




Does Allergic Rhinitis Have Effect on Erectile Dysfunction?

Allerjik Rinitin Erektıl Disfonksiyon Üzerine Etkisi Var mıdır?

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ABSTRACT Objective: Allergic rhinitis (AR) affects daily activities of patients by causing several symptoms including insomnia and chronic fatigue. That being said, the effect of AR on erectile dysfunction (ED) has not been examined adequately. The aim of this study is to evaluate the effect of AR on ED. **Material and Methods:** This study included a total of 196 male subjects, 100 of them being allergic rhinitis patients who admitted to Allergic and Clinical Immunology, Urology and Internal Diseases outpatient clinics of University of Health Sciences, Bursa Postgraduate Research and Training Hospital between October 2015 and December 2016, and 96 of them being healthy controls. 18 to 55 year-old males with and without allergic rhinitis were included into the study. Males without any known disease comprised the healthy group. AR group included otherwise healthy patients who were regarded as having AR by skin prick test. This study used the International Index of Erectile Function (IIEF) to evaluate the quality of sexual life of males with AR, and the results were compared to the healthy male group matched for age and sex. **Results:** The ages, ED scores and ED categories of the AR and control groups were compared. A difference was found in terms of ED scores and ED categories between two groups ($p<0.001$; $p=0.002$). No difference was detected in terms of age. ED score of the AR group was found to be significantly lower than the healthy group. In pairwise comparisons conducted for ED category, mild ED rate in the AR group was found to be higher than the healthy group, and the rate of subjects without ED in the healthy group was found to be higher. In terms of mild-to-moderate ED, no difference was found between the AR group and healthy group. The difference between allergic rhinitis and healthy subjects was significant in the 25-34 and 45-55 age groups in terms of ED categorization ($p<0.005$, $p<0.001$). **Conclusion:** As other diseases and medical therapies were excluded from our study, we detected AR has adverse effects on ED and increases ED independently from medication use. We concluded that patients admitting for AR should also be evaluated for ED. Nonetheless, it is clear that larger studies examining the effects of allergic inflammation on ED and investigating the causal relationship between AR and ED are needed.

Keywords: Allergic rhinitis; erectile dysfunction; international index of erectile function

ÖZET Amaç: Allerjik rinit (AR), uykusuzluk ve kronik yorgunluk gibi pekçok semptomlara neden olarak hastaların günlük aktivitelerini etkilemektedir. Bununla birlikte AR'nin erektil disfonksiyon (ED) üzerine etkisi yeterince incelenmemiştir. Bu çalışmanın amacı, AR'nin ED üzerine etkisini değerlendirmektir. **Gereç ve Yöntemler:** Bu çalışmaya Ekim 2015 ve Aralık 2016 tarihleri arasında Sağlık Bilimleri Üniversitesi (SBÜ) Bursa Yüksek İhtisas Eğitim ve Araştırma Hastanesi Allerji ve Klinik İmmunoloji, Üroloji ve İç Hastalıkları polikliniklerine başvuran, allerjik rinitli 100 ve sağlıklı kontrol 96 toplam 196 erkek alındı. 18-55 yaşları arasında allerjik riniti olan ve olmayan erkekler çalışmaya dahil edildi. Bilinen bir hastalığı olmayan erkekler sağlıklı grubu oluşturdu. AR grubuna deri prick testi ile AR kabul edilen ve başka herhangi bir hastalığı olmayanlar alındı. Çalışmada, AR'li erkeklerin cinsel yaşam kalitelerini değerlendirmek için Uluslararası Erektıl Fonksiyon İndeksi (IIEF) kullanıldı ve sonuçlar yaş ve cinsiyete uygun sağlıklı erkek grubu ile karşılaştırıldı. **Bulgular:** AR ve kontrol gruplarının yaş, ED skoru ve ED kategorileri karşılaştırılmıştır. İki grubun ED skorları ve ED kategorileri arasında fark bulunmuştur ($p<0.001$; $p=0.002$). Yaşlar arasında ise fark saptanmamıştır. AR grubunun ED skoru sağlıklı gruptan anlamlı ölçüde düşük bulunmuştur. ED kategorisi için yapılan ikili karşılaştırmalarda AR grubunda hafif ED oranı sağlıklı gruptan daha yüksek, sağlıklı grupta ise ED olmayanların oranı yüksek bulunmuştur. Hafif-orta ED açısından AR grubu ve sağlıklı grup arasında fark bulunmamıştır. Allerjik rinitli ile sağlıklı bireyler arasında ED kategorizasyonu açısından fark 25-34 ve 45-55 yaş gruplarında anlamlı idi ($p<0.005$, $p<0.001$). **Sonuç:** Çalışmamızda hastalık ve tıbbi medikasyonlar ekarte edildiği için yaştan ve eşlik eden hastalık ve ilaç alınmadan bağımsız olarak AR'nin ED üzerine olumsuz etkilerinin olduğu ve ED'yi artırdığını saptadık. AR şikayetiyle başvuran hastaların ED açısından da değerlendirilmesi gerektiği sonucuna ulaştık. Yine de allerjik inflamasyonun ED üzerine etkilerinin ve AR, ED bağlantısının nedensel incelendiği daha geniş çaplı çalışmalara ihtiyaç olduğu açıktır.

