ORIGINAL ARTICLE

Allergic Rhinitis: Can We Identify Nonadherence to Therapy and Its Predictors Easily in Daily Practice?

I Koca Kalkan, A Baccioglu Kavut, AF Kalpaklioglu

Kirikkale University School of Medicine, Department of Immunology and Allergic Diseases, Kirikkale, Turkey

Abstract

Background: Allergic rhinitis (AR) is a common chronic condition with significant consequences if left untreated (eg, poor health outcomes, disease progression, and increased health care costs). However, about half of all patients do not fill their prescription. The factors associated with adherence are complex, and many remain poorly defined and understood.
Objectives: This pilot study had 2 objectives. First, to determine whether the medication adherence report scale (MARS) can be applied to identify adherence/nonadherence in patients with AR using patients with chronic obstructive pulmonary disease (COPD) as controls. Second, to identify AR profiles that indicate a particularly high risk of nonadherence.
Methods: AR patients completed the Eysenck Personality Questionnaire-Revised Abbreviated-Form (EPQR-A), the Short Form 36 Health Survey (SF-36), the Mini Rhinitis Quality of Life Questionnaire (Mini-RQLQ), and the MARS. Symptom severity was assessed before and after treatment.
Results: The study population comprised 85 AR patients and 50 COPD patients. Females had worse adherence (significant only in total and unintentional scores) and higher extraversion scores. None of the personality traits predicted adherence. Neuroticism was negatively correlated with the SF-36 score ($P<.001$). A low to moderate correlation was observed between posttreatment improvement in specific/generic health-related quality of life and MARS scores in AR patients ($P=.002$, $r=0.332$; and $P=.022$, $r=–0.251$; respectively). Higher educational level was found to significantly increase adherence ($P=.01$, $r=0.223$).
Conclusions: Our study did not reveal a personality effect. However, it did suggest that use of a brief, self-completed medication adherence questionnaire in daily practice can enable health professionals to identify suboptimal adherence in patients who would benefit from close follow-up.

Key words: Allergic rhinitis. Medication adherence. Personality trait. Health-related quality of life.

Resumen

Antecedentes: La rinitis alérgica (RA) constituye una condición crónica común que tiene consecuencias significativas, tales como una disminución del estado de salud, una progresión de la enfermedad y un incremento en el coste sanitario si no se trata. Aproximadamente la mitad de los pacientes con esta patología no se aplican el tratamiento recomendado. Los factores asociados a la adherencia al tratamiento son complejos, muchos están pobremente definidos y no son bien conocidos.
Objetivo: El objetivo de este estudio piloto fue, en primer lugar, investigar si una escala para analizar la adherencia al tratamiento (MARS) podría ser utilizada para identificar esta condición en pacientes con rinitis alérgica en comparación con la enfermedad pulmonar obstructiva crónica como control.
El segundo objetivo fue identificar el perfil de los pacientes con RA, especialmente de aquellos con alto riesgo de no adherencia al tratamiento.
Métodos: Se aplicó el cuestionario Eysenck Personality Questionnaire-Revised Abbreviated-Form (EPQR-A), Short Form 36 Health-Survey (SF-36), Mini-Rhinitis Quality-of-Life Questionnaire (Mini-RQLQ), MARS".
La gravedad de los síntomas se evaluó antes y después del tratamiento.
Resultados: Fueron incluidos en el estudio 85 pacientes con RA y 50 con enfermedad pulmonar obstrutiva crónica.
En los resultados obtenidos, aunque las mujeres presentaban una menor adherencia (la cual fue únicamente significativa en los scores total y unidireccional), ninguno de los rasgos de personalidad analizados pudo predecir esta falta de adherencia. El neurotismo se correlacionó negativamente con el SF-36 ($p<0.001$). La mejoría postratamiento en el HRQoL específico/genérico se correlacionó moderadamente con los scores del MARS en los pacientes con RA ($p=0.002$, $r=0.332$ y $p=0.022$, $r=-0.251$; respectivamente). Un alto nivel de educación se correlacionó significativamente con un incremento en la adherencia al tratamiento ($r=0.223$, $p=0.01$).
Conclusiones: Este primer estudio que evalúa la asociación entre adherencia al tratamiento y rasgos de personalidad en pacientes con RA no obtiene resultados que confirmen dicha asociación. Sin embargo, un dato de gran interés es que la aplicación de un simple cuestionario de adherencia a la medicación puede beneficiar el seguimiento de estos pacientes con RA por el clínico en la práctica clínica diaria.

