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Original Article / Özgün Araştırma

The Role of Adherence to Pharmacological and Non-Pharmacological Treatments in Hospitalized Patients with Obstructive Airway Diseases

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Abstract

Aim: This study aimed to assess adherence to pharmacological and non-pharmacological treatments, hospital stay duration, and related risk factors in patients hospitalized with COPD and asthma exacerbations.

Methods: A cross-sectional study was conducted between January and March 2023, including patients admitted to the chest diseases department with a diagnosis of COPD or asthma exacerbation. Patients with community-acquired pneumonia, without a known diagnosis of asthma or COPD, were used as a control group. A validated questionnaire adapted from Jeong et al. was used to evaluate treatment adherence. The COPD and asthma groups were compared with the control group. T-tests and chi-square tests were used for statistical analysis.

Results: A total of 30 COPD, 12 asthma, and 17 pneumonia patients were included. The overall mean age was 52.9±10.9 years, and 73% were male. COPD patients were significantly older ($p=0.04$), predominantly male ($p<0.001$), had a higher smoking history ($p=0.02$), and lower BMI ($p=0.02$) than asthma patients. Hospital stay duration and number of exacerbations were similar. Inhaler adherence was low in both COPD (70%) and asthma (66.7%) patients. Non-pharmacological adherence, including vaccination, was also insufficient in all groups.

Conclusion: Although differing in demographics, COPD and asthma patients exhibited similar risk factors and poor treatment adherence. Strategies to improve both pharmacological and non-pharmacological adherence should be integrated into clinical practice to reduce hospitalizations and improve patient outcomes.

Keywords: COPD; Asthma; Treatment Adherence; Drug Therapy; Nonpharmacologic Therapy

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Obstrüktif Havayolu Hastalıkları Nedeniyle Hastaneye Yatırılan Hastalarda Farmakolojik ve Non-Farmakolojik Tedavilere Uyumun Rolü

Öz

Amaç: Bu çalışmanın amacı, KOAH ve astım alevlenmesi nedeniyle hastaneye yatırılan hastalarda farmakolojik ve farmakolojik olmayan tedavilere uyum, hastanede yatış süresi ve ilişkili risk faktörlerini değerlendirmektir.

Yöntemler: Ocak–Mart 2023 tarihleri arasında göğüs hastalıkları kliniğine KOAH veya astım alevlenmesi tanısıyla yatırılan hastalarla kesitsel bir çalışma yapılmıştır. Toplum kökenli pnömoni tanılı ve bilinen KOAH veya astım tanısı olmayan hastalar kontrol grubu olarak dahil edilmiştir. Tedaviye uyumu değerlendirmek için Jeong ve ark. tarafından geliştirilen ve uyarlanmış geçerli bir anket kullanılmıştır. KOAH ve astım grupları kontrol grubu ile karşılaştırılmıştır. İstatistiksel analizlerde t-testi ve ki-kare testi kullanılmıştır.

Bulgular: Çalışmaya 30 KOAH, 12 astım ve 17 pnömoni hastası dahil edilmiştir. Katılımcıların ortalama yaşı 52,9±10,9 yıl olup %73'ü erkektir. KOAH hastaları astım hastalarına kıyasla anlamlı düzeyde daha yaşlı (p=0,04), daha çok erkek (p<0,001), daha fazla sigara öyküsüne sahip (p=0,020) ve daha düşük beden kitle indeksine (p=0,020) sahiptir. Hastanede yatış süresi ve alevlenme sayısı gruplar arasında benzerdi. Hem KOAH (%70) hem de astım (%66,7) hastalarında inhaler tedaviye uyum düşüktü. Aşı gibi farmakolojik olmayan tedavilere uyum da tüm gruplarda yetersizdi.

Sonuç: Demografik farklılıklara rağmen, KOAH ve astım hastaları benzer risk faktörlerine ve düşük tedavi uyumuna sahiptir. Klinik uygulamalarda farmakolojik ve farmakolojik olmayan tedaviye uyumu artırmaya yönelik stratejiler entegre edilmelidir. Bu sayede hastaneye yatış oranları azaltılabilir ve hasta sonuçları iyileştirilebilir.

