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Adherence to Inhaler Treatments: Statement of Patients and Their Relatives: Cross-Sectional Study

İnhaler Tedavilerine Uyum: Hasta ve Hasta Yakınlarının Beyanı: Kesitsel Çalışma

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ABSTRACT Objective: It is obvious that adherence to inhaler treatments is insufficient in patients with obstructive lung diseases. In this study, we aimed to evaluate the consistency of the information provided by patients with obstructive pulmonary disease and their households on medication adherence. **Material and Methods:** A cross-sectional study was conducted between January and March 2020 in a tertiary chest diseases hospital, where patients with asthma and chronic obstructive pulmonary disease (COPD) were regularly followed up. The study included patients who had been followed up with a diagnosis of asthma or COPD for at least 1 year, were using maintenance inhaler therapy, and attended the follow-up visit with a member of the same household. Patients and their household members were independently questioned about patients' medication adherence. According to the information provided by the patients and their households, medication adherence of the patients and the consistency of the information were evaluated. **Results:** Of the 66 patients with obstructive lung disease, 59 (89.39%) were adherent and 7 (10.60%) were non-adherent according to their own statements. Seventeen (28.81%) of 59 patients who were adherent according to their own statements were non-adherent to treatment with respect to household members. The mean age, gender distribution, smoking status, diagnosis of asthma or COPD, and education level did not differ significantly between self-reported adherent and non-adherent patients or between adherent and non-adherent patients with respect to household members. **Conclusion:** Adding information from household members to the use of patient self-reports may increase the clinician's judgment in monitoring adherence.

Keywords: Asthma; chronic obstructive pulmonary disease; inhaler therapy; medication adherence; household members

ÖZET Amaç: Obstrüktif akciğer hastalığında, inhaler tedavilere gösterilen tedavi uyumunun yetersiz olduğu aşikârdır. Bu çalışmada, obstrüktif akciğer hastalığı olan hastalar ve hastaların aynı evi paylaştığı yakınlarının ilaç uyumu konusunda verdikleri bilgilerin tutarlılığını değerlendirmeyi amaçladık. **Gereç ve Yöntemler:** Ocak-Mart 2020 tarihleri arasında astım ve kronik obstrüktif akciğer hastalığı (KOAH) olanların düzenli olarak takip edildiği bir 3. basamak göğüs hastalıkları hastanesinde kesitsel çalışma yapılmıştır. Çalışmaya, en az 1 yıldır astım veya KOAH tanısı ile takip edilen, idame inhaler tedavisi alan ve aynı haneden bir kişi ile takip ziyaretine katılan hastalar dâhil edildi. İnhaler tedavisi kullanan hastalar ve hastalar ile aynı evi paylaşan aile üyeleri, hastaların ilaç uyumu konusunda bağımsız olarak sorgulandı. Hasta ve ailelerinin verdiği bilgilere göre hastaların ilaç uyumları ve bilgilerin tutarlılığı değerlendirildi. **Bulgular:** Obstrüktif akciğer hastalığı olan 66 hastanın kendi ifadelerine göre 59'u (%89,39) uyumlu, 7'si (%10,60) uyumsuzdu. Kendi ifadelerine göre uyumlu olan 59 hastanın 17'si (%28,81), hane halkının ifadelerine göre tedaviye uyumsuzdu. Ortalama yaş, cinsiyet dağılımı, sigara içme durumu, astım veya KOAH tanısı ve eğitim düzeyi, hem hastaların kendi beyanlarına göre değerlendirilen uyumlu ve uyumsuz hastalar arasında hem de hane üyelerinin beyanlarına göre değerlendirilen uyumlu ve uyumsuz hastalar arasında anlamlı farklılık göstermedi. **Sonuç:** Hasta öz bildirimlerine hane halkı üyelerinden bilgi eklemek, klinisyenin tedavi uyumunu izleme konusundaki yargısını artırabilir.

