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Abstract

Objectives Medication non-adherence mostly occurs in patients with a wide range of disease severity, including asthma. The aim of the study was to assess the self reported adherence to asthma therapy and investigate the relationship between adherence, asthma control and asthma-related quality of life. Methods The study was a cross-sectional study in which participants were recruited from an outpatient department, in one hospital in Surabaya. Patients (aged ≥18 years) with asthma who had used any regular asthma medications were included. Standardised questionnaires, including Juniper's Asthma Control Questionnaire (ACQ), Adherence to Refills and Medications Scales (ARMS) and Juniper's Asthma Quality of Life Questionnaire (AQLQ) were used. Results A total of 82 adults with asthma were recruited in the study. Male participants' mean age was 49.13 ± 14.10 years (n = 23). Approximately 59 participants (72.0%) were females, 30 participants (36.5%) were using Budesonide inhaler, and 73 participants (89.0%) never smoked. The mean of ACQ, AQLQ, and ARMS scores were 1.62 ± 1.19, 4.96 ± 1.24, and 16.98 ± 4.12, respectively. Of 82 patients studied 53 (64.5%) had "uncontrolled asthma" and more than 85% participants both showed "non adherence" to asthma therapy and nearly 46% of them indicated that their quality of life was affected by asthma. There was a significant association between ACQ and AQLQ (p<0.05), whereas no statistically significant association was found between ACQ and ARMS. Conclusions The majority of patients reported non-adherence to asthma medications. Poor controlled asthma has been associated with lower asthma-related quality of life.

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The correlation between self-related adherence, asthma-related quality of life and control of asthma in adult patients

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Abstract

Objectives: Medication non-adherence mostly occurs in patients with a wide range of disease severity, including asthma. The aim of the study was to assess the self reported adherence to asthma therapy and investigate the relationship between adherence, asthma control and asthma-related quality of life.

Methods: The study was a cross-sectional study in which participants were recruited from an outpatient department, in one hospital in Surabaya. Patients (aged ≥ 18 years) with asthma who had used any regular asthma medications were included. Standardised questionnaires, including Juniper's Asthma Control Questionnaire (ACQ), Adherence to Refills and Medications Scales (ARMS) and Juniper's Asthma Quality of Life Questionnaire (AQLQ) were used.

Results: A total of 82 adults with asthma were recruited in the study. Male participants' mean age was 49.13 ± 14.10 years ($n = 23$). Approximately 59 participants (72.0%) were females, 30 participants (36.5%) were using Budesonide inhaler, and 73 participants (89.0%) never smoked. The

mean of ACQ, AQLQ, and ARMS scores were 1.62 ± 1.19 , 4.96 ± 1.24 , and 16.98 ± 4.12 , respectively. Of 82 patients studied 53 (64.6 %) had "uncontrolled asthma" and more than 85% participants both showed "non adherence" to asthma therapy and nearly 46% of them indicated that their quality of life was affected by asthma. There was a significant association between ACQ and AQLQ ($p < 0.05$), whereas no statistically significant association was found between ACQ and ARMS.

Conclusions: The majority of patients reported non-adherence to asthma medications. Poor controlled asthma has been associated with lower asthma-related quality of life.

Keywords: adherence; asthma; asthma control; quality of life.

Introduction

Asthma is defined as a chronic inflammatory disorder characterised by symptoms such as recurrent wheezing episodes, breathlessness, chest tightness, dyspnoea and coughing, especially at night or in the early morning [1, 2]. Asthma is one of the most severe public health problems among adolescents and children worldwide. According to World Health Organization (WHO) and Global Initiative for Asthma (GINA) asthma affects as many as 300 million people of all ages and ethnic backgrounds and it is estimated that the number is increased by 2025 [3]. The prevalence of Indonesian adolescents with asthma is poorly known. However, although the number may not be as large as other countries globally, asthma remains one of the public health problems affecting both adults and children in Indonesia.

When asthma is uncontrolled, it puts severe limitations on daily living and sometimes could even be fatal. Asthma affects people in specific ways, as the impact could impair in physical activity and educational lives. Asthma could also have an impact on social aspects, including the contribution to school absenteeism, loss of productivity and the limitation of participation in family and social life [3, 4].