Anahtar kelimeler: KOAH, Astım, Tedaviye Uyum, İlaç Tedavisi, İlaç Dışı Tedavi.

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) and asthma are significant global health problems due to their high prevalence and substantial morbidity and mortality[1,2]. In addition to reduced quality of life, these diseases impose a heavy economic and operational burden on healthcare systems[3]. COPD, particularly in advanced stages, leads to irreversible airflow obstruction, causing dyspnea and reduced physical activity, which negatively affect patients' social and professional lives[2]. Acute exacerbations, characterized by increased airway inflammation and airflow limitation, occur in both diseases and worsen their clinical course[4].

The main goal in disease management is to minimize exacerbations and prevent hospitalizations, thereby reducing complications and healthcare costs. Smoking is strongly associated with COPD, and multiple studies have shown a higher incidence of COPD among smokers[5]. Smoking also aggravates asthma severity and disease progression[6]. Therefore, beyond pharmacological therapies such as inhaled corticosteroids, effective implementation of non-pharmacological strategies including smoking cessation, weight control, regular exercise, and adequate sleep is essential[7]. Socioeconomic status, education, and health literacy are key determinants of adherence and influence patient education and self-management programs[8]. However, evidence indicates that patients with COPD and asthma show poor adherence to treatment plans, leading to frequent exacerbations, poor symptom control, and increased hospitalizations [9-11].

Treatment adherence is a modifiable factor that directly affects disease outcomes. Technical errors in inhaler use, failure to maintain vaccination, and low adherence to lifestyle changes worsen long-term prognosis. Optimizing treatment adherence has been shown to play a crucial role in reducing

exacerbations and hospitalizations, yet more comprehensive research is needed to establish practical and effective strategies[12-14].

This study aimed to evaluate pharmacological and non-pharmacological treatment adherence, length of hospital stays, and associated risk factors in patients hospitalized with COPD and asthma exacerbations. Patients admitted with community-acquired pneumonia were included as a control group. The study seeks to provide data that can guide strategies to enhance adherence and improve healthcare service efficiency.

METHODS

This study was designed as a cross-sectional study to clinically evaluate pharmacological and non-pharmacological treatment adherence in patients hospitalized with COPD and asthma exacerbations.

The study included hospitalized patients in the chest diseases ward with a diagnosis of COPD or asthma exacerbation between January and March 2023. In order to compare non-pharmacological treatment adherence, patients hospitalized during the same period with a diagnosis of community-acquired pneumonia were included in the study as the control group. Patients who were transferred to the intensive care unit, were immobile, had a diagnosis of severe bronchiectasis, experienced severe respiratory failure, or had significant psychiatric illness were excluded from the study. Additionally, only individuals without a known diagnosis of asthma or COPD were included in the pneumonia group.

Data collected included demographic information (such as age and sex), presence of comorbid conditions, respiratory failure status, body mass index (BMI), vaccination status, and smoking history. Non-pharmacological adherence parameters were defined as vaccination status (influenza and pneumococcal), physical activity, regular sleep, body weight stability, and participation in health screening programs. These parameters were selected based on lifestyle and preventive strategies recommended in the GOLD and GINA guidelines. Additionally, in asthma and COPD patients, the types of inhaler therapies used, regularity of inhaler use, compliance of inhaler therapy with international guidelines, number of exacerbations in the past year, number of hospitalizations due to exacerbations, and the length of current hospitalization were recorded. The adherence of inhaler therapies to clinical guidelines was evaluated according to the GOLD and GINA recommendations[1,2].

Validated questionnaire items and threshold values used in a previous study by Jeong et al., which assessed non-pharmacological treatment adherence in COPD patients using a large-scale national database, were utilized in this study[10]. According to this questionnaire, individuals who sleep 6 to 10 hours per day are considered to have a regular sleep habit. Engaging in at least four sessions of walking or exercise lasting 10 minutes within the past month was regarded as the criterion for significant physical activity. Additionally, the questionnaire included items regarding change in weight in the previous year and whether the individual had undergone a health screening within the past two years.

