

Determinants of Sexual Dysfunction in Allergic Rhinitis According to the Unpleasant Symptoms Theory: A Comparative Study

İlknur Özkan¹ , Murat Kar² , Seçil Taylan³ 

¹ Akdeniz University, Kumluca Faculty of Health Sciences, Internal Medicine Nursing Department, Antalya, Türkiye.

² Alanya Alaaddin Keykubat University, Faculty of Medicine, Department of Otorhinolaryngology, Antalya, Türkiye.

³ Akdeniz University, Kumluca Faculty of Health Sciences, Surgical Nursing Department, Antalya, Türkiye.

Correspondence Author: İlknur Özkan

E-mail: ilknurozkan@akdeniz.edu.tr

Received: December 3, 2024 **Accepted:** September 6, 2025

ABSTRACT

Objective: Sexual dysfunction, a key component of adults' quality of life, is under-studied in allergic rhinitis. This study aimed to compare sexual dysfunction in individuals with and without allergic rhinitis and to examine the effects of physiological, psychological, and situational factors, as conceptualized by the Theory of Unpleasant Symptoms.

Methods: This descriptive and between-groups comparative study was conducted between September 2020 and September 2021 in the otorhinolaryngology outpatient clinic. Data were collected from 249 patients with allergic rhinitis and 235 healthy individuals using validated scales that assess depression, anxiety, fatigue, sleep quality, nasal symptoms, and sexual function. Logistic regression analysis was used to identify factors associated with sexual dysfunction.

Results: Compared to the healthy group, individuals with allergic rhinitis had more sexual dysfunction, sleep problems, fatigue, depression, anxiety, and nasal and non-nasal symptoms ($p < .01$). Based on the results of logistic regression analysis, factors contributing to sexual dysfunction in women with allergic rhinitis included anxiety, depression, the presence of asthma, and the severity of physiological symptoms (Nagelkerke R^2 : 0.345; Model: $\chi^2 = 18.759$ $p = .000$). Factors affecting sexual dysfunction in men with allergic rhinitis were determined as sleep quality, depression, the severity of physiological symptoms, fatigue, and smoking (Nagelkerke R^2 : 0.194; Model: $\chi^2 = 17.761$; $p = .023$).

Conclusions: Sexual dysfunction in allergic rhinitis patients is influenced by a range of symptoms, as outlined by the Unpleasant Symptoms Theory. These findings highlight the need for targeted intervention programs to manage sexual dysfunction by addressing both illness symptoms and related factors.

Keywords: allergic rhinitis, sexual dysfunction, unpleasant symptoms theory, symptoms

1. INTRODUCTION

Allergic rhinitis (AR) is a chronic inflammatory disease of the nasal mucosa mediated by IgE, characterized by symptoms of nasal congestion, runny nose, sneezing, and nasal itching triggered by inhaled allergens. AR is among the most prevalent chronic illnesses globally, impacting 10-30% of adults and as many as 40% of children. The prevalence of asthma and allergic rhinitis continues to rise, particularly in Asian countries (1). The disturbing nature of AR symptoms can seriously affect individuals' daily activities, work performance, quality of life, and psychosocial well-being (2-5). AR is also associated with significant economic costs. The

indirect costs of AR-related work and school absenteeism are estimated to be higher than those caused by diabetes, migraine, anxiety, or asthma (6-8). For these reasons, it is emphasized that AR has become an important public health problem worldwide.

Besides the nasal symptoms, individuals with AR also experience additional non-nasal symptoms like fatigue, disrupted sleep, mood disorders, anxiety, depression, and reduced work efficiency (9-11). Nasal congestion is among the most troublesome symptoms contributing to sleep disturbances, particularly in cases involving irregular

How to cite this article: Özkan İ, Kar M, Taylan S. Determinants of Sexual Dysfunction in Allergic Rhinitis According to the Unpleasant Symptoms Theory: A Comparative Study. Clin Exp Health Sci 2025; 15: 568-576. <https://doi.org/10.33808/clinexphealthsci.1595863>

breathing patterns such as snoring and sleep apnea (3, 12). It has been reported that sleep disorders commonly seen in individuals with AR are associated with poor quality of life, fatigue, irritability, memory deficit, anxiety and depression, and sexual dysfunction (13-15).

While numerous studies have explored the physical and social dimensions of allergic rhinitis and its impact on quality of life, sexual function, a vital aspect of adults' quality of life, has frequently been overlooked. Limited studies identified that individuals with allergic rhinitis may encounter sexual dysfunction (16-18). Even though its pathophysiology remains poorly understood, there is a suggestion that the connection between sexual dysfunction and allergic rhinitis may be bidirectional. As previously mentioned, it is believed that AR can induce sleep disorders by impacting both the quality and architecture of sleep, subsequently leading to depression, reduced libido, and organic sexual dysfunction (16, 19). In addition, it is thought that AR may directly cause sexual dysfunction through other mechanisms, including systemic inflammation. Some studies have shown that problems such as erectile dysfunction, orgasm problems, lower sexual desire and lower sexual satisfaction are more common in AR individuals than in healthy individuals (9, 16-18, 20). Accordingly, to organize these interrelated determinants and outcomes, the study is anchored in the Theory of Unpleasant Symptoms (TOUS).

The TOUS, an intermediate-level nursing theory, elucidates the nature of the symptom experience. It comprises three primary components: (1) the symptoms experienced by the patient; (2) the factors influencing the symptom experience; and (3) the outcomes resulting from the symptom experience (performance). Symptoms are perceived indicators of change in normal functioning. Symptoms can occur alone or often occur simultaneously with more than one symptom and interact with each other. When one symptom is not controlled, it can cause another symptom to be more severe.

