Asthma treatment adherence and related factors in Shanghai, China

Juan Du[1,2], Yu-Heng Shi[3], Yu-Xiang Duan[4], Xiao-Ru Wang[5], Min Zhou[6], Wen-Chao Gu[7], Chi-Jun Wen[8], Yi Gong[9], Chun-Ling Du[10], Bo Peng[1], Lin Sun[1], Wei Tang[1]

[1]Department of Respiratory and Critical Care Medicine, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai 200025, China;

[2]Department of Respiratory and Critical Care Medicine, Ruijin Hospital Northern Branch, Shanghai Jiao Tong University School of Medicine, Shanghai 201821, China;

[3]Department of Respiratory Medicine, Shanghai Ninth People's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai 201999, China;

[4]Department of Respiratory Medicine, TongRen Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai 200050, China;

[5]Department of Respiratory Medicine, Da Hua Hospital, Xuhui District, Shanghai 200237, China;

[6]Department of Respiratory Medicine, Shanghai Sixth People's Hospital (Jinshan Branch), Shanghai 201500, China;

[7]Department of Respiratory Medicine, People's Hospital of Shanghai Pudong District, Shanghai 201200, China;

[8]Department of Xiao Gan, Shanghai Ninth People's Hospital (Huangpu Branch), Shanghai 200011, China;

[9]Department of Respiratory and Critical Care Medicine, Huashan Hospital, Fudan University School of Medicine, Shanghai 200040, China;

[10]Department of Respiratory Medicine, People's Hospital of Shanghai Qingpu District, Shanghai 201700, China.

To the Editor: Asthma is a common chronic respiratory disease. It is estimated that 300 million individuals worldwide suffer from asthma, and at least 50% of both adults and children do not take control medication as prescribed.[1] Asthma control is closely related to treatment adherence, and poor adherence is a contributing factor for poorly controlled symptoms, exacerbations, and hospitalizations. Understanding the factors affecting adherence and improving it are important measures in achieving good asthma control. Systematic analysis of asthma treatment adherence shows significant differences in adherence rates and related factors across studies.[2] The aim of this study was to investigate adherence to medication and factors influencing that among asthma patients in Shanghai, one of the most developed metropolises in China, to suggest further interventions to improve adult asthma control.

This was a multi-center cross-sectional study in four tertiary hospitals and six secondary hospitals in Shanghai. The participants were outpatients who had been diagnosed with asthma more than 3 months before, were aged at least 18 years old, had at least a basic ability to communicate, and could complete the questionnaire. The ethics committee of Ruijin Hospital, Shanghai Jiao Tong University School of Medicine approved the study (No. 2017-117). All patients gave written informed consent to participate in this study.

A questionnaire was designed for this study using questions about asthma drug adherence. The contents of the questionnaire included the sociodemographic characteristics of patients (age, gender, education level, and type of outpatient service), disease awareness, asthma drug use within the previous month, eight-item Morisky Medication Adherence Scale (MMAS-8), and the factors associated with patients' non-adherence to asthma drug treatment. We assessed patients' knowledge of asthma using five items [Supplementary Table 1, http://links.lww.com/CM9/A714], all of which were answered yes or no. MMAS-8 is a tool for evaluating patients' medication adherence comprising eight questions, with a total score of eight points. Less than six points were classified as poor adherence, and six points or more as good adherence. We defined 13 potential reasons for poor adherence, based on previous studies[3] and our clinical experience.

We collected a total of 552 valid questionnaires. All statistical analyses used SPSS19.0 statistical software (SPSS Inc., Chicago, IL, USA). Categorical data were described as numbers (percentages) and the Chi-squared test was used to compare differences between the groups. The *P* values of pairwise comparisons were corrected using the false discovery rate. $P < 0.05$ was considered statistically significant.

There were 275 patients (49.8%) in the poor adherence group and 277 (50.2%) in the good adherence group. There was a higher proportion of poor adherence among those between 18 and 30 years old than those over 50 years old ($P = 0.015$). The proportion of poor adherence was

also higher for patients treated in a specialist clinic than a general ($P = 0.004$) or expert clinic ($P = 0.003$). There was also a higher proportion of poor adherence among patients with an education level of university or above than those with education background of junior high school or below, although the difference was not statistically significant ($P = 0.073$) [Supplementary Table 2, http://links.lww.com/CM9/A714].

Among all patients, the rate of correct answers for each of the five items about asthma was 79.9% (441/552), 61.6% (340/552), 50.5% (279/552), 52.2% (288/552), and 40.4% (223/552). Only 30.4% (168/552) correctly answered all five items, with 19.6% (108/552) knowing three to four items, and 50.0% (276/552) knowing two or less. Awareness was significantly lower for four of the five items in the poor adherence group, with the only exception being item 3 (all $P < 0.05$) [Supplementary Table 1, http://links.lww.com/CM9/A714]. The proportion of patients knowing about no more than two items was significantly higher in the poor adherence group ($P < 0.05$).