The assessment of asthma based on morbidity and mortality outcomes is currently insufficient. Therefore, outcomes

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assessment based on patient-oriented assessment has been widely recognised in the last decades. Compliance in medication, asthma control and quality of life (QoL) have emerged as vital outcomes for improving asthma management and communication tools between patients and their healthcare professionals [5–8].

The aim of asthma management is to achieve and maintain adequate asthma control, which can be assessed by measuring asthma symptom severity, the frequency of asthma-related exacerbations and QoL-related asthma [3]. Adherence to medications is one of the main factors in the successful management of asthma [9]. The World Health Organization–Quality of Life Group (WHOQOL) has described as an “individuals” perception of their role in life in the context of the culture and values systems in which they live and of their goals, expectations, standards and concerns [5]. Therefore, QoL is additional outcomes in assessing and measuring health clinical outcomes and interventions, particularly in patients with asthma [10–12].

The study aimed to evaluate self-reported adherence to asthma therapy and to examine the association between adherence, asthma control and asthma-related QoL. This study also aimed to describe the characteristics of patients with poor asthma control and poor adherence based on socio-demographic factors.

Materials and methods

The study was designed as a cross-sectional study with the study period was conducted from August 2017 to July 2019. The hospital’s ethics committee approved the design and procedures of the study. Participants were recruited from the outpatient pulmonology department at a university-affiliated hospital in Surabaya, Indonesia. This study’s eligibility requires asthma patients who have used any daily asthma medications in the previous 12 months, who were 18 years and older, and who speak Indonesian. Patients with chronic respiratory diseases other than asthma such as bronchiectasis or chronic bronchitis, emphysema or if they were unable or contraindicated to spirometer were excluded. Patients signed a written informed consent upon participated in the study.

The self-administered questionnaires contained questions about socio-economic and demography characteristics (i.e., age, gender, education and employment). Additional questions were asked about the history of asthma, smoking status, medicine used, and type of inhaler and comorbid conditions. Asthma control has been measured using the Juniper Asthma Control Questionnaire (ACQ) [13]. The ACQ consists of six questions about asthma symptoms and one question about lung function (FEV_1), with ACQ score 1.5 or higher is graded as “not-well controlled” [14]. The Juniper’s Asthma Quality of Life Questionnaire (AQLQ) score [15] was used to measure the quality of life. The AQLQ is a 32-item disease-specific questionnaire designed to assess the functional impairments that are most troubling for adults with asthma [16]. Participants were asked to recall their experiences over the past two weeks

and to rate each question on a 7-point scale (7 = not impaired at all, 1 = severely impaired), which the overall score of AQLQ (scores range 1–7) is the mean answer to all 32 questions with higher scores suggesting better quality of life [16]. The adherence to asthma treatment was assessed as self-reported using the Adherence to Refills and Medications Scales (ARMS) questionnaire [17]. ARMS consists of 12 questions designed for the response on a Likert Scale answer with the response of “none”, “some”, “most” or “all” of the time, which were given values from 1 to 4, with higher scores indicating higher “non-adherence” [17]. Lung function (pre-bronchodilator FEV_1) was tested using a computerised spirometer (Jaeger, v.4.31, Germany) by a trained respiratory nurse at the Department of Pulmonology.

Data were analysed using the Statistical Package for the Social Sciences, version SPSS version 22.0 (IBM SPSS Statistics for Windows, Armonk, NY, USA). Categorical variables were presented as frequency and proportion. Means, standard deviations and frequencies are presented to explain the characteristics of the study sample. Descriptive statistics have been used to summarise the results. We used the chi-square test to determine the statistical significance between the categorical variables and to compare the means of the quantitative data used in the Student’s t-test. We conducted stepwise multiple regression and path analysis to test the simultaneous and causal relationship between study variables. Logistic regression approaches with forwarding step-by-step conditional methods have also been performed. The odds ratio (OR) from this analysis is the OR for getting low QoL affected by asthma. Selected non-collinear variables with a $p < 0.10$ have been introduced in the binary logistic regression. The significance level was set at $p < 0.05$, with all probabilities reported were two-tailed.