According to the theory the factors influencing symptom experience are classified as physiological (e.g., the presence of any diseases), psychological (e.g., mood state), and situational components (e.g., noise, or heat). The third component is based on the evaluation of functional performance (physical activity, influencing activities of daily living, etc.), role performance (social activities, activities related to work and other roles), cognitive performance (concentration, thinking, problem solving, etc.). It is explained that many or more severe symptoms will affect the functional, role and cognitive performances more negatively (21, 22).

In literature, no study on factors affecting sexual dysfunction in individuals with AR was found. To our knowledge, this is the first study to examine factors affecting sexual function in individuals with AR. Furthermore, although AR is a common chronic disease that negatively affects all aspects of quality of life, it has rarely been addressed in nursing studies. It is thought that determining factors affecting sexual function in individuals with AR will be a useful guide for nurses and other health professionals in determining interventions

for the management of sexual dysfunction. The aim of this study was to compare sexual dysfunction in individuals with and without allergic rhinitis and to examine the effects of physical, psychological and situational factors according to the TOUS on their sexual dysfunction experiences. This study addresses the following research questions:

- Does sexual function differ between adults with allergic rhinitis and healthy adults?
- Within the framework of the Theory of Unpleasant Symptoms, how are physiological (e.g., sinonasal symptom severity; asthma), psychological (anxiety, depression), situational (smoking, alcohol use, employment, socioeconomic status), and symptomatic (sleep quality, fatigue) factors associated with sexual dysfunction in adults with allergic rhinitis?

2. METHODS

This was a descriptive and between-group comparative study.

2.1. Sample and Participants

The study included 249 Allergic Rhinitis (AR) patients who applied to the Ear, Nose and Throat (ENT) outpatient clinic of a training and research hospital in Antalya between September 2020 and September 2021, and 235 healthy individuals as the control group. The sample size was determined by using the known population sampling formula ($N=700$) and was defined as 249. Participants were selected using the purposive sampling method. The control group included healthy individuals who were aged between 18 and 55, were married, and did not have allergic rhinitis or any chronic diseases. Individuals aged 18-55 years who had been diagnosed with moderate to severe persistent allergic rhinitis (AR) through a skin prick test were enrolled in the study. Since the highest age limit was determined as 55 in studies conducted on sexuality in individuals with AR (9, 17, 23), 55 was accepted as the upper age limit in this study. Individuals with active mental illness, diabetes mellitus, chronic renal failure, and hypertension individuals with AR were excluded from the study, considering that it can affect sexual function.

2.2. The Framework of The Study

In this study, performance was determined as sexual function according to the TOUS, sexual function in individuals with AR affects physiological, psychological, and situational variables as well as other symptoms that they experience. Based on this theory, sleep problem was accepted as the primary symptom and fatigue as the secondary symptom in the study. Physiological factors in the study were defined as age and perceived health status of the patient, psychological factors as anxiety and depression, and situational factors as education, occupation, working status, economic status, using alcohol, smoking, presence of asthma, and type of treatment (Figure 1).

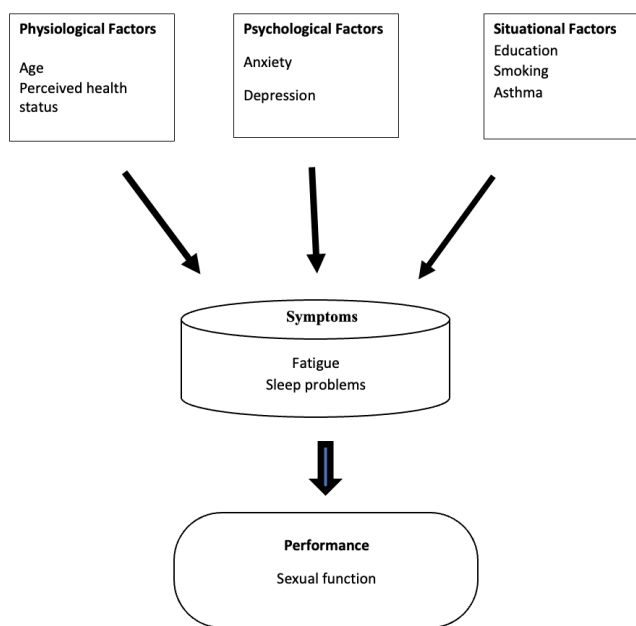


Figure 1. Conceptual framework of this study

2.3. Data Collection Tools

The Descriptive Information Form, consisting of 13 items, includes questions about individuals' characteristics (age, education, occupation, working status, economic status, alcohol use, smoking, presence of asthma, and type of treatment). The form was developed by the researchers based on previous literature (9, 10, 13).

The 22-item Sinonasal Outcome Test (SNOT-22) was developed by Hancı et al. in 2015. The SNOT-22 assesses the severity of both nasal and extranasal allergic rhinitis (AR) symptoms. It comprises 22 items categorized into five domains, namely rhinologic symptoms, extranasal rhinologic symptoms, ear/facial symptoms, psychological dysfunction, and sleep dysfunction. The total score that can be obtained on this scale ranges from 0 to 110 points. Higher scores on the scale indicate an increase in symptom severity and dysfunction. The Turkish version of the scale was adapted by Hancı et al. in 2015 (24, 25). Cronbach's alpha value of the scale, which was adapted into Turkish, was 0.88, and it was determined as 0.81 in this study.

The Female Sexual Function Index (FSI) was developed by Rosen et al. (2000) to assess sexual functions in women. It consists of 19 items and 6 subdimensions (orgasm, pain, lubrication, desire, satisfaction, and arousal). It is a Likert-type scale, and each item is scored between 0 and 5. The cut-off point is 26.55. Those with a score below 26.55 are considered to have female sexual dysfunction (26). Cronbach's alpha value was calculated as 0.98 in the Turkish validity-reliability study of FSFI by Aygin and Aslan (2005) (27), and it was calculated as 0.88 in this study.

