Medication adherence and treatment satisfaction in some Egyptian patients with chronic obstructive pulmonary disease and bronchial asthma

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Background The degree of effectiveness in the management of asthma and chronic obstructive pulmonary disease (COPD) entails proper treatment adherence and satisfaction. In this study, medication adherence and treatment satisfaction were assessed among some Egyptian patients with asthma and COPD.

Materials and methods Consecutive asthma and COPD patients were recruited from the outpatient clinic or inpatients admitted to the Chest Department at Ain Shams University Hospital, Abbassia, and Qena Chest Hospitals. Self-reported medication adherence and treatment satisfaction were tested using the Arabic versions of the eight-item Morisky Medication Adherence Scale and Treatment Satisfaction Questionnaire for Medication (TSQM 1.4), respectively.

Results Totally, 474 asthmatic patients (mean: 34.41 years, 61.2% male and 38.8% female) and 509 COPD patients (mean: 60.39 years, 91.7% male and 8.3% female) were included. According to eight-item Morisky Medication Adherence Scale, mean adherence was 4.55±2.01 and 3.88 ±1.63 in asthma and COPD, respectively, with no significant difference. In asthma and COPD, low adherence was found in 71.7 and 79.4%, medium adherence in 19.8 and 13.6%, and high adherence in 8.4 and 7.1%, respectively. There was a significant difference in all domains of TSQM between asthma and COPD, with more effectiveness, convenience, and global satisfaction but less side effects among asthma patients compared with COPD. There was a significant correlation in asthmatic patients between adherence and all domains of TSQM, whereas in COPD only side effects and convenience correlated significantly with adherence. In COPD, adherence was better in male smokers, with low smoking index, living in urban areas, having severe small airway obstruction, and treated by pulmonologists. In asthma, adherence was mainly affected by treatment satisfaction.

Conclusion Most of the asthma and COPD patients were nonadherent to their medications. Asthma patients were more satisfied with treatment compared with COPD patients.

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Keywords: asthma, chronic obstructive pulmonary disease, medication adherence, questionnaire, treatment satisfaction

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Introduction

Asthma and chronic obstructive pulmonary disease (COPD) are long-term medical conditions that require prolonged treatment. Accordingly, it is important that the patients feel confident with the medication they are taking, and the treatment should be adequate in controlling symptoms with well tolerated and minimal side effects. If these conditions are not met, it is likely that patients will not comply with the prescribed treatment regimen [1].

Treatment adherence is defined as the extent to which a person's behavior in terms of taking medications coincides with medical or health advice [2]. Adherence to treatment is one of the most important factors that guarantee the success of treatment in COPD and asthma. Several factors may influence adherence to treatment, such as patients' knowledge about their disease, cultural and socioeconomic aspects, poor perception of symptoms, adverse events, and the skill of using the inhalation devices [3].

Patient satisfaction is an important measure that should be included in healthcare evaluations; it is important to know how patients feel about treatment regimens actually adopted. Such information may assist the definition of optimal medical care for individual patients [4].

Although medication adherence and treatment satisfaction became well recognized in the recent years with the current guidelines for COPD and asthma stressing upon their pivotal role, the rates are consistently low in both diseases in clinical practice. Moreover, reports in Arab countries are lacking. In view of the above, this study was designed to assess the medication adherence and treatment satisfaction among some Egyptian patients with bronchial asthma and COPD.

