Original Article

DOI: 10.4274/haseki.galenos.2022.8346
Med Bull Haseki 2022;60:234-239

A Prospective Analysis of the Relationship Between Sexual Dysfunction and Allergic Rhinitis in Men

Dogan Cakan*, Emin Ozturk**, Semih Usaklioglu***

*Istanbul University-Cerrahpasa, Cerrahpasa Faculty of Medicine, Department of Otorhinolaryngology, Istanbul, Turkey

**Inegol State Hospital, Clinic of Otorhinolaryngology, Bursa, Turkey

***University of Health Sciences Turkey, Istanbul Haseki Training and Research Hospital, Clinic of Otorhinolaryngology, Istanbul, Turkey

Abstract

Aim: Allergic rhinitis (AR) affects patients' quality of life in many areas. The aim was to investigate the effect of AR on the quality of sexual life (QoSL).

Methods: The study was conducted prospectively between June 2021 and January 2022. All subjects were questioned for AR symptoms, and skin prick tests (SPTs) were performed. Thirty-six AR patients were in the study group. The control group consisted of thirty-six healthy subjects. QoSL was evaluated using the International Index of Erectile Function questionnaire-5 (IIEF-5). IIEF-5 questions were grouped into the first 4 (Q1-Q4) and the final question (Q5). The patient group was asked whether AR affects their sexuality. The effect of symptoms on sexuality was evaluated. After AR treatment, the IIEF-5 was repeated. The obtained data was analyzed statistically.

Results: Pre-treatment IIEF-5 and IIEF-5 (Q1-Q4) scores were significantly lower than those in the control group ($p<0.05$). The number of patients who stated that AR affects their sexuality was 19 (52%). In the examination of symptoms, rhinorrhea, which is the most common symptom affecting sexuality, was significantly higher compared with other symptoms ($p=0.0003$). Post-treatment IIEF-5 and IIEF-5 (Q1-Q4) scores were significantly higher than the pre-treatment scores ($p<0.05$). No significant difference was found between the groups in terms of other parameters.

Conclusion: Allergic rhinitis may affect QoSL. Patients with sexual dysfunction should be questioned for AR and they should be provided with the necessary treatment.

Keywords: Rhinitis, allergic/etiology, erectile dysfunction, quality of life, sexual dysfunction

Introduction

Allergic rhinitis (AR) is a chronic allergic disease that affects up to 18.1% of the worldwide population (1). The symptoms of classic AR are nasal congestion, rhinorrhea, sneezing, and itching (1,2). AR affects patients' quality of life (QoL) in many areas, such as academic, athletic, and job performance (3,4).

Erectile dysfunction (ED) is a prevalent medical condition described by the National Institutes of Health (NIH) as "the inability to attain and maintain an erection of sufficient quality to permit satisfactory sexual intercourse" and affects approximately 100 million men worldwide (5,6). Penile erection (PE) is a multiplex process that is affected by many conditions, such as psychogenic, neurogenic, vascular, and hormonal factors (7). The International Index of Erectile Function Questionnaire (IIEF) is a 15-item self-reported inventory developed by Rosen et al. (8) to provide a brief measure of erectile function and capacity that has become the primary and standard method in ED studies. The IIEF-5 is a variant of this form that is used in patients who present with the complaint of sexual dysfunction (SD). The test consists of five questions. The first four questions are for ED, and the last question is for sexual satisfaction (9).

The incidence of ED that negatively affects QoL increases with the accompanying chronic diseases such as chronic lung diseases, diabetes, dyslipidemia, hypothyroidism, cardiovascular disease, genitourinary diseases, obesity,

Address for Correspondence: Dogan Cakan
Istanbul University-Cerrahpasa, Cerrahpasa Faculty of Medicine, Department of Otorhinolaryngology, Istanbul, Turkey
E-mail: drdgnckn@gmail.com ORCID: orcid.org/0000-0002-6283-2916
Received: 22.03.2022 **Accepted:** 07.05.2022

sleep apnea, and psychiatric disorders (10). AR is also a chronic upper airway disease that mostly affects the nose. Kirmaz et al. (11) showed that AR causes SD as first in literature. Since the first study, there are limited studies in the literature examining the relationship between AR and SD. This study examined the frequency of SD in men with AR and its response to medical treatment.