Palabras clave: Rinitis alérgica. Adherencia a la medicación. Rasgos de personalidad. Calidad de vida.

Introduction

Allergic rhinitis (AR) is an atopic disease that causes major illness and disability worldwide. Lifetime prevalence is estimated to be between 10% and 30%. AR seriously affects patients' social life, sleep, school performance, and work productivity and has a major economic impact. It is also considered one of the main risk factors for the development of asthma. Management of AR is based on patient education, environmental control measures, pharmacotherapy, and specific immunotherapy [1,2].

Adherence to treatment is essential for optimizing health outcomes in nearly any disease. In 1979, Haynes et al [3] defined adherence as "the extent to which a person's behavior coincides with medical or health advice". Nonadherence is associated with worsening of disease and increased morbidity, as stated by Hippocrates more than 2000 years ago [4].

Poor adherence is very common, especially when medication must be taken over long periods and the disease being treated is not associated with severe symptoms. According to the World Health Organization [5], an average of 50% of patients adhere to long-term therapy. Consistent with this observation, published data show that half of all AR patients do not fill a prescription for their medication [6]. Nevertheless, clinician awareness of nonadherence is limited, resulting in the need to readily identify adherence-related behavior at the point of care [7].

Assessing adherence is problematic, since many aspects of this complex concept remain poorly defined. The factors associated with nonadherence can be organized into 5 interacting domains: socioeconomic factors, therapy-related factors, patient-related factors, condition-related factors, and health system–related factors [5].

Nonadherence can also be attributed to 2 types of behavior: unintentional (eg, forgetting, misunderstanding instructions for use, high costs of medication, and poor application technique) and intentional (eg, choosing not to take medication on the basis of beliefs and attitudes regarding disease and its treatment) [8].

The decision to take medication is under the patient's control, and closer attention to this aspect would be an important step in improving adherence. Therefore, physicians should become familiar with the concept of adherence in clinical practice and the factors affecting it, which remain underestimated and poorly studied. The present study focuses not only on identifying nonadherent patients in an easy, practical manner at outpatient clinics, but also on predicting patient-related factors, especially personality traits, since human behavior must be taken into account when evaluating adherence.

To our knowledge, this is the first study to hypothesize that the personality of AR patients could influence adherence to treatment and health-related quality of life (HRQOL). The objectives of this pilot study were as follows: first, to determine whether the medication adherence report scale (MARS) score is correlated with the outcome of treatment in AR patients in order to use it as a predictor of nonadherent patients who could benefit from further educational interventions; second, to identify sociodemographic and clinical characteristics and personality traits that would enable us to identify patients with a particularly high risk of nonadherence who would benefit from appropriate counseling in outpatient clinics; and finally, to compare adherence in AR patients with adherence in a control group comprising patients with chronic obstructive pulmonary disease (COPD), who were repeatedly found to have the lowest levels of adherence, even lower than asthmatic patients [9-11].

Methods

Participants

The study population comprised 85 consecutive recently diagnosed AR patients and 50 COPD patients on regular treatment at Kirikkale University Hospital who were enrolled between May 2009 and November 2010. The inclusion criteria were age >16 years and no previous or current history of psychiatric disorders or treatment. Patients who gave their written informed consent were invited to participate in the study at a visit to the clinic. Sociodemographic variables, body mass index, smoking habits, and disease duration were assessed.

AR was diagnosed based on characteristic clinical symptoms and a positive skin prick test result with a panel of common inhalant allergens (*Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, *Blattella* species, cat epithelium, dog epithelium, *Alternaria* species, *Aspergillus* species, grasses, trees, weeds, and grasses/cereal mix) (Allergopharma, Germany).