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Materials and methods

This prospective study included consecutive adult (≥18 years old) patients with bronchial asthma and COPD recruited either from the outpatient clinic or inpatients admitted to the Chest Department at Ain Shams University Hospital, Abbassia, and Qena Chest Hospitals from April 2014 to December 2015. COPD and bronchial asthma were diagnosed according to the guidelines of the Global Initiative for Chronic Obstructive Lung Diseases [5] and Global Initiative for Asthma, respectively [6]. The current prescribed medications for asthma and COPD were identified for all included patients. Respiratory medications included long-acting β2-agonists (LABA), inhaled corticosteroids, combined LABA/inhaled corticosteroids, combined LABA and long-acting anticholinergics, short-acting anticholinergics, short-acting β2-agonists, long-acting anticholinergics, combined anticholinergics/short-acting β2-agonists, oral methylxanthines, and oral corticosteroids. Most patients were on combination therapy. All participants were interviewed and detailed medical history taking as well as thorough clinical examination, plain chest radiography, and spirometry were recorded. Patients with recent change in respiratory medications or those with a short duration of respiratory medications (~1 month) for asthma or COPD were excluded from the study. Verbal consent was obtained from all included patients before the onset of the study and the study was approved by the institutional ethical committee.

Lung function

Prebronchodilator and postbronchodilator reversibility tests were performed according to the standard practice [7]. Forced expiratory in the first second (FEV_1), forced vital capacity (FVC), FEV_1/FVC ratio, and forced expiratory flow over 25–75% part of FVC ($FEF_{25–75\%}$) were measured using MicroLab (CareFusion Company, Sydney, Australia). Readings were performed in triplicate, with the highest values recorded and expressed as a percentage of the predicted value according to the guidelines of the American Thoracic Society [7].

Medication adherence

Medication adherence was tested using the Arabic version of the validated eight-item Morisky Medication Adherence Scale (MMAS-8, UCLA, Los Anglos, USA) [8–11]. The Arabic version of the questionnaire as well as the coding instructions for the MMAS-8 (8-item) and copyright agreement were obtained directly from professor Morisky. The Arabic version of MMAS-8 is an eight-item questionnaire with seven yes/no questions and the last question is a five-point scale. On the basis of the scoring system of MMAS-8, adherence was rated as follows: high adherence (score: 8), moderate adherence (score: 6 to <8), and low adherence (score: <6). Patients with low or moderate grades of adherence were considered nonadherent to their medications.

Treatment satisfaction

Treatment satisfaction was tested using the Arabic version of Treatment Satisfaction Questionnaire for Medication (TSQM 1.4). The TSQM 1.4 is a 14-item validated questionnaire consisting of four scales: the effectiveness scale (questions 1–3), the side effects scale (questions 4–8), the convenience scale (questions 9–11), and the global satisfaction scale (questions 12–14). The TSQM 1.4 domain scores were calculated as recommended by the Questionnaire's authors [12–14]. The TSQM 1.4 domain scores range from 0 to 100 with higher scores representing higher degree of satisfaction. The global satisfaction scale is used to evaluate the overall satisfaction of patients with their medications.

Doctors asked the questions of both questionnaires to all patients and all questions were answered by all included patients.

Statistical analysis

Parametric numerical data were expressed as mean±SD and median, whereas nonparametric numerical data were expressed as number and percentage. Independent sample *t*-test was used to compare two groups as regards quantitative variables. Pearson's correlation test was used to rank different variables against each other positively or inversely. Multiple stepwise linear regression analysis was performed to identify the independent predictors of adherence. Statistical significance was set at *P* value less than 0.05. Statistical analyses were performed utilizing statistical package for the social sciences software (SPSS for Windows, version 17.0; SPSS Inc, Chicago, Illinois, USA).

Results

Totally, 983 patients agreed to participate in this study; 509 COPD patients and 474 asthma patients. The basic characteristics of all included patients are listed in Table 1.