Materials and Methods

Compliance with Ethical Standards

This study was conducted prospectively on AR patients and volunteers who applied to Inegol State Hospital between June 2021 and January 2022 with the approval of Istanbul University-Cerrahpasa, Cerrahpasa Faculty of Medicine Clinical Research Ethics Committee (decision number: 604.01.02-74239). Informed consent was obtained from the individuals.

Populations, Inclusion and Exclusion Criteria

All participants in the study applied to the Clinic of Otorhinolaryngology, Inegol State Hospital. Sexually active male patients with AR symptoms and positive skin prick tests (SPTs) for non-seasonal allergens (negative in SPT for grass, cereal, weed, and tree pollen extracts) were included in this study as a study group.

The exclusion criteria, conditions that may be risk factors for SD, were as follows: previous or active sexual or psychiatric disorders, such as depression; the presence of chronic disease, especially asthma; diseases associated with atherosclerosis; the regular use of any medication, including anti-allergic drugs, in the past 6 months; body mass index (BMI)≥30 kg/m^2; alcohol dependence; smoking; Lack of mental capacity and refusal to enter the study or to complete the questionnaire (12).

The control group consisted of thirty-six sexually active healthy male subjects with no AR symptoms and negative SPT (Figure 1).

Sample Size and Sampling Technique

A stratified sampling method was used in this study. People who applied to our clinics were separated into subgroups according to whether they had AR or not. Those with diseases and habits that may affect the investigated parameters were excluded from the AR subgroup. The minimum sample size was estimated on the basis of the study by Kirmaz et al. (11). The minimum sample size with a 95% confidence interval and 5% tolerable error assumptions was 16 for each group. However, statistical analyses in the prior study were performed using non-parametric tests (11). In our study design, we planned to use parametric tests to obtain more statistically significant results. At least 30 patients were planned to be included in each group since the minimum sample size for parametric tests was thirty (13). In accordance with this information, considering that we will exclude samples that may disrupt the normal distribution and that some subjects might be excluded from follow-up, we included 36 patients in the study group and 36 healthy individuals in the control group. In addition, a post-hoc test analysis was planned at the end of the study to calculate the sampling power of valid equations.

Procedures and Data Collection

All AR patients were questioned for allergic symptoms and sexual activity. Endoscopic nasal examinations were performed, BMIs were calculated, and SPTs were planned. The SPTs were performed according to the European Academy of Allergology and Clinical Immunology guidelines to support the diagnosis of allergy and to determine the allergens in the etiology of AR (14). The SPT was performed using_mites [Dermatophagoides (D) pteronyssinus, D. farinae], weeds (Plantago lanceolata, Artemisia vulgaris, Taraxacum vulgare, Urtica dioica), fungi (Cladosporium, Aspergillus, Penicillium, Alternaria), animal fluff (Dog and Cat), grasses (Dactylis glomerata, Phleum pratense, Hulcus lanatus, Poa pratensis, Lolium perenne, Fectuca pratensis), tree pollens (Fraxinus excelsior, Quercus robur, Ulmus scabra, Alnus glutinosa, Olea europaea), grains (Secale cerela, Hordeum vulgare, Triticum sativum, Avena sativa) and food allergens (Banana, cocoa, egg, fish, nuts), latex and cockroach extracts (Prick test kit, Stallergenes Greer, France). Positive control was performed with histamine hydrochloride (10 mg/mL). The reactions were reported for 20 minutes by the investigator who performed the test. SPT was evaluated according to the diameter of induration and diameters of 3 mm and larger were accepted as positive.