Allergic rhinitis (AR) is one of the most common atopic diseases. Its prevalence varies by region, and it affects 20-25% of the population.^{1,2} The prevalence in Turkey is 11 to 17.6%.³ Rhinitis diagnosis is made by the presence of two of the symptoms including nasal congestion, itchy nose, sneezing and decreased sense of smell lasting more than one day per week.^{4,5} Allergic Rhinitis symptoms usually starts before the age of 20, and it severely affects daily activities including work performance and exam performance in younger individuals, and psychosocial status.⁶⁻⁸ Impaired quality of life causes productivity loss and increased utilization of resources.⁹ In 1992, Erectile Dysfunction (ED) was defined as a man's inability to achieve or maintain an erection sufficient for sexual intercourse erection for at least 6 months in National Institutes of Health (NIH) meeting.¹⁰ (ED) prevalence increases with age, and it is an important health problem adversely affecting the quality of life. Given that life expectancy is increasing today, it is clear that these rates are also increasing with the aging population. This prospective study examined the relationship between AR and ED both of which become a public health concern and adversely affect the quality of life.

MATERIAL AND METHODS

This study was included a total of 196 male subjects, 100 of them being AR patients who admitted to Allergic and Clinical Immunology, Urology and Internal Diseases outpatient clinics of Bursa Postgraduate Research and Training Hospital between October 2015 and December 2016, and 96 of them being healthy control group. Males with and without allergic rhinitis with the age of 18 to 55 were included into the study. Males without any known disease comprised the healthy group. AR group included patients who were regarded as having AR by skin prick test and do not have any other disease. These patients were included into the study at the active stage of the disease between June and October and/or in a period in which they needed treatment. Patients with hypertension, diabetes, coronary artery disease, arrhythmias, asthma, chronic obstructive pulmonary disease (COPD), is-

chemic stroke and hyperlipidemia, any kind of systemic inflammatory disease, severe anemia or hematological disease, malignancy, chronic liver, heart or kidney disease, and patients using ACE inhibitors, beta-adrenergic blockers, statins, systemic corticosteroids, anti-inflammatory or anticoagulant medications were excluded from the study. All patients gave informed consent. This study was approved by University of Health Sciences, Bursa Postgraduate Research and Training Hospital, Ethics Committee.

International Index of Erectile Function (IIEF) is one of the most frequently used forms for the patients presenting with sexual dysfunction. ED is mostly questioned by IIEF-5 form. This questionnaire asks 5 questions regarding sexual dysfunctions in males. Patients were grouped by IIEF scores as (5-7)- severe, (8-11)- moderate, (12-16)- mild-to-moderate, (17-21)- mild, and (22-25)- no ED.

STATISTICS

Descriptive statistics are presented by frequency, mean, standard deviation, median, minimum, and maximum values. For the analysis of categorical data, the percentage of the cell of which the expected value is less than 5 is more than 20%, Fisher's Exact Test was used, and if it is less than 20% Pearson Chi-Square Test was used. Normality assumption was tested based on skewness and kurtosis values and using q-q plot figure. For the analysis of the difference of the numerical data between of two groups, Independent Samples t test was used for the normally distributed data and Mann-Whitney U test for the non-normally distributed data. For the analysis of categorical data, Pearson Chi-Square test was used. Pairwise comparisons were conducted using Bonferroni Procedure. Analyses were conducted using SPSS 23.0 software. p value being <0.05 was regarded as statistically significant.

