RESEARCH ARTICLE

Medication adherence and quality of life among asthmatic patients in primary care in Indonesia

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Abstract

Background: Asthma is a chronic disease that occurs in various ages, either in developed or developing countries, causing the disturbance in daily life. The absence of asthma symptoms before an attack potentially leads to medication non-adherence behaviour. **Objectives:** This study aimed to assess medication adherence of asthmatic patients and analyse the relationship with quality of life. The asthmatic patients who were smokers were also identified. **Methods:** A cross-sectional study using the survey method was conducted. Medication Adherence Rating Scale (MARS-A) was used to measure adherence, and The Asthma Quality of Life Questionnaire (AQLQ) was used for measuring the quality of life. **Results:** 80 asthmatic patients from ten primary health care centers in Surabaya participated in this survey, predominantly female (56, 70.0%) and 45- 54 years of age (27, 33.8%). There were eight (10.0%) participants who were smokers. Most asthmatic patients were categorised to have intermittent asthma (41, 51.2%) and mostly received oral short-acting beta$_2$-agonist (56, 41.0%). Fully adherence behaviour was only detected in 12 patients (15.0%). Most patients had a moderate quality of life (66, 82.5%). There was a low and positive relationship between adherence and quality of life (r = 0.296, *p* = 0.008). **Conclusions:** Because medication adherence is linked to quality of life, health care providers should encourage adherence among asthmatic patients. The quality of life of asthmatic patients in primary care should be improved by further research. Also, there were asthmatic patients who were smokers who needed more help quitting.

Introduction

Asthma is a medical problem that impairs airway function, causing difficulty in breathing. It is a chronic disease that affects patients of various ages and countries, both in developed and developing countries. The number of patients with asthma has been increasing. In 2025, it is estimated that more than 400 million people will have asthma (Global Asthma Network, 2014). Its symptoms, such as wheezing, chest tightness, and shortness of breath (Sorkness & Blake, 2017), potentially disturb the patient's quality of life. The asthma symptoms could be diminished even without medications, and sometimes they did not exist for several weeks or months. Nevertheless, asthma exacerbation could happen unexpectedly (Global Initiative for Asthma, 2017).

The World Health Organization noted that medication adherence among asthmatic patients ranged between 30 - 40% (Sumino & Cabana, 2013). In a study from 328 elderly asthmatic patients, only 37% adhere to the corticosteroids inhalation prescribed (Brooks *et al.,* 2014). Another study found that the suboptimal rate of adherence of adult asthmatic patients who were in inhaled medication therapy was more than 50% (Murphy *et al.*, 2012).

Besides its lousy impact on lung function, smoking could decrease the response of inhaled corticosteroids (Chalmers, 2002). Based on a study, compared with non-smokers, the mild persistent asthmatic patients who were smokers became less sensitive to the low dose of inhaled corticosteroids that were given in 12 weeks (Tomlinson *et al.*, 2005). Moreover, asthmatic patients who were smokers tend to have a low quality of life and experience worse asthma symptoms compared to non-smoker asthmatic patients (Tan *et al*., 2012).

Since the ultimate goal of therapy of asthma is to increase patients' quality of life (QoL), it is vital to know

the QoL of patients with asthma. QoL in patients with asthma could be considered in several aspects, including activity limitation, asthma-related symptoms, emotional function, and environmental exposure (Juniper *et al.*, 1993). The status of an asthma condition, which is controlled or uncontrolled, the severity of asthma, and smoking status were predictors of decreased quality of life in a patient with asthma (Lomper *et al.*, 2016). Another study suggested that age, gender, asthma severity, asthma control and ability to participate in social roles or activities as predictors of the quality of life of patients with asthma (Stucky *et al.*, 2015).

Finding the relationship of QoL with medication adherence is also essential to find different strategies to increase QoL. This study would like to identify medication adherence and quality of life of asthmatic patients, reveal the relationship between medication adherence and quality of life, and identify asthmatic patients who are smokers.