According to MMAS-8, the mean adherence score was 4.55±2.01 among asthma patients and 3.88±1.63 among COPD patients, with no significant statistical

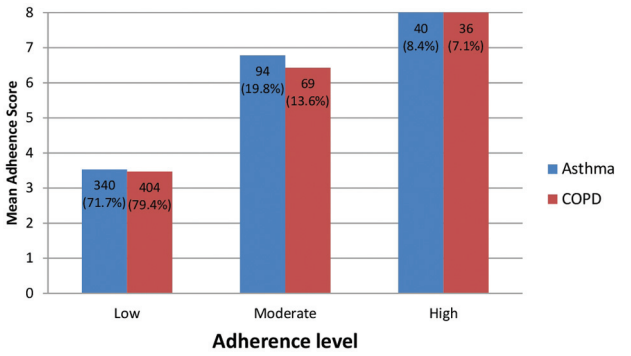
Table 1 Basic demographic and clinical characteristics of asthma and chronic obstructive pulmonary disease patients

	Asthma (*N*=474) [*n* (%)]	COPD (*N*=509) [*n* (%)]
Age (years)	34.41±11.56	60.39±9.22
Sex (male/female)	290/184 (61.2/38.8)	467/42 (91.7/8.3)
Residence		
Urban	260 (54.9)	214 (42)
Rural	214 (45.1)	295 (58)
Level of education		
Illiterate	122 (25.7)	382 (75)
Educated	321 (67.7)	127 (25)
Highly educated	31 (6.5)	0 (0)
Comorbidity		
Yes	36 (7.6)	313 (61.5)
No	438 (92.4)	196 (38.5)
Smoking status		
Never smoker	358 (75.5)	49 (9.6)
Ex-smoker	64 (13.5)	234 (46)
Current smoker	52 (11)	226 (44.4)
Spirometry		
FVC (l)	3.42±1.04	2.45±1.08
FVC (% predicted)	79.91±19.05	58.46±21.36
FEV_1 (l)	2.42±0.92	1.37±0.78
FEV_1 (% predicted)	68.75±22.02	41.01±18.72
FEV_1/FVC	70.11±12.90	54.01±11.68
$FEF_{25–75}$ (%)	55.28±24.65	28.96±19.45
Treatment prescribed by		
Patient himself	0 (0)	0 (0)
Pharmacist	6 (1.2)	0 (0)
GP	71 (15)	73 (14.3)
Pulmonologist	397 (83.8)	436 (85.7)
Duration of treatment (median) (months)	3	4
Subjective regularity of treatment		
Regular	247 (42.1)	183 (36)
Irregular	227 (47.9)	326 (64)
Subjective satisfaction to treatment		
Satisfied	306 (64.6)	281 (55.2)
Unsatisfied	168 (35.4)	228 (44.8)
Recurrent hospital admission		
Yes	145 (30.6)	302 (59.3)
No	329 (69.4)	207 (40.7)

COPD, chronic obstructive pulmonary disease; $FEF_{25–75}$, forced expiratory flow at 25–75% of forced vital capacity; FEV_1, forced expiratory volume in 1 s; FVC, forced vital capacity; GP, general practitioner.

difference in the mean adherence between the two groups ($P>0.05$). Low adherence to treatment was found in 340 (71.7%) asthma patients and 404 (79.4%) COPD patients, moderate adherence was found in 94 (19.8%) asthma patients and 69 (13.6%) COPD patients, and high adherence score was found in 40 (8.4%) asthma patients and 36 (7.1%) COPD patients. Nonadherence to treatment was observed in 91.5% of asthma patients and 93% of COPD patients (Fig. 1). Analysis of responses to MMAS-8 among asthma and COPD patients are presented in Table 2.

Figure 1



Adherence level among asthma and chronic obstructive pulmonary disease patients.

For TSQM 1.4, the mean±SD for the effectiveness domain in COPD and asthma patients, respectively, was 42.80±23.19 and 57.62±26.96, for the side effects domain it was 82.20±25.76 and 72.17±27.68, for the convenience domain it was 74.60±18.07 and 79.22±23.25, and for the global satisfaction domain it was 40.25±26.65 and 70.94±28.10. There was a significant statistical difference in all four domains of TSQM between asthma and COPD patients ($P<0.05$, Table 3).

