

Original Research

The Asthma Control Test (ACT) as Predictor of Asthma Exacerbation among Indonesian Hajj Pilgrims in 2018

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Abstract:

Objective: Every year, millions of Muslims from around the world gather in Saudi Arabia to perform Hajj. Before leaving for pilgrimage, Indonesian pilgrims go through various health examinations in Regional Primary Health Center (Pusat Kesehatan Masyarakat/ Puskesmas). Since there was no existing research on Asthma Control Test (ACT) assessment for pilgrims with bronchial asthma to predict asthma exacerbations during Hajj pilgrimage period, this cohort study was conducted to fill this gap. **Methods:** Pilgrims who suffered from asthma were recruited in Daerah Khusus Ibukota (DKI) Jakarta Province region in 2018. The degree classification of asthma in the ACT group was determined as uncontrolled, partially controlled, and fully controlled. ACT scores were calculated in Puskesmas and embarkation. Observation of asthma exacerbations in pilgrims while performing Hajj was performed by doctors. Data were analyzed with SPSS for Windows. **Results:** A total of 68 participants were included (46 female [67.6%]; 45 aged <60 years [66.2%]). At embarkation, the asthma classification based on the ACT was as follows: 36 (52.9%) and 13 (19.1%) pilgrims had partially controlled and uncontrolled asthma, and 17 (47.2%) and 8 (61.5%) of each group experienced exacerbation, respectively, with $p = 0.006$ for the ACT values at embarkation. The area under the curve value was 0.717 (95% CI; 0.596-0.838). **Conclusion:** There was increased asthma exacerbation incidence in the uncontrolled and partially controlled ACT groups at embarkation compared to the fully controlled ACT group. The ACT score was able to predict the occurrence of acute asthma exacerbation during Hajj period.

Keywords: Asthma, control, hajj.

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Introduction

The Hajj pilgrimage is the fifth pillar of Islam, which is once in a lifetime obligation for every Muslim who is able to fulfill it. The Qur'an, Surah Ali-Imran, verse 97 explains that doing Hajj is a human obligation to Allah for those who are able to travel to the holy land. The implementation of health services for Hajj pilgrims in Indonesia is outlined in the Regulation of the Health Minister of the Republic of Indonesia (PERMENKES RI) of 2016 (Number 15).² All Hajj pilgrims need to be physically fit enough to perform rituals activities because millions of pilgrims do so on the same day

and encounter many difficulties, such as strenuous activities and hot weather. To meet health criteria outlined in the regulation, early preparation must be carried out by Indonesian government. The pilgrimage period organized by the Ministry of Religion of the Republic of Indonesia lasted for 40 days, consisting of Hajj pilgrimage (in Mecca, Arafat, Mina and Muzdalifah) and worship in Medina.

Asthma exacerbation can be triggered by several factors, such as air pollution, respiratory infection, weather, food, and fatigue.³ The 2017 Hajj season coincided with extreme weather, with the highest

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air temperature reaching 55°C, which may trigger episodes of asthma exacerbation. In addition, air pollution can cause exacerbation in patients with a history of asthma.^{4,5,6} In 2017, Indonesia had the most pilgrims compared with other countries, amounting to 221,000 pilgrims.¹ A total of 36,044 of these pilgrims were diagnosed with acute respiratory tract infections. Respiratory diseases were the top two causes of death in Indonesian pilgrims in 2017. Asthma occupied the top ten diseases in the Indonesian Hajj Health office (Kantor Kesehatan Haji Indonesia/KKHI) referral from 2015 to 2017.²

Asthma Control Test (ACT) questionnaire was developed as a screening tool for simple and rapid assessment of asthma in clinical practice. The ACT is used as an asthma control measurement consisting of five questions that assess activity limitations, shortness of breath, nighttime symptoms, drug use, and overall health during the previous four weeks. The ACT was designed as an assessment tool for doctors to use in daily practice to predict asthma control in the previous 1 month.⁷ There is currently no research on the relationship between the ACT and exacerbation of asthma in Hajj pilgrims. For this reason, this research was conducted to explain the role of ACT score as predictor of asthma exacerbation among Hajj pilgrims.