RESULTS

Age, ED score and ED categories of the allergic rhinitis and control groups were compared. Difference was found in terms of ED scores and ED categories between two groups ($p < 0.001$; $p = 0.002$). No

difference was detected in terms of age. ED score of the AR group was found to be significantly lower than the healthy group. In pairwise comparisons conducted for ED category, mild ED rate in the AR group was found to be higher than the healthy group, and the rate of subjects without ED in the healthy group was found to be higher. In terms of mild-to-moderate ED, no difference was found between the AR and healthy group (Table 1).

The difference between allergic rhinitis and healthy subjects was significant in the 25-34 and 45-55 age groups in terms of ED categorization ($p < 0.005$, $p < 0.001$) (Table 2).

In the 25-34 and 45-55 age groups, patients with allergic rhinitis were more likely to have a slight ED score, whereas healthy subjects were more likely to have no ED. The ED scores of patients with allergic rhinitis were lower than healthy subjects, but this difference was not significant in the 35-44 age group ($p = 0.095$) (Figure 1).

ED score of the AR group was found to be significantly lower than the healthy group ($p < 0.001$) (Figure 2).

The rate of subjects without erectile dysfunction is higher in the healthy group. In terms of mild-to-moderate ED, there is no difference between the AR and healthy groups. The rate of mild ED in the AR group is higher than the healthy group ($p < 0.002$) (Figure 3).

Distribution of the AR and healthy groups by ED categories and ED scores were shown in Figure 3 and 4.

DISCUSSION

Allergic Rhinitis (AR) is classified as seasonal and perennial. While seasonal AR is caused by exposure to plant pollens including herbs pollinating by wind, weeds and tree pollens, perennial AR is caused by house dust mites, domestic animals, cockroaches and fungi. AR is an IgE-mediated in-

TABLE 1: Distribution of the patient and healthy groups by age, sex and ED score.

	Allergic Rhinitis			Healthy			
	n	Mean±Sd	Median (Min-Max)	n	Mean±Sd	Median (Min-Max)	
Age [#]	100	38.01±6.8	37 (25-55)	96	38.07±7.82	35 (27-55)	0.952
ED score [§]	100	21.13±2.88	21 (13-25)	96	22.6±2.62	23 (15-25)	<0.001
ED Category+							
Score 12 to 16, mild-to-moderate	8	8.0%		6	6.3%		0.002
Score 17 to 21, mild	44	44.0%		21	21.9%		
Score 22 to 25, no Erectile Dysfunction	48	48.0%		69	71.9%		

#Independent Samples t Test, § Mann Whitney U Test, + Pearson Chi Square Test.

The ages of 100 subjects in the AR group are between 25 and 55 (38.01±6.8), of 96 subjects in the healthy group between 27 and 55 (38.07±7.82) years. There is no difference between the ages ($P = 0.952$) (Figure 1), Sd: Standard deviation.

TABLE 2: Distribution of the patient and healthy groups by age and ED score.

Age groups	Groups	n	ED score		z	p
			Mean±Sd	Median (Min-Max)		
25-34 years	Allergic Rhinitis	31	21.13±2.26	21(16-25)	-2.812	0.005
	Healthy	46	22.59±2.55	23(16-25)		
35-44 years	Allergic Rhinitis	50	21.72±3.04	22(13-25)	-1.669	0.095
	Healthy	25	22.72±2.95	24(15-25)		
45-55 years	Allergic Rhinitis	19	19.58±2.89	19(15-24)	-3.286	0.001
	Healthy	25	22.52±2.5	23(16-25)		

Sd: Standard deviation.

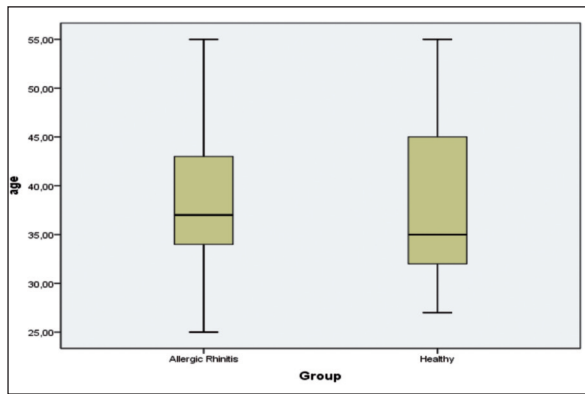


FIGURE 1: Distribution of AR and healthy groups by age.