Among asthma patients, there was a positive and significant correlation between adherence score and all domains of TSQM ($P=0.000$, $r=0.278$ for effectiveness domain; $P=0.000$, $r=0.366$ for side effects domain; $P=0.000$, $r=0.295$ for convenience domain; and $P=0.001$, $r=0.153$ for global satisfaction domain) (Fig. 2). However, in COPD patients, there was a positive and significant correlation between adherence score and side effects domain ($P=0.000$, $r=0.161$) as well as convenience domain ($P=0.000$, $r=0.245$), but not with effectiveness domain ($P=0.924$, $r=-0.004$) or global satisfaction domain ($P=0.969$, $r=0.002$) (Fig. 3).

Stepwise multiple linear regression analysis was performed for adherence in COPD; high adherence scores were found in male sex ($\beta=-0.126$, $P=0.025$), smokers ($\beta=0.252$, $P=0.000$), urban residents ($\beta=-0.123$, $P=0.036$), those with low smoking index ($\beta=-0.360$, $P=0.000$), those with low $FEF_{25–75\%}$ ($\beta=-0.227$, $P=0.001$), and those undergoing COPD treatment prescribed by pulmonologists ($\beta=0.234$, $P=0.000$).

Stepwise multiple linear regression analysis was performed for adherence in asthma; high adherence scores were found in patients with high global satisfaction to asthma medication ($\beta=0.438$, $P=0.000$).

Table 2 Patients' responses to eight-item Morisky Medication Adherence Scale-8

Morisky 8-item medication adherence scale	Asthma (*N*=474) [*n* (%)]		COPD (*N*=509) [*n* (%)]	
	Yes	No	Yes	No
1. Do you sometimes forget to take your asthma/COPD medicine?	70 (14.8)	404 (85.2)	124 (24.4)	385 (75.6)
2. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past 2 weeks, were there any days when you did not take your asthma/COPD medicine?	266 (56.1)	208 (43.9)	282 (55.4)	227 (44.6)
3. Have you ever cut back or stopped taking your asthma/COPD medication without telling your doctor, because you felt worse when you took it?	258 (54.4)	216 (45.6)	335 (65.8)	174 (34.2)
4. When you travel or leave home, do you sometimes forget to bring along your asthma/COPD medication?	98 (20.7)	376 (79.3)	122 (24)	387 (76)
5. Did you take your asthma/COPD medicine yesterday?	267 (56.3)	207 (43.7)	319 (62.7)	190 (37.3)
6. When you feel like your asthma/COPD is under control, do you sometimes stop taking your medicine?	281 (59.3)	193 (40.7)	354 (69.5)	155 (30.5)
7. Taking medication everyday is a real inconvenience for some people. Do you ever feel hassled about sticking to your asthma/COPD treatment plan?	324 (68.4)	150 (31.6)	316 (62.1)	193 (37.9)
8. How often do you have difficulties remembering to take all your asthma/COPD medications?				
Never/rarely	183 (38.6)		225 (44.2)	
Once in a while	97 (20.5)		59 (11.6)	
Sometimes	151 (31.9)		135 (26.5)	
Usually	42 (8.9)		82 (16.1)	
All the time	1 (0.2)		8 (1.6)	

COPD, chronic obstructive pulmonary disease.

Table 3 Treatment Satisfaction Questionnaire for Medication 1.4 domain scores among asthma and chronic obstructive pulmonary disease patients

Domain	Asthma (*N*=474)	COPD (*N*=509)	*P*
Effectiveness	57.62±26.96	42.80±23.19	0.000
Side effects	72.17±27.68	82.20±25.76	0.000
Convenience	79.22±23.25	74.60±18.07	0.000
Global satisfaction	70.94±28.10	40.25±26.65	0.000