Materials and Methods

This cohort study was conducted in several stages: at 30 Regional Primary Health Centers (Puskesmas) in Jakarta a few months before pilgrims departure, at Pondok Gede Jakarta Hajj Dormitory one day before their departure to Saudi Arabia, and during the pilgrimage in Saudi Arabia. This study was conducted from April to September 2018. Subjects were recruited if they met the inclusion criteria and consented to participate in the study. Subjects recruited from Integrated Pilgrims Computerization System (SISKOHAT) in 2018 that undergone two times health assessment in the Puskesmas as a government mandatory requirement for Indonesian Hajj pilgrims and diagnosed with bronchial asthma. All Indonesian pilgrims health data were stored in SISHOKAT. From the data, we evaluate their asthma once more at Puskesmas before their pilgrimage to Saudi Arabia to reassure that their asthma diagnosis were correct. As Global Initiative for Asthma (GINA) Guideline 2017, there are criteria that must be assessed to establish asthma diagnosis. 1) History

of variable respiratory symptoms like wheeze, shortness of breath, chest tightness and cough. People with asthma generally have more than one of these symptoms. The symptoms occur variably over time, vary in intensity and often worse at night or awake. Symptoms are often triggered by exercise, laughter, allergens or cold and occur or worsen with viral infections. 2) Evidence of variable expiratory airflow limitation. At least once during the diagnostic process when FEV₁% is low, document that the FEV₁/FVC ratio is reduced. The FEV₁/FVC ratio is normally more than 0,80 in adults. Another way is documentation of variation in lung function that is greater than in healthy people, such as FEV₁% increases by more than 12% and 200 ml after inhaling bronchodilator.¹³

Sample size

Sample size determined by two independent proportion calculation ($n = \frac{(Z_{\alpha} \sqrt{P_1Q_1} + Z_{\beta} \sqrt{P_2Q_2} + P_2Q_2)^2}{(P_1 - P_2)^2}$). n= minimal sample size. P₁ = standard effect proportion (from book). P₂ = research effect proportion (clinical judgment). α = level of significance; Z_α = 1,96 ; β = power; Z_β = 0,842. From the calculation then minimal sample size was obtained as 58 subjects.

Data collection

The data collected in this study included (1) Anamnesis (e.g. age, gender, occupation, education, smoking, history of asthma trigger/allergy before departure, comorbidities e.g. diabetes mellitus, hypertension, coronary heart disease); (2) General physical examination; (3) Spirometry test to determine the lung function (FEV₁, FEV₁%, FEV₁/FVC) and to help confirming diagnosis of asthma in the subjects. Spirometry test was carried out based on American Thoracic Society guideline.¹⁶ Researcher first gave example to the subjects on how to do the test. Spirometry was done 3 times before and 3 times after used of salbutamol inhaler. Patients did spirometry test in standing position and the best result was taken. (4) Assessment through the ACT during examination that did by researchers at Puskesmas and embarkation in Pondok Gede Hajj Dormitory to determine asthma control level from the subjects. We did examination and ACT score at Puskesmas approximately one month before embarkation. ACT value consists of 3 parts: not controlled, if score was 19 or less; partially controlled, if score between 20 and 24 and fully controlled, if score was 25.¹⁷ (5) Fitness level (VO₂ max) from Rockport Test or Six Minutes Walking Test that

already been done by the Puskesmas. VO_2 max value based on American Heart Association Cardiorespiratory Fitness Chart 1972.^{14,15} They are consisting of five level: very poor, poor, fair, good and very good. Researchers left an evaluation sheet with the subjects during their embarkation period in Pondok Gede Hajj Dormitory and required them to fill it out when their asthma became exacerbated during their Hajj.

Inclusion and exclusion criteria

This study inclusion criteria were pilgrims with bronchial asthma from the DKI Jakarta Province in 2018. Exclusion of the samples were as follows: a contraindication to spirometry examination, suffered from chronic lung diseases other than bronchial asthma (Chronic Obstructive Pulmonary Disease (COPD), lung tuberculosis or lung cancer), difficulty communicating (cognitive decline), an unwillingness to take part in the research, heart problems that limit physical activity, and limited movement due to certain diseases (history of stroke, severe osteoarthritis, etc). Subjects have been told to fill the informed consent form if agree to include in this study.