Methods

Study design

A cross-sectional study using the survey method was performed. This study was conducted from April to September 2018. The inclusion criteria were those diagnosed as patients with asthma at least two months, aged more than 18 years, and willing to participate by filling out an informed consent form. The study protocol was approved by the Health Research Ethics Committee, Faculty of Public Health Airlangga University, with approval number 425-KEPK.

Data collection, instrument, and statistical analysis

Data collection was conducted in ten primary cares in Surabaya, with the highest number of asthmatic patients. The sampling frame was from the record of asthmatic patients' visits in January 2018. Simple random sampling was performed, and then a home visit to the respondent was conducted. The sample size was calculated using the formula below (Hulley *et al.,* 2013). This calculation yielded a sample size of 29 respondents.

$$N = [(Z_\alpha + Z_\beta) \div C]^2 + 3.$$

With N = sample size; Z_α = normal standard deviation for α (1,96); Z_β = normal standard deviation for β (0,84); C = 0,5 x ln [(I+r)/(I-r)] with r = 0.5 (from other study that found that the correlation of adherence and quality of life in patients with asthma was 0.58 (Fitri *et al.*, 2016)); r = correlation coefficient

The asthma severity was classified based on the National Heart, Lung and Blood Institute (2007), which counted for the frequency of asthma attacks day and night and also how far the symptoms related to asthma disturb patients' daily activity. There were four categories; intermittent, mild, moderate, and severe asthma. Following the demographic and clinical information related to asthma, there were two instruments used for measuring adherence and quality of life; The Medication Adherence Report Scale for Asthma (MARS-A) and the Asthma Quality of Life Questionnaire (AQLQ) that have had permission to use from the developers. MARS-A was a validated questionnaire with a good relationship with the adherence measured by metered-dose inhaler and showed a consistent a-Cronbach of 0.85 (Cohen, 2009). MARS-A had a 5-Likert Scale from never, rarely, sometimes, often, and always (Horne, 2002). There were ten items, with each score ranging between 1 to 5. Then the average score of the ten items was categorised as fully adhering to the medication treatment with an average score $\geq$ 4.5, and < 4.5 was categorised as not fully adhering (Cohen *et al.*, 2009). MARS-A questionnaire used in this study was in the Indonesian language version, which has been validated by another study (A'yun *et al.*, 2014).

The AQLQ instrument used in this study was the Indonesian version which was obtained directly from the developer (Dr Juniper). AQLQ used four types of responses; each used the 7-Likert Scale with different options (Juniper *et al.*, 1993). The reliability test showed high consistency with Cronbach-a 0.95. Each item scored 1 to 7, then the average score was calculated. The average score of 1 < 3 was categorised as bad, 3 to 6 was moderate, and 6 to 7 was good quality of life (Leidy & Coughlin, 1998). The survey kit also consisted of a research explanation sheet and an informed consent form. Descriptive analyses such as respondents' characteristics and clinical profiles were performed in frequency and percentage. A normality test was conducted before performing a correlation between medication adherence and quality of life. All significant level was at $p < 0.05$. The correlation coefficient was classified as very weak (0 - 0.19); weak (0.2 - 0.39); moderate (0.4 - 0.59); strong (0.6 - 0.79); and very strong (0.8 - 1) (BMJ, 2021).

Results

Eighty respondents participated in this survey. The validity and reliability of the Indonesian version of instruments were tested on 52 people who matched the inclusion criteria of this study. The MARS-A instrument was valid with the r_{xy} of all items, ranging

between 0.292 - 0.836, higher than the r table of product-moment of 0.273 (α = 0.05, df = 50). This instrument also had good reliability with Cronbach-α 0.831. AQLQ also had good validity with r_{xy} ranging between 0.346 - 0.868 and good reliability with Cronbach-α 0.957. Since all instruments showed good validity and reliability, respondents who were participated in the pilot study were then included in data analysis.