The International Index of Erectile Function (IIEF) was developed by Rosen et al. in 1997. It comprises 15 items and is designed to assess various aspects of male sexual function, including erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. Each item is scored on a scale of 0 to 5 points. The total score is then used to classify the severity of erectile dysfunction, with the following interpretations: 0-10 points indicate severe dysfunction, 11-16 points indicate moderate dysfunction, 17-21 points indicate mild to moderate dysfunction, 22-25 points indicate mild erectile dysfunction and 26-30 points indicate no erectile dysfunction.(28). In the original study, a high degree of internal consistency was reported for each of the five domains and for the total scale, with Cronbach's alpha values of 0.73 and above for the subscales, and 0.91 and above for the total scale. The Turkish adaptation of the IIEF was conducted by the Turkish Society of Andrology, and in this study, the Cronbach's alpha value for the scale was determined to be 0.85.

The Pittsburgh Sleep Quality Index (PSQI) was developed by Buysse et al. in 1989 [30]. It comprises 19 items and assesses seven subcomponents of sleep quality, including subjective sleep quality, sleep duration, habitual sleep efficiency, sleep latency, sleep disturbances, daytime dysfunction, and the use of sleeping pills. The total score is calculated by summing the scores from the seven subcomponents and can range from 0 to 21. A PSQI total score of ≤ 5 indicates good sleep quality, while a total score >5 suggests poor sleep quality (29). The Turkish adaptation of the PSQI was carried out by Agargün et al. in 1996, and they reported a Cronbach's alpha value of 0.80 for the scale in their study (30). In the current study, the Cronbach's alpha value was determined to be 0.78 for the PSQI.

The Fatigue Severity Scale (FSS) was developed by Lauren B. Krupp et al. in 1989. It is composed of 9 items and is used to assess the severity of fatigue. The FSS is a Likert-type scale where respondents rate their agreement with statements using a scale of 1 (strongly disagree) to 7 (strongly agree). The total score on the FSS can range from 9 to 63, with higher scores indicating greater severity of fatigue. (31). The Turkish adaptation study of the scale was conducted by Armutlu et al., and Cronbach's alpha value was calculated as 0.88 (32). The Cronbach's alpha value was calculated as 0.80 in this study.

The Beck Depression Inventory (BDI) was developed by Beck et al. in 1961. It consists of items covering 21 symptom categories, with each item offering four response options. Responses to each item are scored on a scale ranging from 0 to 3. The total score on the BDI is obtained by summing the scores of all the items. A higher total score on the BDI indicates a higher level of depression. The scores means as follows: 0-9, minimal; 10-16, mild; 17-29, moderate; 30-63, severe depression. (33) The Turkish adaptation study of the scale was conducted by Hisli in 1988. In the adaptation study, Cronbach's alpha value was calculated as 0.80 (34), and it was calculated as 0.76 in this study.

The Beck Anxiety Inventory (BAI) was developed by Beck et al. in 1993. This scale is designed to assess the frequency of anxiety symptoms experienced by an individual. It comprises 21 items, and each item is scored on a scale from 0 to 3. A higher score on the BAI indicates a higher level of anxiety. Scores on the scale means as follows: 0-17, low; 18-24, medium; ≥ 25 , high anxiety levels (35, 36). The Turkish adaptation study of the scale was conducted by Ulusoy et al in 1998. Cronbach's alpha value of the scale was calculated as 0.92, and it was calculated as 0.84 in this study.

2.4. Data Collection

Data collection forms were applied by the researcher using face-to-face interview technique in an empty room in the outpatient clinic where the research was conducted. Filling the forms took approximately 20-25 minutes. The healthy control group consisted of parents of students at the school where the researchers' children attended. First, parents were informed about the study in school WhatsApp groups and the questionnaires were administered online to those who agreed to consent to participate in the study.

2.5. Data Analysis

SPSS 23 (Statistical Package of Social Science) software package was used for analyzing. The findings were statistically evaluated using a 95% confidence interval at a 5% significance level. Subject demographics and scale scores were reported using descriptive statistics. The determinants of sexual function in individuals with AR were assessed using logistic regression analysis. Variables identified by TOUS were analyzed in the logistic regression model. The forward selection method was used to decide which variables would be included in the model.

2.6. Ethical Considerations

The study received ethical approval from the Akdeniz University Non-Interventional Clinical Research Ethics Committee (Approval date: April 8, 2020; Number: KAEK-305). Individuals with allergic rhinitis and healthy controls were informed about the study, and both written and verbal informed consent was obtained prior to participation.

3. RESULTS

In this study, a total of 249 individuals with allergic rhinitis (AR) and 235 individuals in the healthy control (HC) group were included. The comparison of the descriptive characteristics of these two groups, as presented in Table 1, indicated that there were no statistically significant differences between the groups ($p > .05$).

A high-level, statistically significant difference was found between the mean scores of individuals in the AR group and HC group on the BDI, FSI, PSQI, and SNOT22 scales, between the total FSI and subgroup scores of women in both groups,

and between the IIEF subgroup scores of men in both groups ($p < .01$). In further analysis, it was found that there was a statistically significant difference between the BAI scores of the individuals in the AR group and the BAI scores of the individuals in the HC group, and the difference was due to the individuals with moderate depression scores in the AR group ($p < .05$). Although individuals with AR were not treated for depression, most had moderate depression scores. In addition, individuals with AR had high rates of anxiety, poor sleep, fatigue, and sexual dysfunction (Table 2).

It was determined that male individuals with statistically highly significant AR smoked and consumed alcohol more than female individuals and that male individuals had another chronic disease ($p < .01$). It was found that 45.1% of female individuals and 34.6% of male individuals used leukotriene antagonists and that 7.9% of female individuals and 25.9% of male individuals received oral antihistamine treatment ($p < .01$) (Table 3).