Statistical Analysis

Treatment adherence parameters of the COPD and asthma groups were compared with those of the control group. Descriptive statistics were used to define the demographic characteristics of the patients and the basic features of their treatment adherence. The chi-square test was used for comparisons between categorical variables. For continuous variables, if the data were normally distributed, a t-test or One-Way ANOVA was applied; if not, the Mann–Whitney U test or Kruskal–Wallis test was used. A p-value of <0.05 was considered statistically significant. All analyses were performed using IBM SPSS version 25 (IBM Corp., Armonk, NY,

USA). This study was approved by the local institutional ethics committee under protocol number 116.2017.R-274 and was carried out in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants.

RESULTS

In this study, patients hospitalized due to COPD exacerbation (n=30), asthma exacerbation (n=12), and community-acquired pneumonia (n=17) were analyzed. Of the patients, 73% were male, and the mean age was found to be 52.9 ± 10.9 years. It was determined that 35.6% of participants had at least two comorbidities.

When comparing patient groups, asthma patients were observed to be younger, predominantly female, and had higher BMI values compared to the other two groups (p=0.016, p<0.001, p=0.007). Although the rate of respiratory failure was higher in the COPD group (p=0.060), no statistically significant differences were found between the groups in terms of comorbidity rates or length of hospital stay (Table 1).

Table 1: Comparison of the general characteristics of the patient groups

	COPD Exacerbation (n=30)	Asthma Attack (n=12)	Community-acquired pneumonia (n=17)	P value
Age*	66 ± 7	55 ± 16	64 ± 11	0.016
Gender (Male)**	26 (86.7%)	2 (16.7%)	15 (88.2%)	<0.001
≥2 comorbidity**	10 (33.3%)	4 (33.3%)	7 (41.2%)	0.850
Body Mass Index (kg/m^2)*	25 ± 4	30 ± 6	27 ± 5	0.007
Respiratory failure on admission **	22 (81.5%)	5 (41.7%)	10 (58.9%)	0.060
Length of hospital stay (days)*	6.6 ± 2.6	7.4 ± 3	8.1 ± 3.6	0.270

**Kruskal Wallis, mean±SD ** Chi-Square, n(%)*

Patients in the COPD exacerbation group were older (66 ± 7 vs. 55 ± 16; p=0.040) and predominantly male (86.7% vs. 16.7%; p<0.001) compared to those hospitalized for asthma exacerbation. Although the smoking history was significantly higher in the COPD group (49 ± 17 vs. 21 ± 13 pack-years; p=0.020), the number of exacerbations and frequency of hospitalizations due to exacerbations were similar between the COPD and asthma groups (Table 2).

The majority of COPD and asthma patients were found to be non-compliant with regular inhaler therapy (70% vs. 66.7%), and the adherence of their treatments to clinical guidelines was also low (57.1% vs. 66.7%) (Table 2).

Table II: Comparison of data between COPD and asthma exacerbation patients

	COPD Exacerbation (n=30)	Asthma Attack (n=12)	P value
Age*	66 ± 7	55 ± 16	**0.040**
Gender (Male)**	26 (86.7%)	2 (16.7%)	**<0.001**
Body Mass Index (kg/m^2) *	25 ± 4	30 ± 6	**0.020**
Smoking History (pack-years) *	49 ± 17	21 ± 13	**0.020**
Number of exacerbations *	4.9 ± 4.1	3.3 ± 3.2	0.250
Number of hospitalizations due to exacerbations*	1.8 ± 1.9	0.8 ± 0.6	0.100
Irregular Treatment **	21 (70%)	8 (66.7%)	0.420
Guideline-Appropriate Treatment **	16 (57.1%)	8 (66.7%)	0.570

**Mann Whitney-U, median±IR*

*** Chi-Square, n(%)*

When COPD, asthma, and pneumonia groups were compared in terms of non-pharmacological treatment adherence, no statistically significant differences were found in active smoking, physical activity level, participation in health screenings, or vaccination status. However, these rates were low across all groups, indicating insufficient adherence to non-pharmacological treatments. Regular sleep patterns and weight stability over the past year were also similar among the groups (p=0.640) (Table 3).