At the recruitment visit (V1), upper airway symptoms (blocked nose, rhinorrhea, sneezing, nasal itching, and postnasal drip) were evaluated on a scale of 0 (no symptoms) to 3 (severe symptoms). The sum of these scores gave the total symptoms score (TSS) as a subjective report. Patients then completed the MARS, the Eysenck Personality Questionnaire-Revised Abbreviated-Form (EPQR-A), and generic and specific HRQOL questionnaires (the Short Form 36 Health Survey [SF-36], the Mini Rhinitis Quality of Life Questionnaire [Mini-RQLQ]). This process took approximately 30 minutes.

Rhinitis was treated according to the Allergic Rhinitis and its Impact on Asthma recommendations [1]. At the end of the treatment period (week 4, V2); the patients completed all the questionnaires again, and the TSS of rhinitis was recorded.

COPD patients had only 1 visit (V1) and completed the EPQR-A questionnaire, the MARS questionnaire, and the SF-36 questionnaire.

Questionnaires

EPQR-A: We used the 24-item EPQR-A. This self-administered questionnaire is designed to assess personality in 3 dimensions: extraversion, neuroticism, and psychoticism. It also includes a lie scale as a subscale for the control of social desirability bias. The extraversion scale reflects sociability and liveliness. The neuroticism scale measures emotional instability and anxiety. The psychoticism scale assesses aggression, impulsiveness, and assertiveness. Each question had a binary response (yes/no). Each dichotomous item was scored 1 or 0, and each scale had a maximum possible score

of 6 and minimum of 0, with higher scores indicating higher levels for the personality traits. The Turkish language version of the EPQR-A has been validated and demonstrated to be reliable [12].

MARS: This short self-administered questionnaire is a 5-item scale for assessment of adherence that covers unintentional nonadherent behavior (*"I forgot to take them"*, item 1) and intentional nonadherent behavior (*"I alter the dose"*, item 2; *"I stop taking them for a while"*, item 3; *"I decide to miss out a dose"*, item 4; *"I take less than instructed"*, item 5). Each item was evaluated using a 5-point Likert-type scale, ranging from 1 (very often) to 5 (never). Low scores indicate low levels of adherence. The published cutoff value for MARS is <20; a score of ≥20 is considered to indicate adherence. A score of 25 indicates perfect adherence [13].

SF-36: This generic self-administered questionnaire consists of 36 questions and was developed to measure 8 HRQOL health domains, which can be grouped into 2 summary scales: the physical component summary (PCS) and the mental component summary (MCS). Higher scores represent better health status. The Turkish language version of the SF-36 has been validated [14].

Mini-RQLQ: This specific HRQOL tool comprises 14 questions in 5 domains: activity limitations, practical problems, and nose, eye, and other symptoms. Responses to each item are given on a Likert-type scale ranging from 0 to 6. All items are equally weighted, and higher scores show worse outcome. The Turkish language version of the Mini-RQLQ has been validated [15].

Statistical Analysis

Statistical analyses were performed using SPSS version 18 (SPSS). Descriptive statistics (frequency mean [SD]) were calculated. The *t* test was used to compare means between groups. Comparisons between more than 2 groups for nonparametric variables were performed using the Kruskal-Wallis test; the Mann-Whitney test was used for subgroup analyses. Group characteristics were compared using the Fisher exact test and the χ^2 test. Correlation coefficients *(r)* were used to explore associations between variables, as follows: Pearson *r* for correlations between interval variables and Spearman *r* for correlations including an ordinal variable. Multiple linear regression analysis was used to make predictions about self-reported adherence. A *P* value of <.05 was considered statistically significant.

The primary outcome for the study was the correlation between the HRQOL and MARS scores. A total sample size of 112 was required to detect at least a correlation of 0.30 between the HRQOL and MARS scores with a power of 90% at the 5% significance level. The prevalence for AR and COPD was 10% in our population. At least 2 COPD patients were included for each of the 3 AR patients as a control group. In the COPD group, for a 10% sampling rate, at least 50 participants were required; in the AR group, for a 50% sampling rate, at least 75 participants were required. Considering a 15% dropout rate, the sample size was increased to 84. The correlation of 0.30 was based on our clinical experience. Sample size was estimated using NCSS and PASS 2000 software (NCSS LLC).