Table 1. Clinical characteristics of patients with allergic rhinitis and healthy controls

Clinical characteristics		Allergic rhinitis (n=249) X $\pm$ SD	Healthy controls (n=235) X $\pm$ SD	p
Age		38.91 $\pm$ 13.266	36.30 $\pm$ 12.851	.934
		n (%)	n (%)	
Gender	Female	154 (51.5)	145 (48.5)	.974
	Male	95 (51.4)	90 (48.6)	
Educational level	Literate	16 (69.6)	7 (30.4)	.291
	Primary education	121 (51.9)	112 (48.1)	
	Secondary education	45 (47.49)	50 (52.6)	
	Higher education	67 (50.4)	66 (49.6)	
Employment status	Not Working	163 (48.5)	173 (50.7)	.083
	Working	86 (58.1)	62 (43.4)	
Occupation	Greenhouse Worker	110 (55.8)	87 (44.2)	.604
	Officer	25 (50.0)	25 (50.0)	
	Self Employed	19 (52.8)	17 (47.2)	
	Housewife	42 (50.6)	41 (49.4)	
	Retired	4 (44.4)	5 (55.6)	
	Other	49 (45.0)	60 (55.0)	
Economic Status	Income expenditure	86 (50.6)	84 (49.4)	.546
	Income= expenditure	117 (53.9)	100 (46.1)	
	Income expenditure	46 (47.4)	51 (52.6)	
Using Alcohol	Yes	52 (51.5)	49 (48.5)	.543
	No	197 (51.4)	186 (48.6)	
Smoking	Yes	41 (55.4)	338 (44.6)	.271
	No	208 (50.7)	202 (49.3)	

Student-t test and Ki-Kare test were used

Table 2. Comparison of symptom and sexual function scores between patients with allergic rhinitis and healthy controls

Measure (scale/subscale)		Allergic rhinitis (n=249) X±SD	Healthy controls (n=235) X±SD	p
Beck Depression Inventory (BDI)		18.08±8.168	13.94±8.300	.000
Beck Anxiety Inventory (BAI)		22.08±8.168	20.03±9.468	.011*
Fatigue Severity Inventory (FAI)		3.8063±1.53	2.79±.97	.000**
Pittsburgh Sleep Quality Index (PSQI)		10.23±1.666	4.20±1.888	.000**
Sinonasal Outcome Test (SNOT22) questionnaires		55.59±13.80	42.52±15.81	.000**
FSFI sub-domains				
Desire		3.58±.94	4.43±1.25	.000**
Arousal		3.67±.94	4.40±1.5	.000**
Lubrication		3.01±1.38	3.62±1.97	.002**
Orgasm		3.00±1.43	3.43±1.86	.023*
Satisfaction		2.81±1.34	3.37±1.96	.004**
Pain		2.40±.88	3.63±2.32	.000**
FSFI total		18.56±3.8	22.91±6.64	.000**
IIEF				
Erectile function		20.36±8.97	26.31±9.166	.000**
Orgasmic function		7.59±2.56	14.42±2.71	.000**
Sexual desire		7.07±2.12	13.17±2.11	.000**
Intercourse satisfaction		7.76±5.12	13.80±5.18	.000**
Overall satisfaction		7.16±2.32	13.12±2.449	.000**
		n(%)	n(%)	
Depression	Minimal depression	99(49.0)	103(51.0)	.000**
	Mild	20(24.1)	63(75.9)	
	Depression	113(66.1)	58(33.9)	
	Moderate	17(60.7)	11(39.3)	
	Severe depression			
Anxiety	Mild Anxiety	44 (39.6)	67(60.4)	.009**
	Moderate	128 (55.9)	101(44.1)	
	Anxiety	70 (56.9)	53(43.1)	
	Severe Anxiety			
Fatigue	Not tired	144 (40.3)	213(59.7)	.000**
	Tired	105 (82.7)	22(17.3)	
Sleep Quality	Poor sleep	242 (84.6)	44(15.4)	.000**
	Quality sleep	7 (3.5)	191(96.5)	
FSFI (according to cut-off point ≤26.55)	Sexual dysfunction	137 (73.3)	50(26.7)	.000**
	Normal sexual function	17 (15.2)	95(84.8)	
IIEF (according to cut-off point ≤25)	Erectile dysfunction	55 (57.3)	41 (42.7)	.003**
	No erectile dysfunction	39 (39.8)	59(60.2)	

Student-t test and Ki-Kare test were used *p<.05 ** p<.01

FSFI: Female Sexual Function Index, IIEF: International Index of Erectile Function

Table 3. Distribution of smoking, alcohol use, comorbidities, and allergic rhinitis treatments by sex among patients with allergic rhinitis

Distribution of Characteristics	Female n(%) 164 (66.9)	Male n(%) 81 (33.1)	p
Using alcohol			
Yes	8(4.9)	30(37.0)	.000**
No	156(95.1)	51(63.0)	
Smoking			
Yes	8(4.9)	18(22.2)	.000**
No	156(95.1)	63(77.8)	
Another chronic disease			
Yes	56(34.1)	7(8.6)	.000**
No	108(65.9)	74(91.4)	
Presence of asthma			
Yes	72(43.9)	28(34.6)	NS
No	92(56.1)	53(65.4)	
Allergic Rhinitis Treatment			
Oral antihistamines	13(7.9)	21(25.9)	.000**
Nasal corticosteroids	32(19.5)	12(14.8)	
Leukotriene Antagonists	74(45.1)	28(34.6)	
Others	45(27.4)	20(24.7)	

NS = nonsignificant, p values were determined using chi-squared test and t test.