Discussion

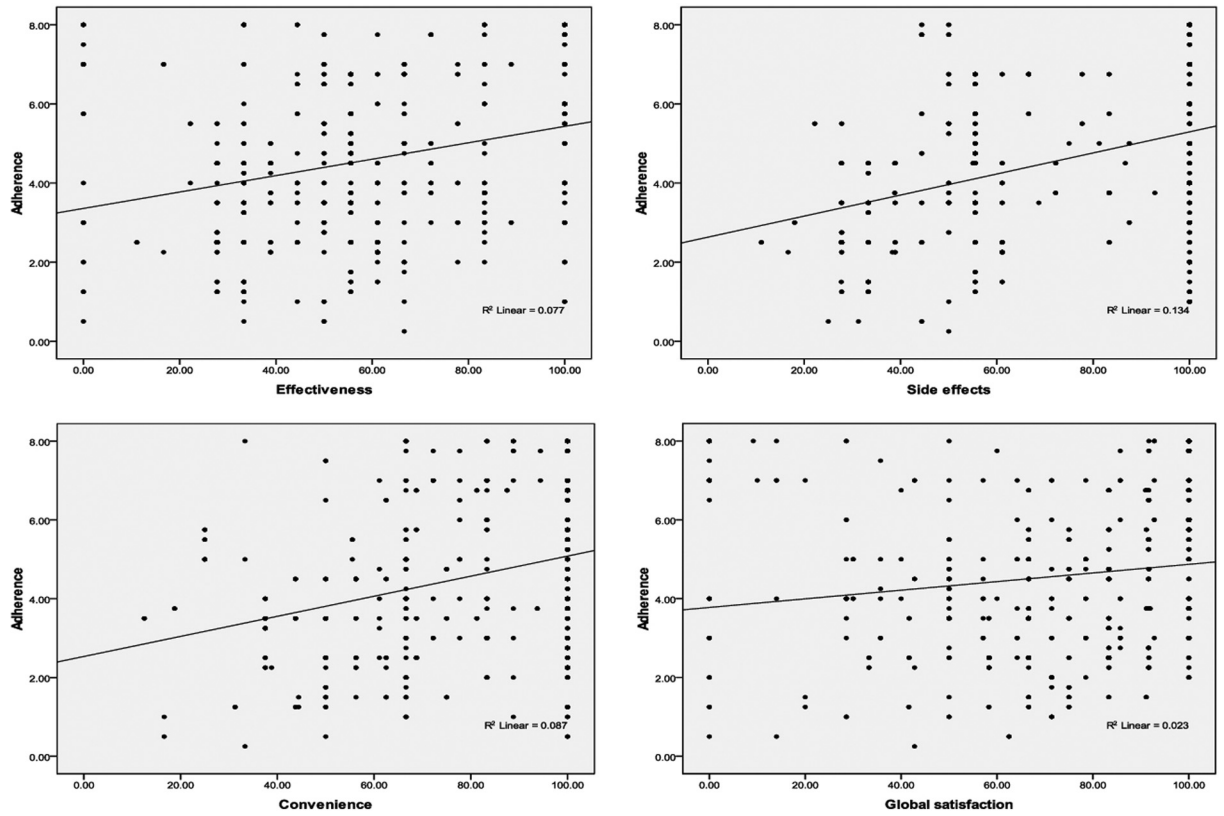
Our study focused upon the evaluation of medication adherence and treatment satisfaction in COPD and asthma patients simply because poor adherence and satisfaction were associated with defective disease control, increase in the rate of exacerbations and increase in healthcare utilization and costs.

As regards the medication adherence, our results showed that the majority of asthma and COPD patients had low adherence rates, denoting that most of the patients were nonadherent to treatment. The adherence rates were 8.5% for asthmatic patients and 7% for COPD patients. In previous studies, among asthma patients, medication adherence rates have consistently been shown to be 30–40% and may increase as high as 70% [15–19]. A recent study investigated the adherence rates among 750 000 adults with one of eight chronic medical conditions (including asthma/COPD, cancer, depression, diabetes, hypercholesterolemia, hypertension, multiple sclerosis, and osteoporosis); medication adherence rates for COPD/asthma were the lowest of all the diseases studied (33%), compared with depression (62%), diabetes (51%), and hypertension, hyperlipidemia, osteoporosis, multiple sclerosis, and cancer (>75%) [20]. Our adherence rates were far lower than the corresponding rates reported in other studies among different populations. This discrepancy could be attributed to the different methodologies used for the assessment of adherence. Besides, most of the asthma and COPD medications are inhaled, and the cultural background in Egypt can directly affect the rate of adherence, especially with the prevailing false belief among many Egyptians that inhalation therapy causes drug dependence. Further, most of these medications are expensive and patients fail to adhere to their medications under the influence of their financial status, especially with both COPD and asthma being two chronic diseases, and this chronicity ultimately contributes to the poor adherence to any long-term therapy even in the developed countries [21].