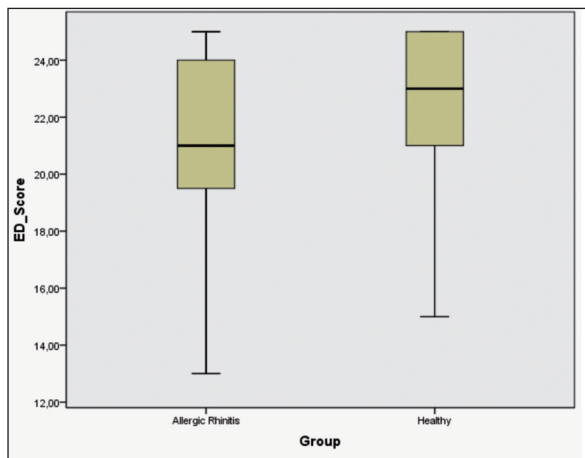


FIGURE 2: Distribution of the AR and healthy groups by ED score.

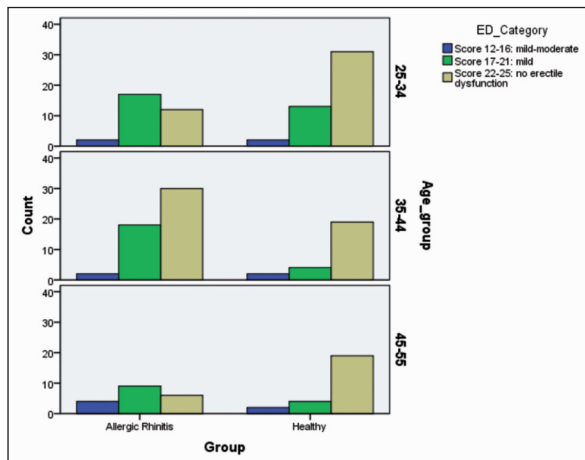


FIGURE 3: Distribution of the AR and healthy groups by ED category.

flammatory disease of nasal mucosa.¹ Developments have shown that AR is not only a local disease, and inflammation caused by it may also have systemic effects.^{11,12} Two components including acute allergic reaction and late-phase inflamma-

tory reactions play a role in its pathogenesis. Type I hypersensitivity reaction accounts for the majority of acute clinical presentation of AR. Macrophages, dendritic cells, CD4+ T cells, B cells and plasma cells play a role in the sensitization phase. While mast cells play a role in the early phase of the inflammation, eosinophils, basophils, monocytes and lymphocytes play an important role in the late phase of the inflammation. This period is the clinical phase of the disease¹. Additionally, inflammatory mediators and cells which are thought to be related in atherosclerosis process and ED development such as leukotrienes, IgE and mast cells also have role in AR.¹³⁻¹⁶ Important chronic inflammatory airway diseases including COPD and asthma have been reported to be associated with ED.^{17,18} There are three studies in which sexual activities of AR patients were investigated in the literature, and these were criticized due to small sample size, lack of control group, lack of information regarding comorbidities and concomitant medications, and they were considered to be weak in terms of showing the relationship between AR and ED.¹⁹⁻²¹ This study hypothesized that AR may play a role in the development of ED. To summarize; our study compared the ages, ED scores and ED categories of the AR and control groups. Difference was found in terms of ED scores and ED categories between two groups ($p < 0.001$; $p = 0.002$). ED score of the AR

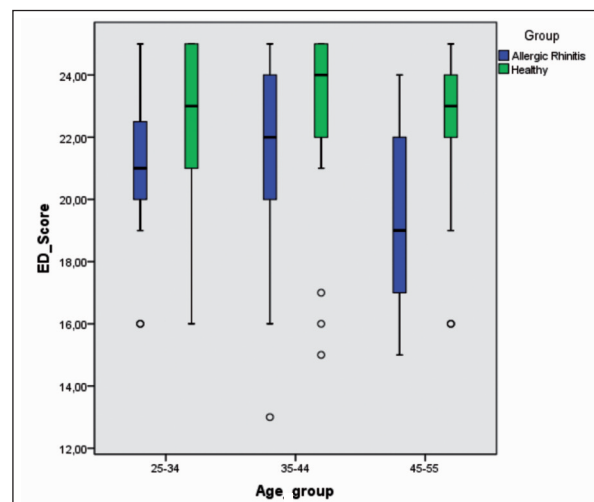


FIGURE 4: Distribution of the AR and healthy groups by ED score.