The best model in logistic regression was formed in step 4 (Table 3). It was determined that women without asthma experienced 65.5% less sexual dysfunction than women with asthma. Female individuals experienced sexual dysfunction 1.070 times more as BAI scores increased, 1.066 times more as BDI scores increased, and 1.028 times more as SNOT 22 scores increased (Nagelkerke R²: 0.345; Model: x²= 18.759; p= .000) (Table 4).

The best model in logistic regression was formed in step 4 (Table 4). It was determined that non-smoking male individuals experienced 72.0% less sexual dysfunction than male individuals who smoked. It was found that male individuals experienced sexual dysfunction 1.014 times more as PSQI scores increased, 1.175 times more as BDI scores increased, 2.058 times more as SNOT 22 scores increased, and 2.858 times more as FAI scores increased (Nagelkerke R²: 0.194; Model: x²= 17.761 p= .023) (Table 5).

Table 4. Determinants of factors affecting sexual dysfunction in women with allergic rhinitis

Independent variables	β	SE	Wald	p	OR	95% CI
Constant	-4.622	1.466	9.932	.002	0.072	
BAI	.068	.031	4.681	.030	1.070	1.006 1.138
BDI	.064	.027	5.846	.016	1.066	1.012 1.123
Asthma (None)	-1.035	.389	7.086	.008	.355	.166 .761
SNOT22	.079	.026	9.163	.002	1.082	1.028 1.139

Variables included in the multivariable logistic regression model were age; education; occupation; employment status; socioeconomic status; alcohol use; smoking; physician-diagnosed asthma; type of allergic rhinitis treatment; and total scores on the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Female Sexual Function Index (FSFI), Pittsburgh Sleep Quality Index (PSQI), and the 22-item Sinonasal Outcome Test (SNOT-22). The most significant model was formed in step 5. Nagelkerke R²: 0.345 Model: x²= 18.759 p= .000 *p<.05, **p<.01 CI: confidence interval. OR: odds ratio. SE: Standard Error

Table 5. Determinants of affecting sexual dysfunction in men with allergic rhinitis

Independent variables	β	SE	Wald	p	OR	95% CI	
Constant	2.917	.725	16.206	.000	.054		
PSQI	.113	.050	5.025	.025	1.120	1.014	1.236
BDI	1.188	.524	5.141	.023	3.280	1.175	9.160
SNOT22	.722	.476	2.304	.129	2.058	.810	5.229
FSI	1.050	.425	6.105	.013	2.858	1.243	6.575
Smoking (No)	-1.273	.675	3.560	.059	.280	.075	1.051

Variables included in the multivariable logistic regression model were age; education; occupation; employment status; socioeconomic status; alcohol use; smoking; physician-diagnosed asthma; type of allergic rhinitis treatment; and total scores on the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Female Sexual Function Index (FSFI), Pittsburgh Sleep Quality Index (PSQI), and the 22-item Sinonasal Outcome Test (SNOT-22). Forward selection method was used. The most significant model was formed in step 5. Nagelkerke R²:0.194, Model: $\chi^2=17.761$ $p=.023$ * $p<.05$, ** $p<.01$ CI: confidence interval OR: odds ratio. SE: Standard Error

4. DISCUSSION

In the study, the sexual functions of individuals with AR were compared with healthy individuals, and the factors affecting sexual function were examined based on the TOUS. In the study, sexual dysfunction was more common in both men and women in the AR group than in the healthy control group (Table 2). These findings are consistent with previous studies on individuals with AR (9, 16-18, 20). According to research findings, factors affecting sexual function were determined as the patient's health status (SNOT-22) (physiological factors), anxiety, depression (psychological factors), asthma, smoking (situational factors), fatigue, and poor sleep (symptomatic factors) (Tables 4 and 5). Therefore, factors affecting the sexual dysfunction of individuals with AR will be discussed in this section.

The patient's perceived health status, which is one of the physiological factors, was evaluated with SNOT-22 in the study. An increase in SNOT – 22 score means that both nasal and non-nasal physiological symptoms are experienced intensely. In the study, as the severity of nasal and non-nasal physiological symptoms experienced by both male and female individuals due to AR increased, their sexual dysfunctions were found to increase, as well (Tables 4 and 5). Consistent with our findings, two studies using SNOT-22 found a significant association between the severity of physiologic symptoms related to allergic rhinitis and sexual dysfunction in individuals with AR (9, 23). In another study, it was noted that physiological symptoms related to AR, such as chronic nasal congestion, runny nose, and sneezing, may cause embarrassment and avoidance of close contact, thus affecting sexual activities and satisfaction (16). Therefore, in the management of sexual dysfunction, it is important to ensure individuals' compliance with AR treatment to control their physiological symptoms.

Among psychological factors, anxiety was found to be related to sexual dysfunction only in women (Table 4), whereas

depression was found to be related to sexual dysfunction in both men and women (Tables 4 and 5). The literature review showed that there were no studies on the association between depression and anxiety and sexual function in individuals with AR. However, there were studies showing that mental health problems such as anxiety and depression were more common in individuals with AR than in healthy individuals, as in this study (37-39). According to many studies, decreased sexual desire and arousal in women are associated with depression and anxiety (40-43). For example, in one study, it was determined that depressed women were twice as likely to experience sexual problems, including lower levels of sexual desire, arousal, and orgasmic function, than women without depression (44). In the same study, it was determined that women with anxiety were 33-50% more likely to experience the same sexual problems than women without anxiety (44). Studies conducted on men showed that depression and anxiety were associated with sexual dysfunction (45-47). In this respect, it was important to evaluate individuals with AR experiencing sexual dysfunction in terms of anxiety and depression.