Results

Participant Characteristics

The study population comprised 135 patients; 85 patients with AR (51 seasonal AR [SAR], 34 perennial AR [PAR]) and 50 patients with COPD. The baseline characteristics of these groups of patients are shown in Table 1. As expected, gender, age, level of education, occupation, and smoking habits were significantly different between AR and COPD patients. COPD patients were chosen as the control group, since they are known to have poor adherence. However, within the AR group, none of these variables were statistically significant between SAR and PAR patients (*P*=.25, *P*=.54, *P*=.76, *P*=.98, and *P*=.92, respectively).

Personality Traits

Significant gender difference was observed for extraversion, in which women exhibited higher mean scores (3.83 [1.89] vs 3.03 [1.95]; *P*=.01). COPD patients had significantly lower extraversion scores than AR patients (Table 2). Associations were observed between extraversion and age, gender, and smoking habits, indicating that younger women have higher extraversion scores and were less inclined to be smokers (Table 3).

Predictions of HRQOL

The PCS of SF-36 was significantly lower for COPD patients (Table 2). No significant gender differences were found in generic HRQOL (*P*=.78 for PCS and *P*=.83 for MCS). The 2 most influential personality traits were extraversion, which was positively correlated with MCS only (*P*<.001), and neuroticism, which was negatively correlated with both PCS and MCS (*P*<.001 and *P*<.001) (Table 3).

Medication Adherence

The mean MARS score was 21.5 (3.2) in patients with SAR, 21 (4.5) in patients with PAR, and 20.6 (4.1) in patients with COPD. No statistically significant differences were observed within the groups (Table 2). A total of 28 patients (20.7%) reported perfect adherence, that is, a MARS score of 25 (SAR, 9 [17.7%]; PAR, 7 [20.6%]; and COPD, 12 [24%]), whereas 38 patients (28.2%) reported suboptimal adherence, that is, a MARS score <20 (SAR, 13 [25.49%]; PAR, 8 [23.53%]; and COPD, 17 [34%]).

Women reported lower MARS scores than men, but only the differences in total and unintentional scores were significant (*P*=.009 and *P*=.04, respectively).

Overall, the low to moderate positive correlations observed with PCS and MCS demonstrated that adherence improves with HRQOL and vice versa (r=0.311, *P*<.001; *r*=0.271, *P*=.002). Diagnosis-based subgroup analyses showed that MCS was a low to moderate positive correlate of medication adherence in AR patients (*r*=0.334 [*P*=.01] for SAR and *r*=0.365 [*P*=.03] for PAR), but not in COPD patients (*r*= 0.161, *P*=.26), as PCS was associated with MARS in PAR patients only (*r*=0.589, *P*=.001).

Adherence also increased with educational level in AR patients (*r*=0.223, *P*=.01). However, MARS did not correlate with age, body mass index, disease duration, or smoking habit.

Table 1. Sociodemographic and Clinical Profile of the Study Groups

	SAR (n=51)	PAR (n=34)	*P* Value[a]	COPD (n=50)	Total (n=135)	*P* Value[b]
Gender, No. (%)						
Female	31 (60.8)	25 (73.5)	0.25	3 (6)	59 (43.7)	<.001
Male	20 (39.2)	9 (26.5)		47 (94)	76 (56.3)	
Age, y, mean (SD)	30.9 (11.7)	32.7 (15.5)	0.54	63.2 (9.2)	43 (19.4)	<.001
Body mass index, kg/m^2, mean (SD)	24.9 (4.4)	26.3 (4.9)	0.2	25.1 (4.8)	25.3 (4.7)	.8
Duration of disease, y, mean (SD)	6.9 (6.1)	6.1 (5.4)	0.3	8.6 (8.7)	7.3 (6.9)	.2
Level of education, No. (%)						
Uneducated	2 (4)	1 (2.9)	0.76	4 (8)	7 (5.2)	
Elementary school	12 (24)	12 (35.3)		31 (62)	55 (41)	<.001
High school	17 (34)	10 (29.4)		6 (12)	33 (24.6)	
University	19 (38)	11 (32.4)		9 (18)	39 (29.2)	
Occupation, No. (%)						
Employed	4 (7.8)	2 (5.9)	0.98	17 (34)	23 (17)	<.001
Civil servant	8 (15.7)	6 (17.6)		16 (32)	30 (22.2)	
Housewife	20 (39.2)	15 (44.2)		3 (6)	38 (28.1)	
Student	16 (31.4)	10 (29.4)		–	26 (19.3)	
Other	3 (5.9)	1 (2.9)		14 (28)	18 (13.4)	
Smoking habit, No. (%)						
Nonsmoker	34 (68)	24 (70.6)	0.92	4 (8.3)	62 (46.9)	<.001
Ex-smoker	9 (18)	5 (14.7)		29 (60.4)	43 (32.6)	
Current smoker	7 (14)	5 (14.7)		15 (31.3)	27 (20.5)	