More than half of participants were females (56, 70%), mostly were 45 - 54 years of age (27, 33.8%), had Junior High School as their highest education (26, 32.5%). Almost all participants had Indonesian Government Insurance (BPJS) (77, 96.3%), most were in the subsidised category (socio-demographics profiles were shown in Table I). Unfortunately, asthmatic patients, who were smokers, were found in eight (10%) respondents. Most asthmatic patients in this survey have had asthma for more than three years, and most of them were in the intermittent category (41, 51.2%). Table II shows that most of them did not have a comorbid disease (40, 43.0%). Asthma medications used by participants were either in the form of tablets or inhalers. The most medicines used was salbutamol tablet (56, 41.8%) (Table III).

Table I: Socio-demographic profiles of the respondents (N=80)

Data demographic		n (%)
Age	18-24	4 (5.0)
	25-34	5 (6.3)
	35-44	10 (12.5)
	45-54	27 (33.8)
	55-64	19 (23.8)
	65-74	15 (18.8)
Gender	Male	24 (30.0)
	Female	56 (70.0)
Occupation	Unemployed (housewife)	40 (50,0)
	Government employee	1 (1.3)
	Private-employee	9 (11.3)
	Self-employed	12 (15.0)
	Retired	4 (5.0)
	Student	2 (2.5)
	Others (unemployed, laborer)	12 (15.0)
Education	Junior High School or less	45 (56.3)
	Senior High School	25 (31.3)
	College/University	10 (12.5)
Health Insurance	BPJS (Government Insurance)-Subsidised	50 (62.5)
	BPJS (Government Insurance)-Non subsidised	27 (33.8)
	None	3 (3.8)

Table II: Disease profile of respondents (N=80)

Disease profile		n (%)
Asthma severity	Intermittent	41 (51.2)
	Mild persistent	30 (37.5)
	Moderate persistent	7 (8.8)
	Severe persistent	2 (2.5)
Had asthma since	<1 year	6 (7.5)
	1-3 year	13 (16.3)
	>3 year	61 (76.3)
Smoking status	Non-smoker	56 (70.0)
	Smoker	8 (10.0)
	Ex-smoker	16 (20.0)
Comorbid	None	40 (43.0)
	Hypertension	18 (19.4)
	Others (hyperuricemia, Vertigo, Osteoporosis)	11 (11.8)
	Diabetes	8 (8.6)
	Hypercholesterolemia	6 (6.4)
	Gastritis	6 (6.4)
	Heart Disease	4 (4.3)

Tabel III: Asthma medication used by participants (N=80)

Asthma medication	Route	n (%)
Salbutamol	Oral	56 (41.8)
Teophilin + Salbutamol (Teosal)	Oral	6 (4.5)
Prednison	Oral	1 (0.8)
Fenoterol HBr (Berotec)	Inhalation	27 (20.1)
Salbutamol (Ventolin)	Inhalation	18 (13.4)
Budesonide + Formoterol (Symbicort)	Inhalation	14 (10.4)
Salmoterol + Fluticasone (Seretide)	Inhalation	10 (7.5)
Tiotropium bromide (Spiriva)	Inhalation	2 (1.5)
Total		**134[T] (100)**
Reliever only		0 (0)
Controller only (single or multiple drugs)		41 (51.3)
Reliever and Controller		39 (48.8)
Total		**80 (100)**

[T]*One patient could use more than one medication*

From this study, asthmatic patients who fully adhered to the medication were only 12 participants (15.0%). As shown in Table IV, most participants had a moderate quality of life (66, 82.5%). Because of the normality test showed that the data was normal, then Pearson Correlation was performed to analyse correlation. It was found that there was a significant relationship between adherence to treatment and the quality of life of asthmatic patients (p = 0.008) with an r of 0.296, which was a positive and weak correlation.