Anahtar Kelimeler: Astım; kronik obstrüktif akciğer hastalığı; inhaler tedavi; ilaç uyumu; hane halkı üyeleri

Despite the tremendous progress in the inhaler treatments used in asthma and chronic obstructive pulmonary disease (COPD) in recent years, the desired control levels cannot be achieved in patients. Strict patient adherence to inhaler treatments is one of the critical points in achieving desired treatment results and disease control in asthma and COPD.[1,2] However, studies clearly show that adherence with

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inhaler treatments is insufficient in patients with asthma and COPD.[3,4]

Medication adherence is defined as the process by which patients takes their medication, compared to the regimen recommended by the clinician.[5,6] Adherence problems have emerged with the use of inhalers in obstructive airway diseases.[7] International asthma and COPD guidelines strongly recommend that treatment adherence be evaluated before concluding that current therapy is inadequate.[1,2] Inadequate medication adherence is associated with poor disease control and poor clinical outcomes. Real-life data in asthma show that treatment adherence is in the range of 8-70%. Low inhaler adherence has also been associated with frequent asthma exacerbations.[8-10] In COPD, adherence with medical treatment is between 20-60%, and low treatment adherence is associated with increased disease mortality.[11,12]

Currently, there is no perfect method for determining adherence to inhaler treatments in patients with obstructive lung diseases. A valid, robust and evidence-based approach is needed to assess commitment. If a systematic approach and standardization to measure and report adherence can be developed, patient follow-up can be improved and the value and generalizability of clinical trials can be increased.[6]

In this study, we aimed to evaluate the consistency of the information provided by patients with obstructive pulmonary disease and their households on medication adherence. In addition, we aimed to compare the demographic, smoking-related, and clinical characteristics of patients who stated that they were adherent and non-adherent to inhaler therapy.

MATERIAL AND METHODS

A cross-sectional study was conducted between January and March 2020 in a tertiary chest diseases hospital, where patients with asthma and COPD were regularly followed up. The study included patients who had been followed up with a diagnosis of asthma or COPD for at least 1 year, were using maintenance inhaler therapy, and attended the follow-up visit with a member of the same household. In order to question the adherence of the patients who agreed to participate in the study, the patient and their household member were taken to different rooms and interviewed by Drs. T.T. and A.F. who are the investigators of the study. In these face-to-face meetings, the patients and the household members were asked whether the patient used the prescribed inhaler treatment regularly. The patient was asked whether he used the prescribed inhaler every day, how many times a day he used it, and whether he used the drug regularly within 4 weeks. Household members were also questioned independently about whether the patient used inhaler therapy regularly. Patients were grouped as adherent or non-adherent according to their own statements, and adherent or non-adherent according to their household member's statement.

Age, gender, education level, and smoking status were compared between patients who are adherent and non-adherent based on patients' own statements and their household members' statements.

Normally distributed data were expressed as mean±standard deviation, non-normally distributed data as median [interquartile range (IQR)], and categorical data as numbers (percentages). The normal distribution of continuous variables was evaluated by the Shapiro-Wilk and Kolmogorov-Smirnov normality tests, histograms and Q-Q graphs. Any differences between groups were evaluated using Mann-Whitney U or Student's t-test for continuous variables and chi-square test for categorical variables. All statistical tests were two-sided, and a p value <0.05 was considered statistically significant. The analyses were carried out using SPSS (IBM Corp., Armonk, NY, USA) version 22.

The study was approved by the Keçiören Training and Research Hospital Clinical Research Ethics Committee (date: January 8, 2020, no: 2012-KAEK-15/2040). Informed consent was obtained from all participants in line with the Declaration of Helsinki.

RESULTS

A total of 66 patients, 42 (63.63%) with COPD and 24 (36.36%) with asthma, were included in the study. Median disease duration was 6.50 years (IQR 7.75 years) in patients with COPD, and 11.00 years (IQR 16.75 years) in those with asthma. The characteristics of the study group are presented in Table 1. Of

the patients, 59 (89.39%) reported that they used the prescribed inhaler regularly, and 7 (10.60%) reported that they used it irregularly. However, according to the statements of the household members, 45 (68.18%) patients were adherent and 21 (31.81%) were non-adherent with their inhaler treatment.