Abbreviations: COPD, chronic obstructive pulmonary disease; PAR, perennial allergic rhinitis; SAR, seasonal allergic rhinitis.
[a]SAR vs PAR.
[b]AR vs COPD.

Table 2. Mean (SD) Scores for Personality (EPQR-A), Adherence (MARS), and HRQOL (SF-36)

	SAR (n=51)	PAR (n=34)	*P* Value[a]	COPD (n=50)	Total (n=135)	*P* Value[b]
EPQR-A						
Extraversion	3.5 (2.0)	3.9 (1.7)	0.4	2.8 (1.1)	3.3 (1.9)	0.01
Neuroticism	3.1 (1.5)	3.2 (2.1)	0.6	3.0 (1.8)	3.2 (1.7)	0.4
Psychoticism	1.0 (0.9)	0.8 (0.8)	0.3	0.9 (0.9)	0.9 (0.8)	0.8
MARS						
Total score	21.5 (3.2)	21 (4.5)	0.9	20.6 (4.1)	21 (3.9)	0.4
Intentional score	17.4 (2.6)	17.9 (2.3)	0.6	16.8 (3.3)	17.3 (2.8)	0.2
Unintentional score	3.7 (0.9)	3.8 (1.1)	0.5	3.8 (1.1)	3.79 (1.0)	0.8
SF-36						
PCS	67.4 (18.9)	63.9 (22.5)	0.5	51.0 (26.4)	60.6 (23.8)	0.001
MCS	62.2 (20.3)	61.4 (22.9)	0.9	54.8 (29.0)	59.3 (24.6)	0.2

Abbreviations: COPD, chronic obstructive pulmonary disease; EPQR-A, Eysenck Personality Questionnaire-Revised Abbreviated-Form; HRQOL, health-related quality of life; MARS, medication adherence report scale; MCS, mental component score; PAR, perennial allergic rhinitis; PCS, physical component score; SAR, seasonal allergic rhinitis; SF-36, Short Form 36 Health Survey.
[a]AR vs PAR.
[b]AR vs COPD.

Table 3. Correlations Between Variables in the Study Group (n=135)

	Age	Extraversion	Neuroticism	Psychoticism	PCS	MCS	Gender	BMI	DoD	LoE
Extraversion[a]	–0.207[c]									
Neuroticism[a]	–0.148	–0.242[d]								
Psychoticisma	0.043	0.162	–0.061							
PCS[a]	–0.365[d]	0.111	–0.334[d]	–0.017						
MCS[a]	–0.133	0.301[d]	–0.559[d]	–0.010	0.673[d]					
Gender[b]	0.495[d]	–0.205[c]	–0.157	0.040	0.018	0.024				
BMI[a]	0.184[c]	0.122	–0.132	0.116	–0.069	0.018	0.082			
DoD[a]	0.305[d]	–0.007	–0.052	0.009	–0.230[d]	–0.196[a]	0.017	0.053		
LoE[b]	–0.440[d]	0.090	0.031	–0.053	0.338[d]	0.450[d]	0.054	–0.106	–0.224[c]	
Smoking[b]	0.490[d]	–0.233[c]	0.051	–0.103	–0.103	–0.181[c]	0.501[d]	0.003	–0.031	–0.057

Abbreviations: BMI, body mass index; DoD, duration of disease; LoE, Level of education; MCS, mental component score; PCS, physical component score.
[a]Pearson correlation.
[b]Spearman rank correlation.
[c]Correlation is significant at the .05 level (2-tailed).
[d]Correlation is significant at the .01 level (2-tailed).