Significantly higher proportions of patients in the poor adherence group had been given short-acting bronchodilator inhalers (22.2% $vs.$ 13.7%, $\chi^2 = 6.716$, $P = 0.010$), combined oral compound methoxyphenamine (19.6% $vs.$ 11.9%, $\chi^2 = 6.199$, $P = 0.013$), and traditional Chinese medicine (6.2% $vs.$ 1.8%, $\chi^2 = 6.908$, $P = 0.009$) [Table 1]. That group also had a higher proportion of patients using four or more forms of medication (13.8% $vs.$ 2.5%, $\chi^2 = 23.497$, $P < 0.001$).

The participants chose reasons for poor adherence from a list of 13 possible causes. The causes that were given most often were: self-defined symptom improvement (31.9%, 176/552), forgetting to take medication (24.5%, 135/552), inconvenience of buying medicine (21.2%, 117/552), reluctance to use inhalers over a long period (17.2%, 95/552), fear of drug dependence (16.7%, 92/552), unreasonable drug prices (15.9%, 88/552), difficulty of long-term persistence (14.9%, 82/552), fear of side-effects (9.1%, 50/552), financial difficulties paying for medicines (5.6%, 31/552), finding it hard to use the device (5.4%, 30/552), unable to buy medicines continuously from the hospital (4.7%, 26/552), poor self-perceived efficacy (3.6%, 20/552), and inconvenience of carrying the device (2.7%, 15/552). A significantly higher proportion of patients in the poor adherence group than the good adherence group cited self-defined symptom improvement (47.6% $vs.$ 16.2%, $\chi^2 = 62.612$, $P < 0.001$), forgetting to take medication (37.8% $vs.$ 11.2%, $\chi^2 = 52.957$, $P < 0.001$), reluctance to use inhalers over a long period (25.1% $vs.$ 9.4%, $\chi^2 = 23.887$, $P < 0.001$), fear of drug dependence (22.5% $vs.$ 10.8%, $\chi^2 = 13.636$, $P < 0.001$), difficulty of long-term persistence (24.4% $vs.$ 5.4%, $\chi^2 = 39.173$, $P < 0.001$), finding it hard to use the device (8.4% $vs.$ 2.5%, $\chi^2 = 9.147$, $P = 0.002$), and poor self-perceived efficacy (5.5% $vs.$ 1.8%, $\chi^2 = 5.263$, $P = 0.022$) [Supplementary Table 3, http://links.lww.com/CM9/A714].

Long-term treatment adherence is generally considered to be a problem in patients with chronic diseases. There have been few studies on asthma treatment adherence in China. However, the proportion of asthma patients with poor adherence reported in studies in other countries was between 24% and 81%,[4] probably because of different research populations and adherence criteria. Shanghai is one of the most developed cities in China, with a good medical and healthcare system. Both the asthma treatment level and the availability of asthma medication reflect this. However, we found that only 50.2% of patients showed good asthma treatment adherence, which is not satisfactory. Patients aged 18 to 30 years showed lower treatment adherence than patients over 50 years old, indicating that at least in Shanghai, younger patients pay less attention to asthma prevention. A systematic analysis of 51 studies by Dima et al[2] also showed that young people were the main group of adult asthma patients with poor adherence to treatment. These results suggest that medical teams should pay more attention to asthma education among younger people. Treatment adherence is closely related to efficient communication between physicians and patients.[5] The adherence of patients from expert outpatient clinics was better. This suggests that the experts may have been better at communicating with patients, or that patients had more trust in experts than physicians in the general or specialist outpatient clinics. Unexpectedly, the patients treated in the

Table 1: Use of asthma medications in the poor adherence and good adherence groups (n [%]).

Items	Total (n = 552)	Poor adherence group (n = 275)	Good adherence group (n = 277)	χ^2	P
Inhaled corticosteroid aerosol	24 (4.3)	13 (4.7)	11 (4.0)	0.190	0.663
Fluticasone/salmeterol	260 (47.1)	128 (46.5)	132 (47.7)	0.068	0.794
Budesonide/formoterol	262 (47.5)	132 (48.0)	130 (46.9)	0.063	0.802
Short-acting bronchodilators	99 (17.9)	61 (22.2)	38 (13.7)	6.716	0.010
Combined leukotriene receptor antagonist	173 (31.3)	92 (33.5)	81 (29.2)	1.138	0.286
Combined oral compound methoxyphenamine	87 (15.8)	54 (19.6)	33 (11.9)	6.199	0.013
Combined oral theophylline	13 (2.4)	7 (2.5)	6 (2.2)	0.086	0.769
Combined oral glucocorticoids	13 (2.4)	9 (3.3)	4 (1.4)	2.007	0.157
Traditional Chinese medicine	22 (4.0)	17 (6.2)	5 (1.8)	6.908	0.009
Single drug	278 (50.4)	134 (48.7)	144 (52.0)	0.585	0.444
Two drugs	170 (30.8)	75 (27.3)	95 (34.3)	3.194	0.074
Three drugs	59 (10.7)	28 (10.2)	31 (11.2)	0.147	0.701
Four or more drugs	45 (8.2)	38 (13.8)	7 (2.5)	23.497	<0.001