Of the 59 patients who reported that they were adherent with the treatment, 42 (71.2%) were adherent with the treatment according to the statements of the households, but 17 (28.8%) were non-adherent according to the statements of the households. Of the 7 patients who reported that they were not adherent with the treatment, 4 (57.1%) were non-adherent according to the statements of the households, while 3 (42.9%) were adherent with the treatment according to the statements of the household. In this context, in 20 of 66 patients (30.3%) in the study population, the patient's statement about adherence to treatment contradicted the statement of the household on this issue.

The mean age, gender distribution, smoking status, diagnosis of asthma or COPD, and education level did not differ significantly between self-reported adherent and non-adherent patients (Table 2). According to the statements of household members, 17 (28.81%) of 59 patients who stated that they used inhaler treatment regularly were using their treatment irregularly. Study parameters compared between the two groups were not statistically different (Table 3).

DISCUSSION

The present study reveal that evaluation of patients' adherence with inhaler treatments based only on the patient's statement is problematic. According to the study results, although 89.39% of the patients with obstructive pulmonary disease stated that they regularly used the prescribed inhaler treatment, 28.81% of these patients used their treatments irregularly according to the statements of the household members.

In fact, problems related to the determination of adherence emerged together with the use of inhaler medicines in obstructive airway diseases.[7] Biochemical measurements in blood or other body fluids, patient self-report, pharmacy refill records, and digital adherence technologies are the methods used to assess adherence in the follow-up of asthmatic patients. However, despite the existence of these objective methods, there is currently no perfect method to determine adherence with inhaler therapy in patients with obstructive pulmonary disease. Each of the available methods has its own strengths, but none of them are specifically designed for the management of non-adherence. If regular face-to-face meetings and effective patient-clinician communication are continually activated, the clinician's judgment can provide real insight into non-adherent behaviors.[6,13]

TABLE 1: Demographic, smoking-related, and clinical characteristics of study population (n=66).

Age (years); mean±SD	63.09±13.32
Male gender	33 (50.00)
Current smoker	7 (10.60)
Duration of obstructive lung disease (years); median (IQR)	7.50 (12.00)
Educational level	
Illiterate	10 (15.15)
Elementary-secondary school	47 (71.21)
High school-university	9 (13.63)
Treatment regimen	
Maintenance	22 (33.33)
Maintenance and reliever	29 (43.93)
Maintenance and reliever and nebulised treatment	15 (22.72)
Adherent according to self-report	59 (89.39)
Adherent according to statement of household member	45 (68.18)

Data are given as n (%), unless otherwise stated; SD: Standard deviation; IQR: Interquartile range.

TABLE 2: Comparison of demographic, smoke-related and clinical characteristics of adherent and non-adherent patients according to their own statements (n=66).

	Adherent (n=59)	Non-adherent (n=7)	p value
Age (years); mean±SD	62.62±13.21	67.00±14.62	0.416
Male gender	28 (47.45)	5 (71.42)	0.427
Current smoker	4 (6.77)	2 (28.57)	0.118
Asthma/COPD diagnosis	22 (37.28)/37 (62.71)	2 (28.57)/5 (71.42)	1.000
Educational level			
Illiterate	9 (15.25)	1 (14.28)	0.997
Elementary-secondary school	42 (71.18)	5 (71.42)	
High school-university	8 (13.55)	1 (14.28)	

Data are given as n (%), unless otherwise stated; SD: Standard deviation; COPD: Chronic obstructive pulmonary disease.

TABLE 3: Comparison of demographic, smoke-related and clinical characteristics of patients adherent according to themselves grouped according to the adherence notification of household members (n=59).