In the present study, 59.3% of asthmatic patients and 65.5% of COPD patients reported that they sometimes stop taking their medications when they felt their asthma/COPD was under control. Similarly, in a study of adherence in COPD patients by Dolce *et al.* [22], 31% of patients consciously decided to skip their medication if they were controlled.

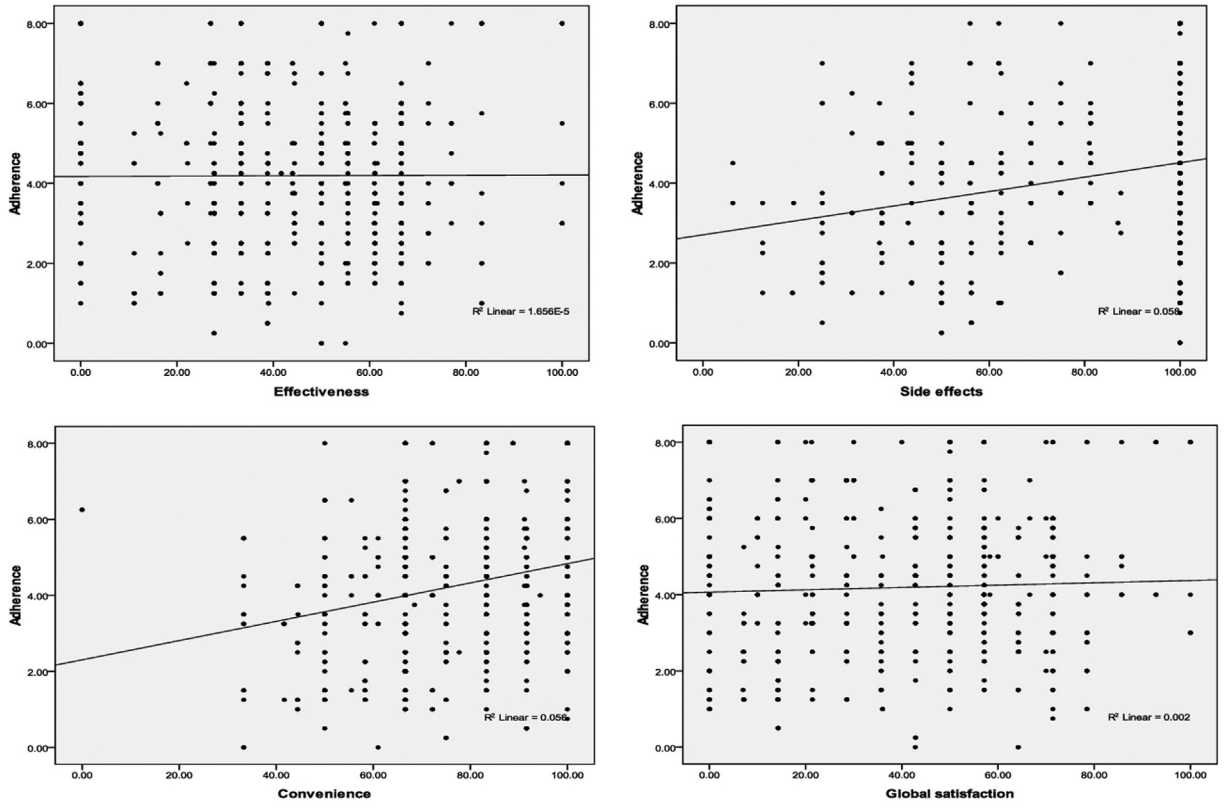
The evaluation of medication adherence is either subjective or objective. Objective methods include dose counting, prescription refills, and the

Figure 2



Scatter plot for the correlation between adherence and the four domains of Treatment Satisfaction Questionnaire for Medication among asthma patients.