Determining asthma exacerbation

Indonesian Hajj Health Team (Tenaga Kesehatan Haji Indonesia/TKHI) responsible for health problems in their Hajj group. In the embarkation, researchers coordinate with TKHI to observe the subjects directly to determine asthma exacerbation during Hajj in Saudi Arabia. Exacerbation was determined in Saudi Arabia in three ways: 1) through direct visitations by researcher to the subjects in the hotel where subjects stayed and also follow up through whatsapp and telephone to subjects. 2) TKHI observation of asthma exacerbation to the subjects routinely everyday and 3) through analyzed records of the research questionnaire that was given to the pilgrims before their departure. From combining these three methods, then we determined whether subjects have asthma exacerbation or not. If there was questionnaire result that wasn't in accordance with asthma exacerbation that reported to researcher and also observation by TKHI, then the result of questionnaire will be confirmed whether it was valid or not by complete anamnesis and physical examination to the subject. Researcher and TKHI then collaborate to conclude if the exacerbation were valid or not, so the possibility of discrepancies between questionnaire result and researcher/TKHI observation could be minimized. Subjects were

considered exacerbated if they have symptoms that arise in the form of shortness of breath or dyspnea that varies from time and intensity and usually have triggers and can be accompanied by coughing or wheezing.

Statistical analysis

Data from the research results were recorded in research forms, validated and then processed using SPSS for Windows version 22. Basic characteristics of the research subjects will be presented in the table. Categorical data were presented in the form of quantities and percentages while numerical data will be presented in the form of mean with standard deviations if the distribution was normal and in the form of a median with maximum and minimum values if the data distribution wasn't normal. Relationship between ACT and asthma exacerbation variables were found using the chi-square method. Sensitivity and specificity were calculated using ROC curve.

Results

Out of 8,519 pilgrims from the DKI Jakarta Province that registered SISKOHAT in 2018, 72 had asthma. 2 pilgrims excluded because had tuberculosis and lung cancer, respectively. In addition, 2 pilgrims refused to include as subjects. As such, a total of 68 pilgrims with asthma were included in this research.

Characteristics of the research participants

In this study, there were 68 pilgrims with asthma. Table 1 shows the participants' characteristics.

Table I: Characteristics of Research Participants

Variable	n (%)	Median (min,max)/ Mean±SD
Age		
<60 years	45 (66.2)	
≥60 years	23 (33.8)	
Gender		
Male	22 (32.4)	
Female	46 (67.6)	
Education		
No formal education	2 (2.9)	
Elementary school	5 (7.4)	
Junior high school	5 (7.4)	
Senior high school/ equivalent	26 (38.2)	
Bachelor degree/ equivalent	25 (36.8)	

Variable	n (%)	Median (min,max)/ Mean±SD
Occupation		
Master degree	5 (7.4)	
Housewife	28 (41.2)	
Private employee	8 (11.8)	
Government employee	9 (13.2)	
Pensioner	12 (17.6)	
Other	11 (16.2)	
Primary Health Center Area		
Central Jakarta	11 (16.2)	
East Jakarta	28 (41.2)	
West Jakarta	6 (8.8)	
South Jakarta	16 (23.5)	
North Jakarta	7 (10.3)	
Result of Spirometry Test		
<i>Pre-salbutamol</i>		
FEV ₁		1.54 ± 0.51 liter
FEV ₁ % ≤ 80%	56 (82.4)	61.58% ± 17.37%
FEV ₁ % > 80%	12 (17.6)	
FEV ₁ /FVC < 80%	56 (82.4)	72.1% (min 34.9, max 92.2)
FEV ₁ /FVC ≥ 80%	12 (17.6)	
<i>Post-salbutamol</i>		
FEV ₁		1.59 ± 0.50 liter
FEV ₁ % ≤ 80%	56 (82.4)	63.25% ± 16.86%
FEV ₁ % > 80%	12 (17.6)	
FEV ₁ /FVC < 80%	56 (82.4)	70.62% ± 10.66%
FEV ₁ /FVC ≥ 80%	12 (17.6)	

There were 26 (38.2%) subjects with a high school education, while 28 (41.2%) subjects were housewives, and 28 (41.2%) subjects lived in East Jakarta. 45 (66.2%) subjects had history of triggers/allergy to dust and 26 (38.2%) to weather changes, such as cold or hot air. We found that 12 subjects had FEV₁% > 80% and FEV₁/FVC ≥ 80%. This could happen because at the time of examination the subject was in a state of fully controlled asthma. However, when a complete

history was taken, the subjects had history of asthma before and the majority used inhaler to reduce tightness when their asthma exacerbated.

Incidence of acute asthma exacerbation

A total of 27 (39.7%) pilgrims experienced asthma exacerbation during their pilgrimage in Saudi Arabia, which occurred more frequently in participants who were less than 60 years old, were female, and/or had failed the fitness tests. The characteristics of the acute exacerbation events recorded in this study are explained in Table II.