	Adherent according to household members (n=42)	Non-adherent according to household members (n=17)	p value
Age (years); mean±SD	62.71±13.79	62.41±12.08	0.937
Male gender	20 (47.61)	8 (47.05)	0.969
Current smoker	3 (7.14)	1 (5.88)	1.000
Asthma/COPD diagnosis	17 (40.47)/25 (59.52)	5 (29.41)/12 (70.58)	0.426
Educational level			
Illiterate	5 (11.90)	4 (23.52)	0.530
Elementary-secondary school	31 (73.80)	11 (64.70)	
High school-university	6 (14.28)	2 (11.76)	

Data are given as n (%), unless otherwise stated; SD: Standard deviation; COPD: Chronic obstructive pulmonary disease.

Bender et al. investigated adherence in patients with COPD for 12 months from the date of the first inhaler prescription and found it to be 22.2%. This study showed that the level of medicine adherence was significantly low.[14] Smart inhaler devices, also known as e-inhalers and containing sensors within an e-module, can be integrated into asthma management through adherence monitoring.[15] However, it is obvious that these devices cannot help especially for the intelligent non-adherence type.[13] Therefore, the discrepancy between the statements given by the patients and their relatives in our study revealed a serious problem in assessment of adherence based solely on the patient's statement. We think that patient relatives may be involved in the clinical judgment of adherence. This approach may help us both to evaluate adherence more accurately and to increase patient adherence. In this context, our study suggest a different perspective.

Sulaiman et al. conducted an actual adherence study in patients with COPD in 2017, and reported that the mean adherence is 59.8%. The major factors determining adherence were poor lung function and impairment in cognitive function.[16] In a prospective, observational cohort study conducted by Cushen et al. in 2018, discharged COPD patients were followed with a smart inhaler for adherence. It was observed that patients with irregular use and poor inhaler technique had the highest mortality rate. On the other hand, patients with good inhaler technique but irregular use of therapy had the highest overall healthcare utilization. This study emphasizes the importance of detailed assessment of medication adherence in COPD.[17] In 2020, O'Dwyer et al. reported that digital technologies are valuable to quantify adherence and have clinical value in promoting adherence through biofeedback in patients with obstructive lung diseases.[18] However, there are relatively few digital

technologies and smart inhalers in use all over the world. Therefore, the best way to evaluate adherence is a good communication with the patient and to check drug records in the pharmacy system. As revealed in our study, using the information of family members will increase the success in objective evaluation of adherence.

One of the important limitations of our study is the small number of patients. However, the number of patients who attended the follow-up visit with a member of the same household is low. The second limitation of our study is that the relationship between adherence and disease control was not evaluated. The third limitation of our study is that patient and household statements were not verified by an objective method. The patient's and households' statements were taken about the patient's medication adherence, and the consistency between these two was investigated. However, this limitation should not be considered as a real limitation. Because the aim of our study is to reveal how much the information provided by patients with obstructive pulmonary disease and their households on medication adherence is compatible. In this context, as far as we know, this approach has not been tried previously.

CONCLUSION

In conclusion, it is a fact that rate of adherence to inhalers is low in real life. Attempts are being made to improve adherence rates, but there is still a long way to go. Adding the information of household members to the use of patient self-reports can increase the power of clinician's judgment in the follow-up of medication adherence.

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

Authorship Contributions

Idea/Concept: *Funda Aksu, Kurtuluş Aksu;* ***Design:*** *Funda Aksu, Kurtuluş Aksu, Tuğba Nur Tezvergil, Ali Fırıncıoğluları;* ***Control/Supervision:*** *Funda Aksu, Kurtuluş Aksu, Tuğba Nur Tezvergil, Ali Fırıncıoğluları;* ***Data Collection and/or Processing:*** *Tuğba Nur Tezvergil, Ali Fırıncıoğluları;* ***Analysis and/or Interpretation:*** *Funda Aksu, Kurtuluş Aksu;* ***Literature Review:*** *Funda Aksu, Kurtuluş Aksu, Tuğba Nur Tezvergil, Ali Fırıncıoğluları;* ***Writing the Article:*** *Funda Aksu, Kurtuluş Aksu, Tuğba Nur Tezvergil, Ali Fırıncıoğluları;* ***Critical Review:*** *Funda Aksu, Kurtuluş Aksu, Tuğba Nur Tezvergil, Ali Fırıncıoğluları.*

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