The quality of sexual life was evaluated using the IIEF questionnaire-5 (IIEF-5). This survey has been commonly used to assess male sexual function. It consisted of five questions. Each question was rated from 1 to 5. The

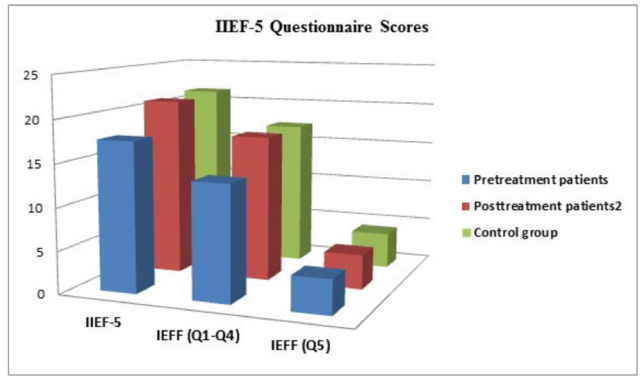

Figure 1. The IIEF-5 questionnaire scores
IIEF: International Index of Erectile Function questionnaire-5

individual scores in each domain were rated to identify the grade of clinical dysfunction; score numbers were determined as follows: 5= no dysfunction, 4= mild dysfunction, 3= mild-to-moderate, 2= moderate, and 1= severe. Lower scores identify higher grades of dysfunction, while higher rates mean lower dysfunction (9). The IIEF-5 was administered to patients in about 15 minutes by the same person. The age and BMI distributions of the groups were compared. The IIEF-5 questions were grouped into themselves, with the first 4 questions (Q1-Q4) and the last question (Q5) separate.

The patient group was asked whether AR affects their sexuality. Those who answered yes to the question were asked which symptoms (nasal congestion, rhinorrhea, sneezing, and itching) affect their sexuality. The frequency was calculated according to the response and symptoms. The effect of symptoms on sexuality was compared statistically.

To avoid systemic effects, the patients included in the study were given local steroid and antihistamine treatment in accordance with the literature (15). The AR patients were treated with azelastine hydrochloride (Nazetin, Berko, Turkey) and beclomethasone dipropionate (Rinoclenil®, Chiesi Farmaceutici, Italy), with one puff in each nostril twice a day for two months. After two months of treatment, the IIEF-5 questionnaire was administered to the patients again.

The values of AR patients before treatment were compared with the control group. Afterward, treatment, AR patients' IIEF-5 scores were compared with both the pre-treatment values and the values of the control group.

Statistical Analysis

The calculations of the minimum sample size and sample power were performed by the G*Power software (16). SPSS 21 was used for statistical analysis. The Kolmogorov-Smirnov and Levene's tests were used to assess the normal distribution and homogeneity of data. For analysis, the paired-samples t-test, Independent samples t-test, and chi-square test were used. The statistical significance level was determined as $p<0.05$.

Results

All individuals included in the patient and control groups completed the study. The mean ages of the groups were 31.06±8.49 for the AR patients and 32.89±8.94 for the control group. The mean BMI was 23.42±1.67 in the AR group and 23.10±1.37 in the control group. There was no significant difference between the groups according to age and BMI (Independent samples t-test, $p=0.380$; $p=0.346$, respectively).

The pre-treatment IIEF-5 and IIEF-5 (Q1-Q4) scores were found to be significantly lower than those of the control group ($p<0.05$). Although the pre-treatment IIEF-5 (Q5) score was lower than that of the control group, no significant difference was found to be according to IIEF-5 (Q5) score ($p=0.249$) (Table 1) (Figure 1).

The frequency of "YES" answers to the question, "Does your rhinitis affect your sexuality?" is 19 (52.8%). The distribution of symptoms that affect the sexuality of these patients was determined. Rhinorrhoea, which is the most common symptom affecting sexuality, was significantly higher compared with other symptoms ($p=0.0003$) (Table 2).

The post-treatment IIEF-5 and IIEF-5 (Q1-Q4) scores were significantly higher than the pre-treatment scores ($p<0.05$). Although the post-treatment IIEF-5 (Q5) score was higher than the pre-treatment score, there was no significant difference according to IIEF-5 (Q5) score ($p=0.822$) (Table 1) (Figure 1).