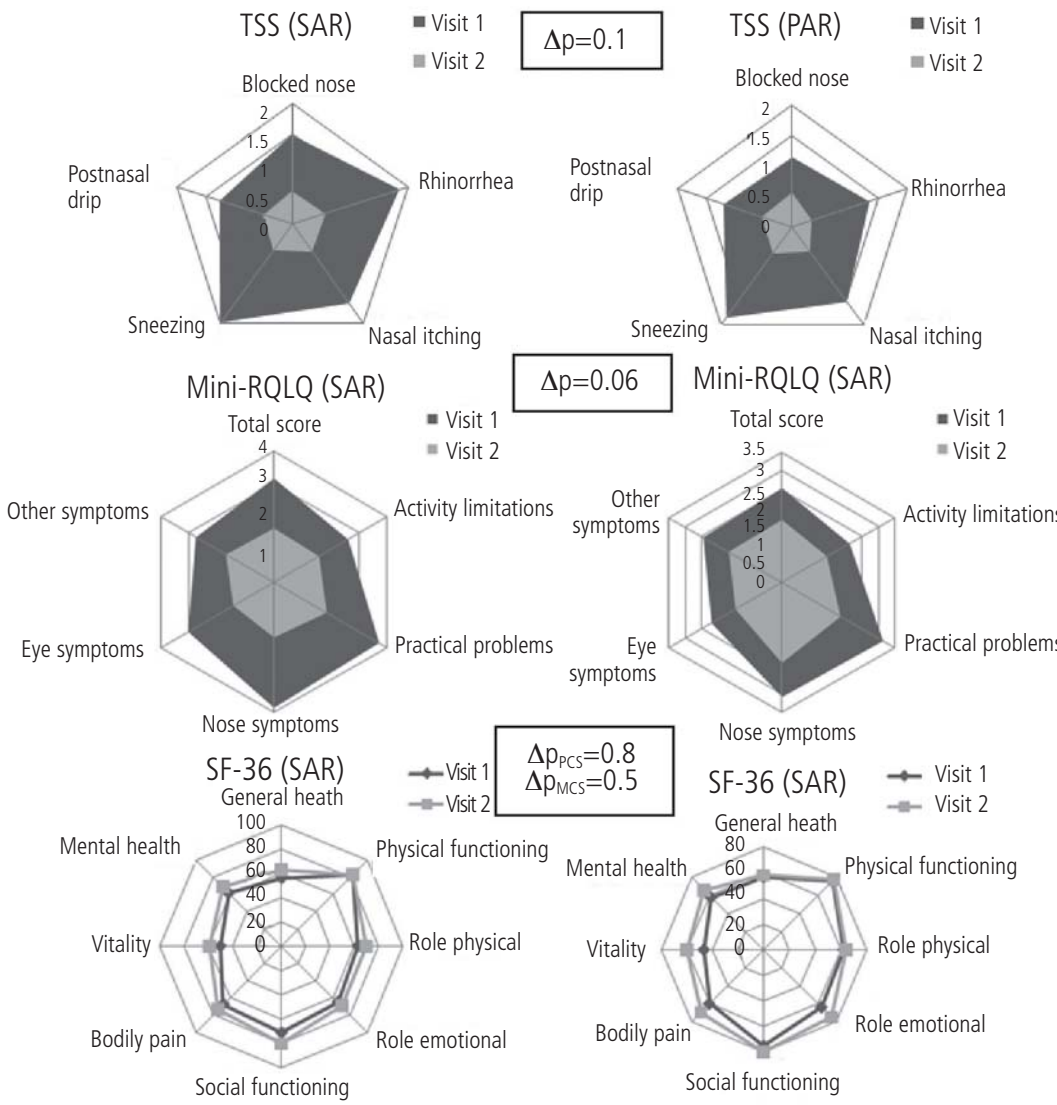

Figure. Improvements in TSS, Mini-RQLQ, and SF-36 scores of patients with rhinitis.
TSS indicates total symptoms score; SAR, seasonal allergic rhinitis; PAR, perennial allergic rhinitis; RQLQ, Rhinitis Quality of Life Questionnaire; SF-36, Short Form 36 Health Survey. Δp, between SAR and PAR differential scores (before-after treatment scores).