Figure 3



Scatter plot for the correlation between adherence and the four domains of Treatment Satisfaction Questionnaire for Medication among chronic obstructive pulmonary disease patients.

biochemical evaluation of drug levels. Although these methods were supposed to present an accurate estimate, this is not actually realistic as dose counting and prescription refills might pose overestimation for the actual drug usage because some patients tend to empty their doses in an attempt to give their physicians a false impression that they were regularly taking their medications. Biochemical evaluation, although accurate, it is both expensive and invasive. Another important accurate objective measure for evaluating medication adherence is the electronic monitoring devices; however, it carries the disadvantage of being expensive and unavailable in many countries. In contrast, subjective evaluation of medication adherence is achieved mainly through patients' self-report; nevertheless, until now, there is no standardized method for this form of evaluation. In the current study, medication adherence was assessed using the self-reported questionnaire MMAS-8. To the best of our knowledge, no previous studies have used this questionnaire to assess medication adherence in Arab patients with COPD and asthma. Although MMAS-8 is one of the subjective measures for the evaluation that might provide a false higher estimate of adherence, the resultant very low adherence rates observed in both COPD and asthma in our study poses a major health problem that requires urgent consideration. Nonadherence to treatment in asthma and COPD is complex; several factors are linked to this phenomena. Adult asthmatic patients for instance show poor or nonadherence, the self-reported factors affecting their adherence include the following: patients' false belief that asthma requires only intermittent treatment during the attacks, the cost of the medications, fear of drug dependence, unawareness of the chronic nature of their disease, the false technique of using their inhalers, and the fear of adverse drug reaction [23]. In addition, ensuring medication adherence in adolescent asthmatic patients poses a great challenge mainly because of the denial and lack of accurate perception of asthma symptoms. In COPD, poor or nonadherence to treatment is related either to the patients, the treatment itself, or to the community [24]. Improper usage of inhalers as well as the type of inhaler itself represents one of the main treatment-related factors of nonadherence in both asthma and COPD. Moreover, the lack of understanding of the chronicity of COPD is considered one of the main patient-related factors of nonadherence. In a previous study, a checklist auditing was performed among some Egyptian asthma and COPD patients to evaluate the usage technique of different inhalation devices in three different Egyptian governorates and nine health services; the results revealed that improper inhaler technique was common with discrepancy between patients' understanding and actual usage technique of different inhalation devices [25]. Another study showed that only one out of 10 COPD patients with pressurized metered-dose inhaler performs all essential steps correctly [26].

Nowadays, treatment satisfaction is regarded as an important predictor of medication adherence in chronic medical conditions such as COPD and asthma. The self-reported TSQM questionnaire used in this study to assess treatment satisfaction was tested before in many diseases; however, this was the first attempt to utilize this diagnostic tool in asthma and COPD. Our study revealed higher rates of effectiveness, convenience, and global satisfaction but lower rates of side effects among patients with asthma in comparison with COPD. The overall satisfaction with medications represented by the global satisfaction was good in asthmatic patients but was bad in COPD patients with a significant difference between the two groups. Furthermore, as expected, the overall adherence correlated with the global satisfaction as well as the effectiveness, convenience, and side effects in patients with asthma. However, the case was different among COPD patients; adherence correlated with side effects and convenience domain but not with effectiveness and global satisfaction. This suggests that COPD patients were more minded with the medications' side effects issue in their decision of whether or not to adhere to their medications; the fear of adding to their suffering led these patients to concentrate more on convenience and side effects. A better insight concerning the nature of COPD as well as the psychosocial well-being of the patients might justify why effectiveness and satisfaction were out of the concern of those patients in the matter of adherence; until now none of the existing COPD medications has been shown conclusively to improve the long-term decline in lung function. Thus, in COPD but not in asthma, patients' adherence to medications might not point to adequate self-reported effectiveness or satisfaction with their treatment.