specialist asthma outpatient clinic had poorer adherence than those in the general outpatient clinic. This suggests that the specialist clinics were ineffective and did not play their expected role in the treatment of asthma. In Shanghai, expert outpatient clinics usually limit the number of patients. This ensures that the clinicians have enough time to communicate with asthma patients. However, other kinds of clinics including specialist outpatient clinics, do not have this limitation, which may influence treatment adherence.

The REALISE study concluded the lack of understanding of the need for sustained treatment or the benefits of long-term treatment is a major factor leading to poor treatment adherence in asthma patients.[6] The five items of asthma perception in this study also focused on understanding of the importance of long-term and sustained treatment for asthma. Patients with poor adherence had less knowledge of asthma, and their awareness rates across the five items were 4.3% to 18.5% lower than those of patients with good treatment adherence. A correct understanding of the necessity for asthma treatment may help to improve treatment adherence and therefore asthma control.

In terms of asthma medications, patients with excessive prescription of short-acting bronchodilators had significantly lower adherence to treatment. Patients with non-standard treatment, such as oral compound methoxyphenamine or traditional Chinese medicine treatment, also had significantly lower treatment adherence, as did those who used four or more kinds of medication. This may be because short-acting bronchodilators provide temporary symptom relief, which adversely affects adherence to anti-inflammatory treatment. Different doses, forms, and uses of drugs may increase the complexity of medication, resulting in poor adherence.

In this study, people were most likely to cite "self-defined symptom improvement" as the reason for poor adherence. A Spanish study that monitored adherence to asthma treatment by telephone visits had similar findings.[5] It is therefore important to improve the communication between physicians and patients to ensure that patients are aware of the gap between their own perception and the actual status of their disease, and to enhance awareness of standardized treatment of asthma. However, this was a cross-sectional observation and other potential factors should be studied in the future.

In conclusion, asthma treatment adherence is not ideal in Shanghai. Reasons for poor adherence are varied, and in this study the main reasons appeared to be lack of awareness about the need for long-term treatment of asthma, self-defined symptom improvement, being relatively young, not being treated and followed up in expert clinics, irregular medication or using too many types of drugs. Clinicians need to be patient-centered, communicate with patients individually, and comprehensively analyze patients' adherence. This would enable them to take measures to improve overall treatment efficacy.

Conflicts of interest

None.

References

1. Global Strategy for Asthma Management and Prevention. Fontana: Global Initiative for Asthma (GINA); 2019. Available from: http://www.ginasthma.org/. [Accessed October 11, 2020]
2. Dima AL, Hernandez G, Cunillera O, Ferrer M, de Bruin M. ASTRO-LAB Group. Asthma inhaler adherence determinants in adults: systematic review of observational data. Eur Respir J 2015;45:994–1018. doi: 10.1183/09031936.00172114.
3. Chiu KC, Boonsawat W, Cho SH, Cho YJ, Hsu JY, Liam CK, et al. Patients' beliefs and behaviors related to treatment adherence in patients with asthma requiring maintenance treatment in Asia. J Asthma 2014;51:652–659. doi: 10.3109/02770903.2014.898772.
4. Engelkes M, Janssens HM, de Jongste JC, Sturkenboom MC, Verhamme KM. Medication adherence and the risk of severe asthma exacerbations: a systematic review. Eur Respir J 2015;45:396–407. doi: 10.1183/09031936.00075614.
5. López-Viña A, Giner J, Molina J, Palicio J, Plaza J, Quintano JA, et al. Multidisciplinary consensus on the nonadherence to clinical management of inhaled therapy in Spanish asthma patients. Clin Ther 2017;39:1730–1745.e1. doi: 10.1016/j.clinthera.2017.06.010.
6. Price D, David-Wang A, Cho SH, Ho JC, Jeong JW, Liam CK, et al. Asthma in Asia: physician perspectives on control, inhaler use and patient communications. J Asthma 2016;53:761–769. doi: 10.3109/02770903.2016.1141951.