Table 4. Correlation Between MARS and Differential Scores (Δ) of Total Symptoms Score, Mini-RQLQ, and SF-36 Before and After Treatment in the Rhinitis Group

	Total (N=85)		SAR (n=51)		PAR (n=34)	
	P Value	r	*P* Value	r	*P* Value	r
Δ Total symptoms score	.66	0.049	.93	0.013	.3	0.162
Mini-RQLQ						
Δ Total score	.002	0.332	.17	0.197	.002	0.524
Δ Activity limitations	.006	0.297	.57	0.271	.04	0.354
Δ Practical problems	.01	0.268	.11	0.227	.057	0.335
Δ Nose symptoms	.07	0.199	.40	0.119	.13	0.265
Δ Eye symptoms	.006	0.299	.27	0.157	.006	0.468
Δ Other symptoms	.009	0.284	.85	0.027	.001	0.565
SF-36						
Δ PCS	.022	–0.251	.18	–0.191	.07	–0.321
Δ MCS	.023	–0.251	.02	–0.332	.30	–0.189

Abbreviations: MARS, medication adherence report scale; MCS, mental component score; PCS, physical component score; RQLQ, Rhinitis Quality-of-Life Questionnaire; SF-36, Short Form 36 Health-Survey.

Personality and Adherence

Overall, no correlations were found between personality traits (EPQR-A) and self-reported medication adherence (MARS) (r=–0.063 [P=.46] for extraversion, r=–0.047 [P=.59] for neuroticism, and r=–0.079 [P=.36] for psychoticism).

A multiple linear regression model showed that PCS was the only significant predictor and that the MARS score increased with each unit increase in this variable (P<.001).

Medication Adherence and Rhinitis Control

Rhinitis treatment resulted in improvements in TSS, Mini-RQLQ, and SF-36 values both in SAR and in PAR patients (Figure). In SAR patients, treatment reduced the TSS by 55.9% (P<.001) and the total Mini-RQLQ by 30.6% (P<.001) and improved the PCS by 21.6% (P=.05) and MCS by 16.3% (P=.01). In the PAR group, treatment improved TSS by 60% (P<.001), MiniRQLQ by 31.1% (P=.001), the PCS by 18.9% (P=.2), and the MCS by 33.1% (P=.03).

Correlations between the pretreatment and posttreatment differential scores for TSS, Mini-RQLQ, and SF-36 and reported medication adherence showed that improvement in the total Mini-RQLQ score, PCS, and MCS revealed a low to moderate association with very good adherence, whereas the TSS did not correlate with MARS (Table 4).

Discussion

Ours is the first study to assess the effect of personality traits on medication adherence, symptoms, and HRQOL using validated instruments in AR patients. We found that the personality of AR patients and COPD patients, whose extraversion scores were significantly lower, was not associated with adherence. In addition, for the first time, scores in the MARS, a self-reported assessment of adherence, were evaluated based on the posttreatment outcomes of AR patients and found to be correlated with an improvement in HRQOL scores, suggesting that this instrument can be used to identify nonadherent patients in outpatient clinics.

Nonadherence in patients with chronic diseases is estimated to have an annual cost of $300 billion in the United States, with COPD among the conditions for which the lowest levels of adherence have been recorded [16]. Since we observed no differences in nonadherence between AR and COPD patients, we can assume that AR also has one of the lowest levels of adherence.