Although both asthma and COPD represent chronic medical conditions, the determinants of medication adherence were different in both diseases. For instance, in COPD patients, adherence was better in urban male smokers with low smoking index, having severe small airway obstruction, and in whom treatment was prescribed by pulmonologists. These findings suggest

that, in COPD patients, the better perception of their illness as well as the realization of the benefits of adhering to their medications might influence adherence. Lau *et al.* [27] and Laforest *et al.* [28] previously reported that adherence to medication in COPD increases if the prescribing physician was a pulmonologist. Nici *et al.* [29] in their study suggested that the degree of airway obstruction was a good predictor of medication adherence in COPD. Laforest *et al.* [28] also declared that female COPD patients were more likely to interrupt respiratory medications intentionally, whereas there was no convincing sex-related effect on accidental omissions. In a recent study, Ágh *et al.* [30] stated that adherence to respiratory therapy in COPD was associated with age, current smoking status, number of respiratory drugs, number of daily respiratory drug doses, and quality of life, whereas adherence was not related to sex, COPD stage, FEV_1, or medication costs. In a recent review addressing adherence-related factors in COPD; it was mentioned that sex, age, educational level, and socioeconomic status were among the factors that did not affect adherence [31]. However, in asthma, our findings suggest that no single factor apart from treatment satisfaction seemed to act as an independent factor affecting medication adherence.

It is of interest to mention that when patients were asked about their own evaluation for their adherence and satisfaction to medications before answering the questionnaires, their responses were far exceeding the self-reported adherence and satisfaction obtained using MMAS-8 and TSQM. This might offer an important strength for these questionnaires, although being subjective tools, in obtaining a close view for the medication adherence and satisfaction.

The poor adherence and dissatisfaction observed in our study was higher in COPD compared with asthma probably because 61.5% of the included COPD patients were having comorbidities and were under complex therapeutic regimens that raise the degree of nonadherence and dissatisfaction, whereas only 7.6% of the included asthmatic patients had comorbidities. Some studies declared that comorbidity including anxiety and depression significantly reduced the rate of adherence to medications in COPD [32–34]. Nevertheless, it is of utmost importance to mention that taking into consideration that, although smoking cessation in COPD represents the most effective therapeutic intervention to control disease progression, the maintenance of this smoking cessation appears to be poor not only in Egypt but also worldwide. Therefore, this mandates proper adherence to medical treatment in an attempt to minimize the symptoms of the disease as well as the rate of exacerbations and hospitalization.

In conclusion, most of the asthma and COPD patients were nonadherent to their medications. In addition, patients with asthma were more satisfied with their treatment compared with COPD patients.

Finally, it is worth mentioning that our study is one of the few studies to assess medication adherence and treatment satisfaction among Arab patients with COPD and asthma using validated tools; however, our study has few limitations. First, medication adherence and treatment satisfaction were assessed using subjective self-reported questionnaires, which might not match the actual rate of adherence and satisfaction; however, the use of patients' self-report could be justified on basis that even the objective assessment of medication adherence or treatment satisfaction can itself represent an inaccurate estimate. Second, adherence and satisfaction should be assessed for individual types of therapy rather than the overall adherence and satisfaction for all medications collectively. Third, recording the patients' income and correlating this with the degree of adherence would have been of value.

In view of the results in our study, raising the awareness of medication adherence in COPD and bronchial asthma is a crucial step to optimize management of these diseases. Moreover, patients' perception of the burden of their disease as well as the consequences of nonadherence to medications should not be overlooked.

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Conflicts of interest
There are no conflicts of interest.

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