The presence of asthma, one of the situational factors, was found to be related to sexual dysfunction in women (Table 4), consistent with the literature. In a study, moderate and severe asthma and female gender were associated with sexual dysfunction (48). Another study found that asthma affected sexual desire and satisfaction in both sexes, affecting orgasm and self-esteem in women but not in men (49). Smoking, a situational factor, has been related to sexual dysfunction in men with AR (Table 5). In the literature, it was shown that both direct use and exposure to smoking were associated with erectile dysfunction (50).

Among symptomatic factors, fatigue and insufficient sleep were related to sexual dysfunction in men (Table 5), but not in women. A study of individuals with AR found a significant association between sleep quality, fatigue and sexual dysfunction in men. In the same study, no association was found between sleep quality and sexual dysfunction in women, while fatigue was found to be associated with sexual dysfunction (9). While certain studies have suggested a potential connection between sexual function and factors such as the severity of allergic rhinitis, medication side effects, reduced sleep quality, and fatigue, these studies have faced criticism due to their limited sample sizes, absence of control groups, and the absence of specific measurement tools (9, 16-18, 20). The study's findings are important in this regard.

Our study has several limitations. One of its major limitations is it relied on self-reported measures, which may be susceptible to bias. Another limitation is that it is a cross-sectional study. The strength of the study is that it is the first study to examine determination of factors affecting sexual function in individuals with AR and that it is based on the TOUS.

5. CONCLUSION

It was determined that individuals with AR experienced more anxiety, depression, fatigue, poor sleep, and sexual dysfunction than healthy individuals. As the Unpleasant Symptoms Theory suggests, individuals' sexual functioning was affected not only by the presence of direct symptoms (nasal symptoms) associated with allergic rhinitis, but also by the presence of other symptoms (psychological, physiological, and situational factors). These findings may help to raise awareness among nurses and other health professionals about the sexual dysfunction that individuals with AR experience and the factors affecting sexual dysfunction. Sexual dysfunction, sleep problems, fatigue, anxiety, and depression may affect the quality of life in individuals with AR. The use of standard measurement tools, as in this study, may help nurses to target specific symptoms and plan interventions for individuals with AR. Educating individuals with AR about the effects of fatigue, sleep problems, anxiety, and depression on sexual dysfunction can raise awareness about these problems and change health-seeking behaviors. Nurses should develop intervention programs that consider the physiological, psychological, and situational factors and other symptoms of the patient in the management of sexual dysfunction.

Acknowledgments: We would like to extend my deepest gratitude to all the participants who contributed to this study.

Funding: The author(s) received no financial support for the research.

Conflicts of interest: The authors declare that they have no conflict of interest.

Author Contributions:

Research idea: İÖ, MK

Design of the study: İÖ, MK

Acquisition of data for the study: İÖ, MK, ST

Analysis of data for the study: İÖ, ST

Interpretation of data for the study: İÖ, ST, MK

Drafting the manuscript: İÖ, ST, MK

Revising it critically for important intellectual content: İÖ, ST, MK

Final approval of the version to be published: İÖ, ST, MK

REFERENCES

- [1] Xing Y, Wong GW-K. Environmental influences and allergic diseases in the Asia-Pacific region: what will happen in the next 30 years? *Allergy Asthma Immunol Res.* 2022;14(1):21-39. <https://doi.org/10.4168/aa.2022.14.1.21>
- [2] Chauhan G, Khokhar C. Quality of life in allergic rhinitis patients. *Int J Indian Psychol.* 2015;2(2):114-122.
- [3] González-Núñez V, Valero AL, Mulla J. Impact of sleep as a specific marker of quality of life in allergic rhinitis. *Curr Allergy Asthma Rep.* 2013;13(2):131-141. <https://doi.org/10.1007/s11882.012.0330-z>
- [4] Hoehle LP, Speth MM, Phillips KM, Gaudin RA, Caradonna DS, Gray ST, Sedaghat AR. Association between symptoms of allergic rhinitis with decreased general health-related quality of life. *Am J Rhinol Allergy.* 2017;31(4):235-239. <https://doi.org/10.2500/ajra.2017.31.4444>
- [5] Campbell AP, Hoehle LP, Phillips KM, Caradonna DS, Gray ST, Sedaghat AR. Depressed mood is associated with loss of productivity in allergic rhinitis. *Allergy* 2018;73(5):1141-1144. <https://doi.org/10.1111/all.13387>
- [6] Cuffel B, Wamboldt M, Borish L, Kennedy S, Crystal-Peters J. Economic consequences of comorbid depression, anxiety, and allergic rhinitis. *Psychosomatics* 1999;40(6):491-496. [https://doi.org/10.1016/S0033-3182\(99\)71187-4](https://doi.org/10.1016/S0033-3182(99)71187-4)
- [7] Meltzer EO. Allergic rhinitis: burden of illness, quality of life, comorbidities, and control. *Immunol Allergy Clin North Am.* 2016;36(2):235-248. <https://doi.org/10.1016/j.iac.2015.12.002>
- [8] Price D, Scadding G, Ryan D, Bachert C, Canonica GW, Mullol J, Klimek L, Pitman R, Acaster S, Murray R, Bousquet J. The hidden burden of adult allergic rhinitis: UK healthcare resource utilisation survey. *Clin Transl Allergy* 2015;5 (39):1-12. <https://doi.org/10.1186/s13601.015.0083-6>
- [9] Jalalia MM, Soleimani R, Jalali SM, Mohisafat B. Evaluation of the effects of allergic rhinitis treatment on sexual functioning, sleep, and fatigue parameters. *Rev Fr Allergol.* 2020;60(2):55-60. <https://doi.org/10.1016/j.reval.2019.04.002>
- [10] Jaruvongvanich V, Mongkolpathumrat P, Chantaphakul H, Klaewsongkram J. Extranasal symptoms of allergic rhinitis are difficult to treat and affect quality of life. *Allergol Int.* 2016;65(2):199-203. <https://doi.org/10.1016/j.alit.2015.11.006>
- [11] Yu J, Cheng Z, Zheng H, Zhuang Y. Quality of life and anxiety and depression symptoms in elderly patients with allergic rhinitis. *Chin J Geriatr.* 2017;36(8):895-898.
- [12] Thompson A, Sardana N, Craig TJ. Sleep impairment and daytime sleepiness in patients with allergic rhinitis: the role of congestion and inflammation. *Ann Allergy Asthma Immunol.* 2013;111(6):446-451. <https://doi.org/10.1016/j.anai.2013.05.020>
- [13] Jaruvongvanich V, Mongkolpathumrat P, Chantaphakul H, Klaewsongkram J. Extranasal symptoms of allergic rhinitis are difficult to treat and affect quality of life. *Allergol Int.* 2016;65(2):199-203. <https://doi.org/10.1016/j.alit.2015.11.006>
- [14] Sabharwal G, Craig TJ. The effect of rhinitis on sleep, quality of life, daytime somnolence, and fatigue. In: Pawankar R, Holgate ST, Rosenwasser LJ, Sheikh A, editors. *Allergy and Asthma: Practical Diagnosis and Management.* Cham: Springer International Publishing; 2016. p.87-97. https://doi.org/10.1007/978-3-319-30835-7_7
- [15] Tamm S, Cervenka S, Forsberg A, Jonsson Fagerlund M, Rasmussen LS, Zetterberg H, Erlandsson Harris H, Stridh P, Christensson E, Granström A, Schening A, Dymmel K, Knave N, Terrando N, Maze M, Borg J, Varrone A, Halldin C, Blennow K, Farde L, Eriksson LI. Evidence of fatigue, disordered sleep and peripheral inflammation, but not increased brain TSPO expression, in seasonal allergy: A [11C]PBR28 PET study. *Brain Behav Immun.* 2018;68:146-157. <https://doi.org/10.1016/j.bbi.2017.10.013>
- [16] Benninger MS, Benninger RM. The impact of allergic rhinitis on sexual activity, sleep, and fatigue. *Allergy Asthma Proc.* 2009;30 (4): 358-65
- [17] Gürlek F, Taşdemir E, Çoban S. Does allergic rhinitis have effect on erectile dysfunction? *J Reconstr Urol.* 2018;8(2):44-49. <https://doi.org/10.5336/urology.2018-61260>
- [18] Özler GS, Özler S. Quality of sexual life in males with allergic rhinitis. *J Clin Anal Med.* 2016;7(2):155-157. <https://doi.org/10.4328/JCAM.2602>