group was found to be significantly lower than the healthy group. In pairwise comparisons conducted for ED category, while mild ED rate in the AR group was higher than the healthy group, the rate of subjects without ED in the healthy group was found to be higher. As shown in Table 1, ED rate in the AR group was found to be significantly higher than the healthy group. There is no difference between two groups in terms of mean age (Figure 1). This suggests that higher rates of ED scores in the AR group are independent from age (Figure 2). In pairwise comparisons conducted for ED category, mild ED rate in the AR group was found to be higher than the healthy group, and the rate of subjects without ED in the healthy group was found to be higher. In terms of mild-to-moderate ED, no difference was found between the AR and healthy group (Figure 3). In the 25-34 and 45-55 age groups, patients with allergic rhinitis were more likely to have a slight ED score, whereas healthy subjects were more likely to have no ED (Figure 4).

In their study, Ozler et al. was included 40 patients with seasonal AR diagnosed by skin prick test and 40 control subjects without any evidence of allergy. Groups consisted of married males between the age of 20 and 50 without alcohol or smoking addiction, obesity, psychiatric or mental disorder, or any other disease. IIEF was used to evaluate quality of sexual life. In terms of ED, the results were significantly in favor of the AR group compared to the control group²¹. In conclusion AR adversely affects the quality of life. Medical therapy of AR also prevents accompanying social, sexual and sleep disorders. Our study found no difference between the trial group and the control group in terms of age, comorbidities and medication use. Sample sizes, 100 for AR group and 96 for control group are higher than this study.

The study by Kirmaz et al. was included 43 patients (27 females, 16 males) between the ages of 22 and 49 years with seasonal allergic rhinoconjunctivitis who are sexually active, and 40 healthy subjects (20 females, 20 males) as control group.¹⁹ The difference from our study is the smaller patient and control sample sizes and inclusion of female

sex. They detected that though limited, allergic symptoms have effects on sexual functions, and the treating rhinitis symptoms using medications provides improvement in sexual function and quality of life. Patients with chronic diseases such as diabetes, chronic kidney disease, atherosclerosis and depression, and patients using medical therapy were excluded from the study. Different from our study, that study includes female sex and it is an overall study. Age range is 22 to 46, and different from our age range which is 18 to 55. Sample sizes (43 AR and 40 controls) are smaller than our study (100 AR and 96 controls).

In their country-wide comprehensive study between 2000 and 2008 years, Su et al. have found a positive correlation between ED and AR.²² Different from our study, it was performed in a total of 128.118 subjects without excluding concomitant medications and chronic diseases except cancer and spinal cord injury. To summarize, in that study, the risk of ED development was found to be considerably higher in the patients with chronic rhinosinusitis compared to the general population irrespective of age, comorbidities and concomitant medications. AR has been determined to increase the rate of ED development by 2.37-fold. Another similar nation-wide trial performed in Taiwan has detected that AR is a risk factor for ED development in 30-year-old or older men.²³ Different from that study, the patients in both the AR and the control groups in our study were consisted of individuals without any comorbidities who do not use medical therapy due to any chronic disease. Therefore, no correction was necessary to prevent confounding by different diseases during the assessment of the results. Differently, our study is not a country-wide and community based study. Therefore, its sample size is smaller. IIEF-5 questionnaire form was used for ED evaluation. The age range was 18 to 55 years, and in this regard, our study was similar to the study by Su et al.

In conclusion, we can say that AR may have adverse, increasing effect on ED. It is clear that larger studies examining the effects of allergic inflammation on ED and investigating the causal relationship between AR and ED are needed.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, ex-

pertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea / Concept: Feridun Gürlek; **Design:** Eyyup Taşdemir, Soner Çoban; **Supervision / Consultancy:** Feridun Gürlek; **Data Collection and / or Processing:** Feridun Gürlek, Eyyup Taşdemir; **Analysis and / or Comment:** Feridun Gürlek, Soner Çoban; **Source Browsing:** Feridun Gürlek, Soner Çoban; **Author of the Production:** Feridun Gürlek, Eyyup Taşdemir; **Critical Review:** Feridun Gürlek; **Resources and Funding:** Feridun Gürlek, Eyyup Taşdemir.

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