Table II: Characteristics of Acute Asthma Exacerbations During Pilgrimage

	Incident of Exacerbation		Total, n (%)
	No, n (%)	Yes, n (%)	
Age			
<60 years	31 (68.9)	14 (31.1)	45 (66.2)
≥60 years	10 (43.5)	13 (56.5)	23 (33.8)
Gender			
Men	12 (54.5)	10 (45.5)	22 (32.3)
Women	29 (63)	17 (37)	46 (67.7)
Fitness Level			
No data	5 (61.5)	3 (37.5)	8 (11.8)
Failed to do fitness test	0 (0)	2 (100)	2 (2.9)
Very poor	5 (45.5)	6 (54.5)	11 (16.2)
Poor	6 (54.5)	5 (45.5)	11 (16.2)
Fair	18 (56.2)	14 (43.8)	32 (47.1)
Good	3 (75)	1 (25)	4 (5.9)
Trigger of Exacerbations History/Allergy History			
Dust	26 (57.8)	19 (42.2)	45 (66.2)
Food	7 (63.6)	4 (36.7)	11 (16.2)
Drug	8 (61.5)	5 (38.5)	13 (19.1)
Weather	12 (46.2)	14 (53.8)	26 (38.2)
Fatigue	1 (12.5)	7 (87.5)	8 (11.8)
Psychology	0 (0)	4 (100)	4 (5.9)
Other	9 (52.9)	8 (47.1)	17 (25)
Comorbidities			
Yes	17 (54.8)	14 (45.2)	31(45.5)
No	24 (64.9)	13 (35.1)	37 (55.5)
Smoking			
Yes	11 (57.8)	8 (42.1)	19 (27.9)
No	30 (61.2)	19 (38.8)	49 (73.1)

ACT assessment of research participants

The first ACT score from subjects were assessed by researchers during examination in Puskesmas. The scores were assessed a second time at embarkation. At embarkation, there was increasing number of subjects observed in the partially controlled asthma group (36 pilgrims; 52.9%) compared to

subjects in Puskesmas (27 pilgrims; 39.7%), as shown in Table III.

Relationship between ACT scores and acute exacerbation of asthma

There was a relationship between ACT score with value of 10.195 at embarkation (in the groups with uncontrolled, partially controlled, and fully controlled asthma) and the incidence of asthma exacerbations ($p = 0.006$). To assess the ability of ACT scores to predict the incidence of asthma exacerbation, the receiver-operator curve (ROC) was used, along with the area under the curve (AUC) value. The statistical analysis of the ROC curve is reported in Figure 1, and the calculated AUC result was 0.717 (95% CI; 0.596–0.838).

Table III: Distribution of Asthma Exacerbation Events During Pilgrimage compared to Subjects' ACT score

ACT Score	Incident of Exacerbation		Total	Chi-square test (value, p)
	No, n (%)	Yes, n (%)		
First ACT at Puskesmas				4.797 ($p=0,091$)
Uncontrolled	10 (45.5)	12 (54.5)	22 (32.4)	
Partially controlled	16 (59.2)	11 (41.8)	27 (39.7)	
Fully controlled	15 (78.9)	4 (21.1)	19 (27.9)	
ACT at Embarkation				10.195 ($p=0,006$)
Uncontrolled	5 (38.5)	8 (61.5)	13 (19.1)	
Partially controlled	19 (52.8)	17 (47.2)	36 (52.9)	
Fully controlled	17 (89.5)	2 (10.5)	19 (27.9)	