- [19] Máspero JF, Serrano FS. Allergic rhinitis and sexual dysfunction. *Curr Treat Options Allergy* 2017;4(1):62-70. <https://doi.org/10.1007/s40521.017.0112-x>
- [20] Su VY-F, Liu C-J, Lan M-Y, Chen Y-M, Su K-C, Lee Y-C, Chen T-J, Chou K-T. Allergic rhinitis and risk of erectile dysfunction: a nationwide population-based study. *Allergy* 2013;68(4):440-445. <https://doi.org/10.1111/all.12100>.
- [21] Lenz ER, Pugh LC, Milligan RA, Gift A, Suppe F. The middle-range theory of unpleasant symptoms: an update. *Adv Nurs Sci*. 1997;19(3):14-27. <https://doi.org/10.1097/00012.272.199703000-00003>
- [22] Lenz ER, Pugh LC, Gift A, Milligan RA. Collaborative development of middle-range nursing theories: toward a theory of unpleasant symptoms. *Adv Nurs Sci*. 1995;17(3):1-13. <https://doi.org/10.1097/00012.272.199503000-00003>
- [23] Mohammad JM, Soleimani R, Jalali SM, Mohisafat B. Quality of life in patients with allergic rhinitis in the north of Iran. *J Clin Diagn Res*. 2018;12(6):MC1-MC4. <https://doi.org/10.7860/JCDR/2018/32872.11694>
- [24] Hancı D, Altun H, Başer E, Ceylan E, Yılmaz M, Karasoy DS. Sinonazal Sonuç Testinin (SNOT-22) Türkçeye çevirisi, kültürler arası adaptasyonu ve validasyonu. *ENT Updates* 2015;5(2):51-57. <https://doi.org/10.2399/jmu.201.500.2006> (Turkish)
- [25] Hopkins C, Gillett S, Slack R, Lund VJ, Browne JP. Psychometric validity of the 22-item sinonasal outcome test. *Clin Otolaryngol*. 2009;34(5):447-455. <https://doi.org/10.1111/j.1749-4486.2009.01995.x>
- [26] Rosen C, Brown C, Heiman J, Leiblum S, Meston C, Shabsigh R, Ferguson D, D'Agostino R Jr. The Female Sexual Function Index (FSFI): A multidimensional self-report instrument for the assessment of female sexual function. *J Sex Marital Ther*. 2000;26(2):191-208. <https://doi.org/10.1080/009.262.300278597>
- [27] Aygin D, Eti Aslan F. Kadın cinsel işlev ölçeği'nin Türkçeye uyarlaması. *Türkiye Klinikleri Tıp Bilimleri Derg*. 2005;25(3):393-397 (Turkish)
- [28] Rosen RC, Riley A, Wagner G, Osterloh IH, Kirkpatrick J, Mishra A. The International Index of Erectile Function (IIEF): A multidimensional scale for assessment of erectile dysfunction. *Urology* 1997;49(6):822-830. [https://doi.org/10.1016/S0090-4295\(97\)00238-0](https://doi.org/10.1016/S0090-4295(97)00238-0)
- [29] Buysse DJ, Reynolds CF III, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res*. 1989;28(2):193-213. [https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4)
- [30] Ağargün M. Pittsburgh uyku kalitesi indeksinin geçerliği ve güvenilirliği. *Türk Psikiyatri Derg*. 1996;7:107-115 (Turkish).
- [31] Krupp LB, LaRocca NG, Muir-Nash J, Steinberg AD. The Fatigue Severity Scale: application to patients with multiple sclerosis and systemic lupus erythematosus. *Arch Neurol*. 1989;46(10):1121-1123. <https://doi.org/10.1001/archneur.1989.005.20460115022>
- [32] Armutlu K, Korkmaz NC, Keser I, Sümbüloğlu V, Akbiyik DI, Güney Z, Karabudak R. The validity and reliability of the Fatigue Severity Scale in Turkish multiple sclerosis patients. *Int J Rehabil Res*. 2007;30(1):81-85. <https://doi.org/10.1097/MRR.0b013e3280146ec4>
- [33] Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry* 1961;4(6):561-571. <https://doi.org/10.1001/archpsyc.1961.017.10120031004>
- [34] Hisli N. Beck depresyon envanterinin üniversite öğrencileri için geçerliliği ve güvenilirliği. *Türk Psikiyatri Derg*. 1989;7:3-13 (Turkish).
- [35] Steer RA, Ranieri WF, Beck AT, Clark DA. Further evidence for the validity of the Beck Anxiety Inventory with psychiatric outpatients. *J Anxiety Disord*. 1993;7(3):195-205. [https://doi.org/10.1016/0887-6185\(93\)90002-3](https://doi.org/10.1016/0887-6185(93)90002-3)