The post-hoc test, which was used to determine the sampling power of this study, was performed using a 5% error probability. The sample power (1-β err prob) was 0.9998.

Discussion

AR is an inflammatory disease with an IgE-mediated immune response that negatively affects social life (17,18). The decrease or loss in sexual function is a status that affects the QoL and may be associated with AR. ED or SD was described as persistent (at least 6 months) inability to attain and maintain an erection sufficient to permit satisfactory sexual activity (5). ED can be affected by many

Table 1. Evaluation of IIEF-5 questionnaire scores

Questionnaire	Mean ± Standard deviation			p-value		
	Control Group	Pretreatment AR patients	Posttreatment AR patients	Pretreatment vs Control	Posttreatment vs Control	Pretreatment vs Posttreatment
IIEF-5	21.39±3.05	17.55±4.18	20.97±2.85	**0.00003***	0.552	**0.00003****
IIEF (Q1-Q4)	17.22±2.75	13.5±3.7	17.17±2.27	**0.00001***	0.926	**0.00001****
IIEF (Q5)	4.22±0.64	4.03±0.77	4.05±0.53	0.249	0.232	0.822

*Independent sample t-test $p<0.05$
**Paired sample t-test $p<0.05$
IIEF: International Index of Erectile Function questionnaire-5

mental and physical diseases and is also associated with otorhinolaryngological diseases. In this study, we showed that SD is more common in AR patients, who do not have conditions known to cause SD, than in healthy individuals, and this case disappears with appropriate AR treatment.

In previous studies, ED was identified in patients with hearing loss, apnea, equilibrium disorders, and halitosis (19-21). Bakır et al. (19) showed that the risk of ED was higher in patients with hearing loss. However, Ozler and Ozler (20). examined patients with hearing loss and reported that there was no negative effect on erectile function and intercourse satisfaction, parts of IIEF-15, whereas the other parts of the questionnaire showed the negative effects. With SDs related to the otolaryngological diseases that there is conflicting information in the literature improve depending on the treatment of the primary disease (11,21).

In previous studies, an increased frequency of SD in AR patients has been reported (21-25). The IIEF form was used in previous studies investigating the presence of SD in patients with AR (11). ED is defined by the NIH as an inability of at least 6 months. Therefore, the IIEF-5 form, which examined the 6-months, instead of the IIFF form, which examined the one-month, would be more appropriate for evaluating the association between AR and ED. In this study, we evaluated the risk of ED in AR patients with IIEF-5 as the first in the literature. Patients with positive SPT for seasonal allergens (grass, cereal, weed and, tree pollen extracts) were investigated in previous studies (11). However, the positive SPT for seasonal allergens was an exclusion criterion in this study to maintain allergic effects for at least 6 months as in the ED definition.

The IIEF-5 consists of five questions; the first four questions are for ED and the last question is for sexual satisfaction (9). In the literature review, although there are studies comparing the IIEF scores in AR patients with the control group, there is no study comparing the test questions by grouping them according to the functions they perform (11). For the first time in literature, although we used the questionnaires as a whole in the comparison of the groups, we also used the questions by grouping them according to ED (Q1-Q4) and sexual satisfaction (Q5).

In this study, we detected the IIEF-5 (Q1-Q4), which is the test section for ED, and total IIEF-5 scores in the AR patients without treatment were statistically significantly lower than the control group ($p<0.05$). No statistical significance was found for IIEF-5 (Q5) scores, which is the test part for sexual satisfaction. In this study, we gave local treatment to AR patients to avoid possible systemic effects. We found that the total post-treatment IIEF-5 and IIEF-5 (Q1-Q4) scores were significantly higher than before the treatment, and no significant difference was found between the post-treatment scores and the control group's scores. This comparison by dividing the questions, which is the first in the literature, suggests that SD detected in the AR patients is related to ED rather than satisfaction and that this disease disappears with proper treatment. In addition, this study suggested that there was no reduction in sexual satisfaction in the case of attaining an erection in AR patients.