Results

The results of this study are based on baseline data of previous RCT study to evaluate the effectiveness of education management by the pharmacist in adults with asthma. In two years of study, 110 eligible subjects were screened in the study. Ten patients declined to participate, and 18 patients were excluded because they had another chronic pulmonary disease. Therefore, 82 adults with asthma were included in this study. Table 1 explains the characteristics of participants, including demographic and socioeconomic profile. Of the 82 enrolled participants enrolled, 72% ($n = 59$) were female. Mean age was 49.13 ± 14.10 for male and 52.58 ± 11.57 for female. As more participants were female, nearly 50% were housewives. The majority of the participants had basic or secondary school education, 64.6% ($n = 53$), and nearly 70% ($n = 57$) belonged to monthly gross household income less than three million rupiahs.

Clinical characteristics of the subjects

About 73 (89.0%) patients were never smoked, and most of them had been diagnosed with asthma for more than five years. These data are included in Table 2, which indicates

Table 1: Demographic and socioeconomic characteristics of study participants (n = 82).

Items	Categories	n, %
Gender	Male	23 (28.0)
	Female	59 (72.0)
Age, mean ± SD	Male	49.13 ± 14.10
	Female	52.58 ± 11.57
Height in cm, mean ± SD	Male	166.89 ± 4.58
	Female	151.95 ± 11.57
Weight in kg, mean ± SD	Male	69.89 ± 12.66
	Female	59.73 ± 14.51
Occupation	Public employee	3 (3.7)
	Private	26 (31.6)
	Self-employed	9 (11.0)
	Housewives	40 (48.8)
	Others	4 (4.9)
Education	Basic or secondary school	53 (64.6)
	Diploma	6 (7.3)
	Higher education	23 (28.1)
BPJS ^a membership	Yes	81 (98.8)
Income	<IDR ^b 3,000,000	57 (69.5)
	IDR 3,000,000–6,000,000	20 (24.4)
	6,000,000	2 (2.4)
	IDR 6,000,000–12,000,000	3 (3.7)
	Do not want to disclose	

^aBPJS, badan penyelenggara jaminan sosial; ^bIndonesian rupiah.

the clinical characteristics of the study. Regarding the level of asthma control, only 35.4% (n = 29) of the participants exhibit well-controlled asthma while the rest showed poorly controlled asthma. More than half of the participants (n = 45) experienced that their QoL was affected by asthma. At the same time, the medication adherence score showed low adherence in all participants (n = 82). Budesonide – Formoterol was asthma medication used by most of the patients. The chi-square analysis showed no significant difference in the control of asthma and adherence to medications was found based on the socio-demographic factors, including gender, educational level and age.

The relationship between medication adherence, asthma control and asthma-related quality of life

We looked at the potential independent variables (overall ACQ and ARMS scores) and the dependent variable (overall AQLQ score) to analyse the variables' relationship. There was a direct association between AQLQ and ACQ scores, although no correlation was found between ARMS and AQLQ scores and between ARMS and ACQ scores. A linear

Table 2: Clinical characteristics of study participants (n=82).

Items	Categories	n, %
Asthma medication used	Budesonide – Formoterol	30 (36.5)
	Salmeterol – Fluticasone	8 (9.7)
	Fenoterol	3 (3.6)
	Budesonide – Formoterol & Salbutamol	10 (12.1)
	Budesonide – Formoterol & Fenoterol	14 (17.0)
	Budesonide – Formoterol, Tiotropium	1 (1.2)
	Budesonide – Formoterol, Fenoterol, Tiotropium	5 (6.0)
	Salmeterol – Fluticasone & Salbutamol	8 (9.7)
	Others	3 (3.6)
	MDI ^e	3 (3.6)
	Asthma medication dosage form	Turbuhaler
Turbuhaler & MDI		24 (29.2)
Turbuhaler & Handihaler		1 (1.2)
Turbuhaler, MDI, Handihaler		5 (6.0)
Accuhaler		8 (9.7)
Accuhaler & MDI		8 (9.7)
Others		3 (3.6)
No		55 (93.2)
Changes in asthma medication in the last month	One week ago	17 (20.7)
	Two weeks ago	7 (8.5)
	Three weeks ago	4 (4.8)
	One month ago	54 (65.8)
Last visit to GPs/Primary care centres/Emergency Department	Regular visit for asthma control	45 (54.8)
	Asthma episode	15 (18.2)
	Other medical conditions	22 (26.8)