Although all patients included in the study had indications for influenza and pneumococcal vaccination, vaccination rates were found to be low. The influenza and pneumococcal vaccination rates were 36.7% and 30% in COPD patients; 16.7% and 33.3% in asthma patients; and 23.5% and 35.3% in pneumonia patients, respectively (Table 3).

Table III: Comparison of non-pharmacological treatment adherence among patient groups

	COPD Exacerbation (n=30)	Asthma Attack (n=12)	Community-acquired pneumonia (n=17)	P value
Stable Body Mass Index (kg/m2)	17 (57.1%)	5 (66.7%)	11 (64.7%)	0.190
Active smoker	11 (50%)	5 (22.7%)	6 (27.3%)	0.940
Influenza Vaccine, (n,%)	11 (36.7%)	2 (16.7%)	4 (23.5%)	0.520
Pneumococcal Vaccine, (n, %)	9 (30%)	4 (33.3%)	6 (35.3%)	0.920
Health Screening	4 (13.3%)	0	5 (29.4%)	0.870
Physical Activity	9 (30%)	5 (41.7%)	7 (41.2%)	0.660
Regular Sleep	21 (70%)	9 (75%)	14 (84%)	0.640

Chi-Square, n (%)

DISCUSSION

In this study, we examined adherence levels to pharmacological and non-pharmacological treatments in patients hospitalized due to COPD and asthma exacerbations. The findings revealed inadequate adherence in both patient groups—particularly low adherence rates to inhaler therapy and lifestyle measures such as smoking cessation, weight control, regular exercise, sleep regulation, and vaccination. Although asthma patients were younger than COPD patients, the number of exacerbations and hospitalizations was similar.

Non-pharmacological strategies such as regular health screening, physical activity, and sufficient sleep play an essential role not only in general well-being but also in the course of obstructive airway diseases like COPD and asthma[10,15]. These interventions improve patients' quality of life and reduce exacerbations and hospitalizations. Studies have shown that smoking habits, physical inactivity, and low vaccination rates are significant predictors of poor disease outcomes and long-term complications[16-18]. Pulmonary rehabilitation has also been shown to improve quality of life and decrease exacerbation frequency in COPD patients[19, 20]. For instance, Puhan et al. reported that patients participating in rehabilitation after COPD exacerbations had fewer hospital readmissions[8]. Similarly, Xiang et al. demonstrated that engaging in regular physical activity reduced exacerbations and mortality[7].

Non-pharmacological adherence represents one of the most neglected dimensions of chronic airway disease management, particularly in hospitalized patients. Although clinical guidelines strongly emphasize lifestyle interventions such as physical activity, vaccination, weight control, and sleep regulation, these measures are often underutilized in daily practice. The uniformly low adherence rates observed across all study groups suggest that hospitalization itself does not translate into improved preventive

behaviors, even among high-risk patients. This finding highlights a critical gap between guideline recommendations and real-world inpatient care, indicating that non-pharmacological interventions should be systematically addressed as part of routine clinical management rather than being deferred to outpatient follow-up.

Smoking cessation remains one of the most effective interventions in COPD management. Prior studies have indicated that quitting smoking slows down the decline in FEV1 and reduces the rate of exacerbations[2,17]. Weight control and exercise are equally crucial in preventing airflow limitation and improving overall respiratory capacity[21,22]. Recent studies conducted in our region also highlight that nutritional depletion and low adherence to preventive measures are closely linked to increased disease severity in COPD patients[23]. In Jeong et al.'s large-scale analysis, non-pharmacological treatment adherence was shown to be low among COPD patients, including poor adherence to health-related behaviors such as diet, exercise, and vaccination[10]. In our study, similar findings were obtained across both COPD and asthma groups, suggesting that behavioral and lifestyle factors play a critical role in both conditions.