- [36] Ulusoy M, Şahin NH, Erkmen H. The Beck Anxiety Inventory: psychometric properties. *J Cogn Psychother*. 1998;12(2):163-172.
- [37] Bedolla-Barajas M, Morales-Romero J, Pulido-Guillén NA, Robles-Figueroa M, Plascencia-Domínguez BR. Rhinitis as an associated factor for anxiety and depression amongst adults. *Braz J Otorhinolaryngol*. 2017;83(4):432-438. <https://doi.org/10.1016/j.bjorl.2016.05.00>
- [38] Kim DH, Han K, Kim SW. Relationship between allergic rhinitis and mental health in the general Korean adult population. *Allergy Asthma Immunol Res*. 2016;8(1):49-54. <https://doi.org/10.4168/aaair.2016.8.1.49>
- [39] Lu Z, Chen L, Xu S, Bao Q, Ma Y, Guo L, Zhang S, Huang X, Cao C, Ruan L. Allergic disorders and risk of depression: a systematic review and meta-analysis of 51 large-scale studies. *Ann Allergy Asthma Immunol*. 2018;120(3):310-317.e2. <https://doi.org/10.1016/j.anai.2017.12.011>
- [40] Atlantis E, Sullivan T. Bidirectional association between depression and sexual dysfunction: A systematic review and meta-analysis. *J Sex Med*. 2012;9(6):1497-1507. <https://doi.org/10.1111/j.1743-6109.2012.02709.x>
- [41] Fabre LF, Smith LC. The effect of major depression on sexual function in women. *J Sex Med*. 2012;9(1):231-239. <https://doi.org/10.1111/j.1743-6109.2011.02445.x>
- [42] Kalmbach DA, Pillai V, Kingsberg SA, Ciesla JA. The transaction between depression and anxiety symptoms and sexual functioning: a prospective study of premenopausal, healthy women. *Arch Sex Behav*. 2015;44(6):1635-1642. <https://doi.org/10.1007/s10508.014.0381-4>
- [43] Oliveira C, Nobre PJ. The role of trait-affect, depression, and anxiety in women with sexual dysfunction: a pilot study. *J Sex Marital Ther*. 2013; 39 (5): 436-442. <https://doi.org/10.1080/0092623X.2012.665813>
- [44] Shifren JL, Monz BU, Russo PA, Segreti A, Johannes CB. Sexual problems and distress in United States women: prevalence and correlates. *Obstet Gynecol*. 2008;112(5):970-978. <https://doi.org/10.1097/AOG.0b013e3181898cbb>
- [45] Rajkumar RP, Kumaran AK. Depression and anxiety in men with sexual dysfunction: a retrospective study. *Compr Psychiatry*. 2015;60:114-118. <https://doi.org/10.1016/j.comppsy.2015.03.001>
- [46] Strand J, Wise TN, Fagan PJ, Schmidt CW Jr. Erectile dysfunction and depression: category or dimension? *J Sex Marital Ther*. 2002;28(2):175-181. <https://doi.org/10.1080/009.262.30252851906>
- [47] Zhang X (Xiansheng Zhang), Gao J (Jingjing Gao), Liu J (Jishuang Liu), Xia L, Yang J, Hao Z, Zhou J, Liang C (Chaozhao Liang). Prevalence rate and risk factors of depression in outpatients with premature ejaculation. *Biomed Res Int*. 2013;2013:317468. <https://doi.org/10.1155/2013/317468>
- [48] Meyer IH, Sternfels P, Fagan JK, Ford JG. Asthma-related limitations in sexual functioning: an important but neglected area of quality of life. *Am J Public Health* 2002;92(5):770-772. <https://doi.org/10.2105/AJPH.92.5.770>

- [49] Kaptein AA, van Klink RCJ, de Kok F, Scharloo M, Snoei L, Broadbent E, Bel EHD, Rabe KF. Sexuality in patients with asthma and COPD. *Respir Med*. 2008;102(2):198–204. <https://doi.org/10.1016/j.rmed.2007.09.012>
- [50] Mollaioli D, Ciocca G, Limoncin E, Di Sante S, Gravina GL, Carosa E, Lenzi A, Jannini EAF. Lifestyles and sexuality in men and women: the gender perspective in sexual medicine. *Reprod Biol Endocrinol*. 2020;18(1):10. <https://doi.org/10.1186/s12958.019.0557-9>