Tabel IV: Medication adherence and quality of life score (N=80)

Instrument	Mean score	Category	n (%)
MARS-A	< 4,5	Not fully adhere	68 (85.0)
	≥ 4,5	Fully Adhere	12 (15.0)
AQLQ	1 < 3	Poor	3 (3.8)
	3 < 6	Moderate	66 (82.5)
	6 - 7	Good	11 (13.8)

Discussion

Medication Guideline for Asthma issued by the Global Initiative for Asthma recommends using short-acting beta$_2$ agonist (SABA) or low dose corticosteroid inhalation. Oral SABA and theophylline are the choices. However, those medicines are not recommended to be used regularly (Global Initiative for Asthma, 2017). Furthermore, several Asthma Therapy Guidelines do not recommend oral SABA because of more prolonged onset of action, higher risk of adverse reaction and sleep disturbance, narrow index of therapy, and high variation in the absorption rate in the gastrointestinal (National Asthma Council Australia, 2006; Singapore Ministry of Health, 2008). In Indonesia, oral salbutamol was still common since the Indonesian primary health care centres used the Guideline of Basic Therapy for Asthma in Primary Care issued by the Indonesian Ministry of Health that included the oral salbutamol as essential therapy for asthma (Indonesian Ministry of Health, 2008). Moreover, the primary health care centre is in the first level of healthcare facilities based on Indonesian Government Insurance, which does not provide salbutamol or other medicines in the inhalation route of administration in the formulary for primary care service (Indonesian Ministry of Health, 2016).

Asthma symptoms in intermittent and mild categories that were mainly found in asthma patients in primary care were relatively insignificant, and sometimes even no symptoms at all. Those patients might become non-adherers to their medication regimen by not using their controller medication as instructed. Several actions were done, including decreasing the dose or temporarily stopping using the medication. When asthmatic patients do not feel any symptoms, they may think they did not need to use their controller medication.

The moderate QoL that mostly happened in this study is a disappointment because most respondents had very mild asthma. According to another research, the level of asthma control, asthma severity, and smoking are predicted to reduce the quality of life in asthma patients (Lomper et al., 2016). However, in this study, the quality of life of asthmatic patients who were smokers was not a focus, although there was a

limitation to further analysis of the correlation in smoking status and QoL due to the very small number of smokers in this research. This study revealed the problem of asthma control by not fully adhering to the treatment. Furthermore, some asthmatic patients were smokers, which can trigger or exacerbate their conditions. The limitation of activities, sleep disturbance, and environmental factors could be improved by increasing medication adherence and stopping smoking. Smokers with asthma have a poor quality of life and have more significant asthma symptoms than non-smoking asthma patients (Tan *et al.*, 2012). The fact that there were asthmatic patients who were smokers should alarm health care providers, including pharmacists. When a pharmacist counsel patient with asthma and finds that the patient is a smoker, the education and persuasion related to smoking cessation should immediately be started.

Based on the result of this study, improved adherence to the medication regimen will increase the quality of life of asthmatic patients. Pharmacists who deliver the medication to the patients should pay more attention to the proper medication use and adherence to the medication regimen. The education that is informing asthmatic patients that adherence could increase the quality of life should be given to the asthmatic patients, even for asthmatic patients with very mild asthma conditions. Information that adheres to the treatment can decrease activity limitation, enhance sleep, and lower worries regarding the disease exacerbation, potentially increasing medication adherence. Smoking cessation education and promotion should be started as early as possible to prevent asthmatic smokers from having lower lung function and disease complications.

The study limitation in this research was the number of respondents who were smokers was very small. There were only eight respondents, and most of them were in the intermittent category (seven respondents, 87.5%); thus, it was difficult to analyse the correlation between QoL among asthmatic patients based on their smoking status.

Conclusion

The authors conclude that there was a relationship between adherence to treatment and the quality of life of asthmatic patients. Healthcare providers need to evaluate patient's adherence whenever possible, specifically for a pharmacist, there is opportunity to assess medication adherence while having conversation in the counseling session with patient with asthma, to quickly address if this problem exist and immediately plan the solution to increase

adherence in asthmatic patients Smoking cessation is also important for a smoker with asthma. Thus, it needs to be promoted as well.

Acknowledgement

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