In comparison to matched controls, patients with AR have an approximately 2-fold increase in medication costs and 1.8-fold the number of visits to health professionals, as well as hidden direct costs of comorbid conditions [17]. Half of all patients with AR do not fill a prescription for their AR medication [18]; however, in the present study, only 28.15% of patients reported poor adherence, which may be due to 3 factors. First, the Hawthorne effect was observed throughout the study (ie, patients tend to participate in a research study to change their behavior). Second, the sample became self-selected, since the more adherent patients were those who remained in the study. Third, patients tend to exaggerate adherence in self-administered questionnaires.

Adherence to drug therapy is important, since nonadherence commonly leads to treatment failure. Sometimes nonadherence is the main factor limiting the maximal effect of a therapeutic regimen; therefore, addressing this issue has added therapeutic value in daily practice. It is essential but also difficult for clinicians to readily identify patients who do not adhere to medication. One of the simplest ways to measure adherence is using patient questionnaires, which are easy to use, inexpensive, and quick, although it must be stressed that patients might be affected by social desirability and thus exaggerate their adherence. Nevertheless, none of the objective methods used to measure adherence is perfect [13,16].

We assessed adherence using a self-report scale that is cost-effective, easily applied in outpatient clinics, and

able to distinguish between intentional and unintentional nonadherence, each of which has different underlying causes and therefore requires different interventions. In our clinical practice, asking patients directly but nonjudgmentally about their adherence, we detect those who admit to lapses in their treatment. Many researchers conclude that such patients should be targeted for adherence counseling. Future studies should focus on educational programs for these nonadherent patients with low MARS scores, who may benefit from counseling. Such programs could also reduce treatment costs and improve health outcomes.

Adherence is a multidimensional phenomenon comprising personality traits that have not previously been taken into account in AR patients. According to the McCrae and Costa "Model of the person" [19], personality traits can explain a person's thoughts, feelings, and actions. As the association between personality traits and medication adherence is therefore indirect, we were not able to demonstrate any effect in either of the study groups. However, the presence of associations between personality and HRQOL is supported by our findings for neuroticism, which was negatively correlated with both MCS and PCS.

The current study is also the first to test whether MARS scores are correlated with the outcome of AR treatment. We showed that both the improvement in PCS and MCS scores and the decline in total Mini-RQLQ score were associated with good adherence. These findings encouraged us to consider using MARS in daily practice. Although adherence was correlated with quality of life, it is noteworthy that the association between the MARS score and TSS was insignificant. There are several possible explanations for this finding. The present study included patients with mild symptoms (mean TSS, 7.6 [3.6]); consequently, a clear relationship between symptoms and adherence was not found. It is also possible that these patients had higher expectations from their treatment. Gibson et al [20] published a study on adherence involving 29 preschool asthmatic children with an electronic inhaler timer device. They reported that a median of 77% of prescribed doses of therapy were taken, but that no apparent relationship was identified between good adherence and low symptom scores, as also shown in the study by Jonasson et al [21]. All in all, our results are consistent with the literature, suggesting that objective clinical recovery is not synonymous with subjective personal recovery, although it can be considered complementary.

Our study is subject to a series of limitations. The first is its small sample size. To increase our knowledge in this area and in order to validate our results, multicenter studies with large samples must be planned in the future. Second, as the data are self-reported, they may be subject to bias. Nevertheless, the rate of nonadherence reported in our study was consistent with those obtained in other AR studies where objective medication monitoring was used [22,23].

In conclusion, this pilot study indicates that use of a brief self-report medication adherence questionnaire in outpatient clinics can enable health care practitioners to identify suboptimal adherence in AR patients, especially those who could benefit from counseling. Although personality traits were not clearly associated with adherence, they should be taken into consideration when evaluating HRQOL. Every effort should be made to develop tools for determining adherence, which could help clinicians to tailor treatment to the needs, abilities, and preferences of their patients.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Funding

The authors declare that no funding was received for the present study.

Previous Presentations

Data from this study were presented at the XXIX Congress of The European Academy of Allergology And Clinical Immunology, 5-9 June 2010, London, England.

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Manuscript received October 10, 2012; accepted for publication January 3, 2013.

Ilkay Koca Kalkan
Attar Sokak, 21/14, GOP
Ankara, 06700 Turkey