Table 2: (continued)

Items	Categories	n, %
Last experience of asthma symptoms/period (breathless)	Never	22 (26.8)
	One month ago	7 (8.5)
	Two weeks ago	3 (3.6)
	One week ago	13 (15.8)
	Less than a week	37 (45.1)
Smoking	Never	73(89.0)
	Yes	9 (11.0)
Level of asthma control	Well-controlled	29 (35.4)
	Poor-controlled	53 (64.6)
Level of adherence	High adherence	0 (0.0)
	Low adherence	82 (100.0)
QoL ^a related to asthma	QoL affected	37 (45.1)
	QoL unaffected	42 (51.2)
Comorbidities	Yes	23 (30.7)
	Other chronic diseases	
	Diabetes	12 (14.6)
	Hypertension	7 (8.5)
	Diabetes & Cardiovascular	2 (2.4)
	Diabetes & Hypertension	2 (2.4)
	None	59 (71.9)
^b FEV ₁ (mL/s) – pre bronchodilator, mean ± SD	1.52 ± 0.66	
ACQ ^c score, mean ± SD	1.62 ± 1.19	
ARMS ^d score, mean ± SD	16.98 ± 4.12	

^aQoL, quality of life; ^bFEV₁, forced expiratory volume in 1 s; ^cACQ, asthma control questionnaire; ^dARMS, adherence to refill medication scale; ^eMDI, metered dose inhaler.

regression confirm that the AQLQ scores of adults with asthma was found to be significantly inversely correlated with their asthma control scores, $r(n = 82) = -0.749$, $p < 0.05$, 95% CI $[-0.978$ to $-0.596]$, AQLQ scores = $6.094 - 0.787$ (ACQ scores). Logistic regression analysis identified that the model predicts the odds of having QoL affected with asthma is 0.075 lower ($p < 0.001$) for those with well-controlled than poorly controlled asthma.

Discussion

This cross-sectional study showed low medication adherence to in 82 patients with asthma (100.0%) who attended a large tertiary outpatient department at a university-affiliated hospital in Surabaya. While there was no statistically significant association between adherence to medications and asthma control in this study, most patients had poorly controlled asthma. This can be clarified as the consequence of having low adherence is affecting their asthma control. However, further study is required to confirm this association in a bigger population size. However, while age and income were considered as to be predictors for control of asthma, the demographic characteristics of participants such as level of education, gender and age were not significantly correlated

with poorly controlled asthma. These findings were similar to those of the Latvian asthma population [8]. The Latvian study confirms that instead of the demographic characteristics of patients, patients' concerns about the side effects of medications were more significant to the level of asthma control and the adherence to medications [8].

In regards to the association between asthma control and asthma QoL, our study's findings are supported by other international studies in Brazilian and Latvian asthma patients [6, 7]. Our study had comparable findings with the research performed by Amaral et al. [6] in Brazil, which showed a significant correlation between asthma control and asthma-related QoL which was in accordance with other international studies [18]. QoL can be affected by multiple factors in asthma patients, which tend to play a crucial role in optimising asthma self-management in patients [19, 20].

There are several self-reported scales for determining adherence to medications in chronic diseases; however, they depend on the nature of the disease; there is no gold-standard scale for evaluating adherence to medicines used [21]. Measurement of adherence using ARMS has advantages in easy to use, is valid and reliable as a method to assess adherence in chronic disease populations and is suitable for patients with low literacy [22, 23]. As a result, we recommend

the use of ARMS in Indonesian asthma patients as a tool to assess adherence to medications.

Our study had several limitations that need to be considered. This study used self-reported scales for measuring adherence, asthma control and asthma-related QoL, although these scales were validated in previous studies, the findings might not be precise and still subject to recall bias or self-presentational that could overestimate the scores. A combination of clinically objective measurement for adherence, such as biomarker and spirometer lung function for asthma control could be more reliable and objective [24–25]. The small sample size could explain the insignificant correlation between adherence and asthma control and adherence to QoL-related asthma in our study. Therefore, we suggest that the same techniques be applied to a more significant population. Moreover, future research directions are warranted to validate different asthma adherence scales, asthma control scores and other related self-assessment tools in a larger sample of Indonesian with asthma. This is to improve their efficiency and optimise their asthma self-management.