Table 2. Symptoms and sexuality

Symptom		Entity			p-value
		Yes	No	Total	
Congestion	Count	11	8	19	
	% within symptom	57.9%	42.1%	100%	
	% within entity	29.7%	20.5%	25%	
Rhinorrhea	Count	16	3	19	
	% within symptom	84.2%	15.8%	100%	
	% within entity	43.2%	7.7%	25%	
Sneeze	Count	4	15	19	
	% within symptom	21.1%	78.9%	100%	**0.0003***
	% within entity	10.8%	38.5%	25%	
Itching	Count	6	13	19	
	% within symptom	31.6%	68.4%	100%	
	% within entity	16.2%	33.3%	25%	
Total	Count	37	39	76	
	% within symptom	48.7%	51.3%	100%	
	% within entity	100%	100%	100%	

*Pearson chi-square: 18,275, df: 3, $p<0.05$

ED in AR patients can be explained by multiple conditions and mechanisms seen in AR. One of these situations is the impact of AR on the sense of "sexiness" discussed by Benninger and Benninger (25). To examine this issue, we asked our patients, "Does your rhinitis affect your sexuality?". Nineteen of 36 patients (52%) answered this question as "yes". These people were asked what symptoms they were affected by. Rhinorrhoea, which is the most common symptom affecting sexuality, was statistically significantly higher compared with other symptoms ($p<0.05$).

Study Limitations

In this study, we made comparisons according to the parameters that were not used before. However, the lack of a mechanical outcome limits this study. We wanted to include more participants in this study, which is unique in the literature with its many features, to establish a more robust clinical relationship. However, some factors limited the number of participants in this study. Firstly, we had difficulty in finding patients who do not use drugs, including antiallergic drugs, because reaching the drugs is so easy in our time. Secondly, since smoking is very common today, we had difficulty in finding non-smoking patients. For the last and most important reason, sexuality is still seen as a taboo. For this reason, the patients did not show the desire to participate in the study. Although these, the sample power of this study was calculated by the post-hoc test and was found to be statistically adequate (0.9998). Another limitation is that we questioned the effect of symptoms on sexuality with a yes or no question, and we did not question the relationship between sexuality and AR symptoms after treatment. If we had obtained numerical pre-treatment and post-treatment data using a scale such as a visual analogue scale instead, our results would have been statistically stronger.

Conclusion

Allergic rhinitis is a risk factor for SD. SD should be questioned in patients with AR, and AR should also be investigated in patients with SD. The repetition of the obtained data with the larger subject numbers and studies on the pathophysiology of SD seen in patients with AR are needed.

Ethics

Ethics Committee Approval: Approval was obtained from the Istanbul University-Cerrahpasa, Cerrahpasa Faculty of Medicine Clinical Research Ethics Committee (decision number: 604.01.02-74239).

Informed Consent: Informed consent was obtained from the individuals.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: D.C., E.O., Design: D.C., S.U., E.O., Data Collection and/or Processing: D.C., E.O., Analysis and/or Interpretation: D.C., S.U., Literature Research: D.C., S.U., E.U., Writing: D.C., S.U., E.U.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The present study has no financial support.

