoking cessation resources [19]. Although previous investigations have reported inconsistent associations between marital status and nicotine dependence, our findings suggest that social responsibilities, chronic stress, and prolonged smoking duration among married individuals may contribute to greater nicotine dependence. Likewise, participants belonging to lower socioeconomic groups demonstrated higher nicotine dependence, emphasizing the influence of social disadvantage on tobacco addiction and supporting evidence that smoking disproportionately affects economically deprived populations [19].

Psychological factors were also examined in the present study. Smokers with higher nicotine dependence tended to report greater levels of depression, anxiety, and perceived stress. Although these associations did not reach statistical significance, the findings remain clinically relevant because psychological distress is known to influence both smoking behavior and smoking cessation outcomes. Nicotine temporarily alleviates symptoms of stress, anxiety, and depression by stimulating dopaminergic reward pathways; however, repeated nicotine exposure ultimately perpetuates dependence and worsens mental health through recurrent withdrawal symptoms and neuroadaptation [20]. Therefore, individuals with severe nicotine dependence often experience a vicious cycle in which smoking is used as a coping strategy despite contributing to worsening psychological well-being over time.

Among all psychological measures evaluated, alcohol dependence demonstrated the strongest and only statistically significant association with nicotine dependence. Smokers with higher AUDIT scores were more likely to exhibit high or very high nicotine dependence, reflecting the well-established co-occurrence of tobacco and alcohol use. Both substances share common neurobiological reward pathways, and concurrent use enhances reinforcing effects, making cessation of either behavior more difficult [21]. This finding has important clinical implications, suggesting that alcohol screening using the AUDIT questionnaire should be routinely incorporated into smoking cessation clinics. Identifying coexisting alcohol dependence may facilitate individualized counseling, improve treatment planning, and increase long-term smoking cessation success.

The present findings emphasize that nicotine dependence should not be viewed solely as a behavioral habit but rather as a multidimensional disorder influenced by clinical, psychological, and socioeconomic determinants. Comprehensive assessment of smokers should therefore extend beyond quantifying cigarette consumption to include evaluation of alcohol use, educational status, socioeconomic background, comorbid diabetes, and mental health. Integrating validated tools such as the FTQ and AUDIT into routine clinical practice may help identify smokers at greatest risk of persistent nicotine dependence and allow healthcare providers to deliver targeted behavioral and pharmacological interventions.

The present study has few limitations. First, the relatively small sample size and single-center design may limit the generalizability of the findings to the broader smoking population. Second, the cross-sectional design precludes establishing causal relationships between nicotine dependence and associated clinical, psychological, and socioeconomic factors. Third, all psychological assessments were questionnaire-based and therefore subject to recall and response bias. Finally, information regarding duration of smoking, pack-years, previous quit attempts, and pharmacological treatment for nicotine dependence was not evaluated, which may have influenced the observed associations.

Despite these limitations, the study highlights several clinically relevant findings. Routine assessment of nicotine dependence using the FTQ, together with screening for alcohol dependence, diabetes mellitus, educational status, and socioeconomic vulnerability, may facilitate early identification of smokers requiring intensive cessation support. Incorporating mental health screening into smoking cessation programs may further improve treatment outcomes by addressing underlying psychological distress. These findings support a multidisciplinary approach integrating physicians, psychologists, and tobacco cessation counselors to optimize long-term abstinence.

CONCLUSION

Nicotine dependence among smokers is influenced by a combination of demographic, socioeconomic, clinical, and behavioral factors. Increasing age, lower educational attainment, diabetes mellitus, alcohol dependence, marital status, and socioeconomic status were significantly associated with greater nicotine dependence, while depression, anxiety, and perceived stress showed positive but non-significant trends. Among the psychological measures, alcohol dependence demonstrated the strongest association with nicotine addiction, highlighting the importance of routine AUDIT screening during smoking cessation counseling. The FTQ remains a valuable tool for assessing nicotine dependence and identifying smokers requiring intensive

intervention. Comprehensive smoking cessation programs should incorporate assessment of psychological health, alcohol use, and clinical comorbidities to deliver individualized treatment strategies. Future multicenter longitudinal studies with larger sample sizes are needed to establish causal relationships and evaluate the long-term impact of integrated behavioral and clinical interventions on nicotine dependence and smoking cessation outcomes.

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