Conclusions

From this study, it can be concluded that poor asthma controlled was associated with lower asthma-related quality of life. Moreover, the majority of adults with asthma reported non-adherence to asthma medication in this study. Further study is needed to determine the effective method for improving adherence and optimising asthma management in adults with asthma.

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Ethical approval: The study has been approved by the human research ethics committee of Universitas Airlangga Hospital. All participants provide written informed consent at the time of enrollment.

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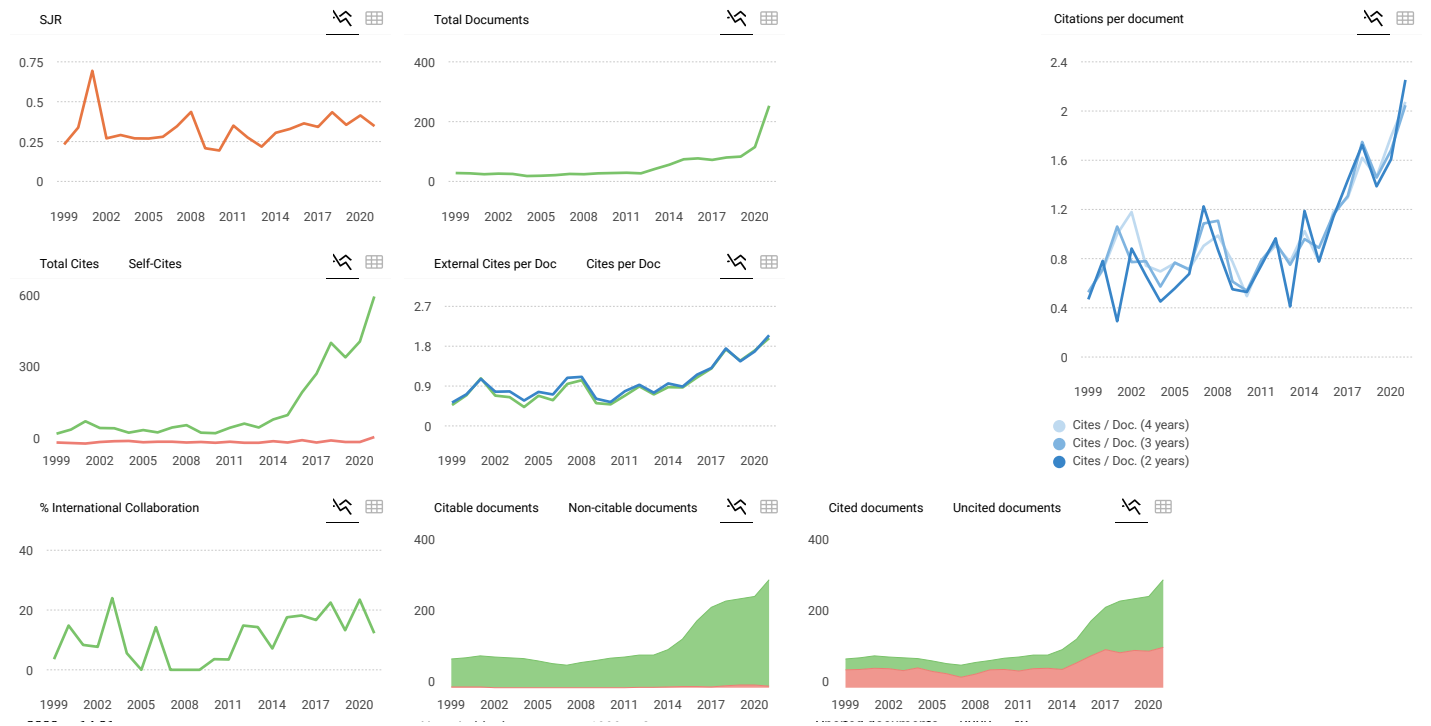


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