References

1. Savouré M, Bousquet J, Jaakkola JJK, Jaakkola MS, Jacquemin B, Nadif R. Worldwide prevalence of rhinitis in adults: A review of definitions and temporal evolution. Clin Transl Allergy 2022;12:e12130.
2. Rosario CS, Murrieta-Aguttes M, Rosario NA. Allergic rhinits: impact on quality of life of adolescents. Eur Ann Allergy Clin Immunol 2021;53:247-51.
3. Lee GN, Koo HYR, Han K, Lee YB. Analysis of Quality of Life and Mental Health in Patients With Atopic Dermatitis, Asthma and Allergic Rhinitis Using a Nation-wide Database, KNHANES VII. Allergy Asthma Immunol Res 2022;14:273-83.
4. Ecevit MC, Özcan M, Haberal Can İ, et al. Turkish Guideline for Diagnosis and Treatment of Allergic Rhinitis (ART). Turk Arch Otorhinolaryngol 2021;59(Suppl 1):1-157.
5. Eid JF, Nehra A, Andersson KE, et al. First international conference on the management of erectile dysfunction. Overview consensus statement. Int J Impot Res 2000;12 (Suppl 4):S2-5.
6. Gowani Z, Uddin SMI, Mirbolouk M, et al. Vascular Erectile Dysfunction and Subclinical Cardiovascular Disease. Curr Sex Health Rep 2017;9:305-12.
7. Sangiorgi G, Cereda A, Benedetto D, et al. Anatomy, Pathophysiology, Molecular Mechanisms, and Clinical Management of Erectile Dysfunction in Patients Affected by Coronary Artery Disease: A Review. Biomedicines 2021;9:432.
8. 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;49:822-30.
9. Rosen RC, Cappelleri JC, Smith MD, Lipsky J, Peña BM. Development and evaluation of an abridged, 5-item version of the International Index of Erectile Function (IIEF-5) as a diagnostic tool for erectile dysfunction. Int J Impot Res 1999;11:319-26.
10. Nobre PJ, Pinto-Gouveia J, Gomes FA. Prevalence and comorbidity of sexual dysfunctions in a Portuguese clinical sample. J Sex Marital Ther 2006;32:173-82.
11. Kirmaz C, Aydemir O, Bayrak P, Yuksel H, Ozenturk O, Degirmenci S. Sexual dysfunction in patients with allergic rhinoconjunctivitis. Ann Allergy Asthma Immunol 2005;95:525-9.
12. Chen L, Shi GR, Huang DD, et al. Male sexual dysfunction: A review of literature on its pathological mechanisms,

potential risk factors, and herbal drug intervention. Biomed Pharmacother 2019;112:108585.
13. Kaur, A, Kumar R. Comparative analysis of parametric and non-parametric tests. Journal of Computer and Mathematical Sciences 2015;6:336-42.
14. Terho E, Frew AJ. Type III allergy skin testing. Position statement for EAACI Subcommittee on Skin Tests and Allergen Standardization. Allergy 1995;50:392-6.
15. Hoyte FCL, Nelson HS. Recent advances in allergic rhinitis. F1000Res. 2018 Aug 23;7:F1000 Faculty Rev-1333.
16. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods 2007;39:175-91.
17. Nur Husna SM, Tan HT, Md Shukri N, Mohd Ashari NS, Wong KK. Allergic Rhinitis: A Clinical and Pathophysiological Overview. Front Med (Lausanne) 2022;9:874114.
18. Chen M, Ge Y, Lin W, et al. Clinical features and nasal inflammation in asthma and allergic rhinitis. Clin Exp Immunol 2022;208:25-32.
19. Bakır S, Penbegül N, Gün R, et al. Relationship between hearing loss and sexual dysfunction. J Laryngol Otol 2013;127:142-7.
20. Ozler GS, Ozler S. Quality of Social and Sexual Life in Males with Hearing Loss. Int Adv Otol 2013;9:211-8.
21. Ceylan C, Odabaş O,Yığman M, et al. Does the Treatment of Sleep Apnea Improve the Sexual Performance in Men with Obstructive Sleep Apnea Syndrome? J Clin Anal Med 2013;4:9-12.
22. Tai SY, Wang LF, Tai CF, Huang YT, Chien CY. Chronic Rhinosinusitis Associated with Erectile Dysfunction: A Population-Based Study. Sci Rep 2016;6:32195.
23. Su VY, Liu CJ, Lan MY, et al. Allergic rhinitis and risk of erectile dysfunction–a nationwide population-based study. Allergy 2013;68:440-5.
24. Martin B. Sexual dysfunction in patients with allergic rhinoconjunctivitis. Ann Allergy Asthma Immunol 2005;95:498.
25. Benninger MS, Benninger RM. The impact of allergic rhinitis on sexual activity, sleep, and fatigue. Allergy Asthma Proc 2009;30:358-65.