Asthma and COPD share overlapping clinical features but differ in age of onset and sex distribution. COPD is usually observed in older males with a history of heavy smoking, whereas asthma may occur in individuals of all ages and is more common among adult females[24]. Consistent with these data, COPD patients in our cohort were older, predominantly male, and had a greater smoking burden than asthma patients. This is in line with the findings of Çelik et al., who reported greater annual FEV1 declines among patients with Asthma–COPD Overlap (ACO) compared with either disease alone[5].

Current management of COPD aims to achieve disease stability and prevent exacerbations through both pharmacological and non-pharmacological measures. GOLD 2025 guidelines emphasize individualized therapy based on symptom burden and exacerbation risk rather than the degree of airflow obstruction[2]. Frequent exacerbators face higher risks of hospitalization and mortality [9]. Hence, interventions that reduce exacerbations—such as pulmonary rehabilitation and vaccination—are fundamental[8,19,20]. Pandey et al. highlighted the post-pandemic need for multidisciplinary care and behavioral interventions to optimize COPD outcomes[17].

In asthma management, the primary goal is to achieve symptom control and minimize future risks such as exacerbations and medication side effects. However, because of its reversible nature, patients may underestimate asthma severity, leading to poor adherence[25]. Education provided by the treating physician plays a pivotal role in adherence improvement[26]. Shao et al. emphasized that targeted education and health literacy programs significantly improved adherence and clinical outcomes in chronic respiratory diseases[14]. The GINA 2024 guidelines also stress preventive measures such as weight control, vaccination, and physical activity for optimal asthma management. In a 2025 analysis by Barat et al., medical adjustments during hospitalization did not significantly reduce readmissions, underscoring the value of non-pharmacological strategies[27]. Furthermore, Kuruvilla et al. highlighted the influence of asthma phenotypes and obesity on disease control and treatment response[18].

In our study, inhaler adherence was low in both COPD and asthma groups—70% and 66.7%, respectively—which may be related to incorrect inhaler technique or insufficient patient education. Studies have demonstrated that structured inhaler education programs

improve treatment adherence and disease control[12,15]. Device variability and complexity may also contribute to poor adherence, as noted in previous observational analyses[16].

Community-acquired pneumonia (CAP) remains a major cause of hospitalization worldwide despite advances in antimicrobial therapy. Preventive vaccination is crucial, particularly for high-risk populations such as those with COPD and asthma. McLaughlin et al. reported that influenza and pneumococcal vaccination significantly reduced pneumonia-related hospitalizations. Similarly, recent CDC recommendations include the 21-valent conjugate vaccine for adults aged ≥65 years or younger adults with chronic conditions[28,29]. Despite such evidence, vaccination rates in our study population remained low, consistent with global data[19,30].

Our findings highlight persistent challenges in translating guideline-based multidimensional care into real-world practice. Despite existing evidence and recommendations, both pharmacological and non-pharmacological adherence remain suboptimal. Future strategies should focus on integrated patient education, behavioral interventions, and routine monitoring of adherence behaviors.

One of the strengths of our study is its inclusion of multiple patient groups—COPD, asthma, and pneumonia—which allowed for a broader assessment of adherence behaviors across respiratory diseases. However, limitations include the cross-sectional design, small sample size, and potential recall bias due to questionnaire-based data. Larger multicenter prospective studies are needed to confirm these findings and evaluate long-term outcomes. Therefore, the findings should be interpreted with caution, particularly regarding their generalizability to broader outpatient populations.

CONCLUSION

Our study highlights the vital importance of interventions aimed at improving treatment adherence in patients with COPD and asthma. In clinical practice, enhancing patient education, improving inhaler technique, and effectively implementing non-pharmacological strategies play a critical role in reducing hospitalizations, frequency of exacerbations, and healthcare costs. In future research, larger sample sizes and long-term multicenter studies are recommended to examine in greater detail the factors affecting treatment.

Note: This study was presented as an oral presentation at the 27th Annual Congress of the Turkish Thoracic Society (April 29 – May 3, 2024, Kyrenia, Northern Cyprus) on May 1, 2024.

Ethical Approval: This study was approved by the local institutional ethics committee under protocol number 116.2017.R-274 and was carried out in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants.

Conflict of Interest: The authors declared no conflicts of interest.

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