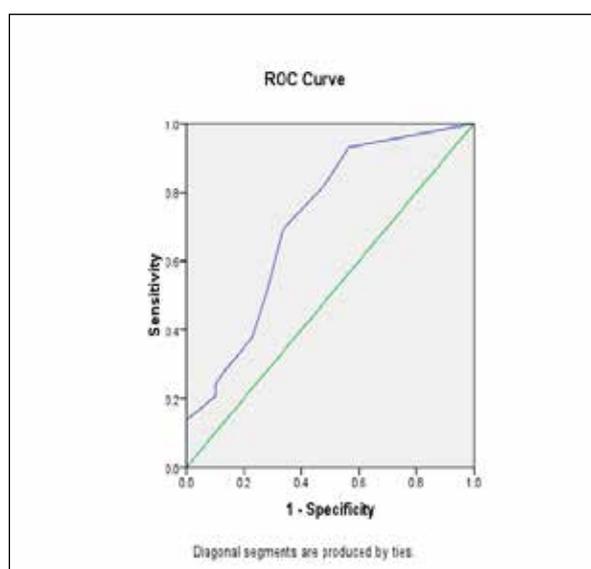


Figure 1: Receiver-Operator Curve of ACT Score

Discussion

Characteristics of research participants

More than half of the participants were less than 60 years old (66.2%), which was similar to the Indonesia Basic Health Research (Riset Kesehatan Dasar Indonesia/RISKESDAS) 2013 study, where the prevalence of asthma began to decrease in the age group of ≥ 60 years. Of the 68 participants included in this study, 67.6% were female. This proportion was the same as that of the RISKESDAS 2013 study, where the prevalence of asthma in women tended to be higher than it was in men. In Indonesia, the estimated prevalence of asthma is 5.7% in those aged 25–34 years and 4.6% in women.⁸

Incidence of asthma exacerbation

The exacerbation rate obtained in this study was quite low, with 27 (39.7%) participants experiencing exacerbations while performing the Hajj. Significant differences were seen in the age groups of < 60 years and ≥ 60 years: in the ≥ 60 -year-old group, there were 13 (56.5%) participants who experienced exacerbations, and in the < 60 -year-old group, there were 14 (31.1%) participants who experienced exacerbations. Most of the subjects have history of triggers or allergy history to dust (66.2%).

The incidence of asthma exacerbation in both genders tended to be balanced between men (45.5%) and women (37%). However, it should be noted that the number of female participants in this study was higher than that of males. Yet, no studies have investigated the effects of gender on the incidence of asthma exacerbations, which may be due to the higher prevalence of asthma among women in the population.

In terms of fitness level, 2 (2.9%) participants failed the fitness test and showed 100% incidence of asthma exacerbations. In those with very poor fitness level, there were 6 (54.5%) participants who experienced acute asthma exacerbations. In the groups with fair and good levels of asthma control, there were 14 (43.8%) and 1 (25%) participants who experienced asthma exacerbations, respectively.

ACT assessment of research participants

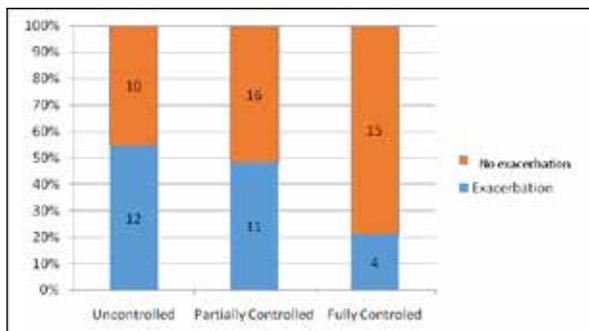
The recorded ACT scores in this study ranged from 11 to 25. A total of 19 (27.9%) participants reached a score of 25 (fully controlled), while 27 (39.7%) participants received a score of 20–24 (partially controlled), and about 22 (32.4%) participants reached ACT scores < 20 during the medical

examination at the Puskesmas. Meanwhile, 19 (27.9%), 36 (52.9%), and 13 (19.1%) participants reached a score of 25 (fully controlled), 20–24 (partially controlled), and <20 (uncontrolled), respectively, during the medical examination at the embarkation site. These results indicate that several participants experienced changes in asthma control status from uncontrolled to partially controlled, while the group with fully controlled asthma remained the same. This change might have occurred because of the education given to asthmatic pilgrims by physician and also researchers on how to control their asthma during the health examinations at Puskesmas. The education especially regarding the prevention of asthma recurrence and encouraging to use inhalers regularly before departure and when in Saudi Arabia.

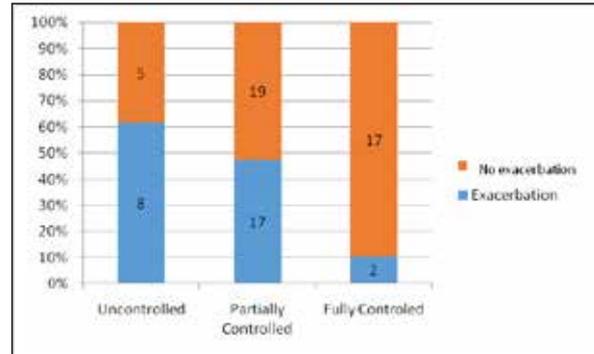
Dalcin et al. study in Brazil explained that there were three factors that were associated with uncontrolled asthma: Severity of asthma, access to medications, and use of inhaled corticosteroids.¹⁸ Al Jahdali et al. revealed concerns regarding the misconceptions and side effects about steroids, which are major factors for reduced compliance in asthma. However, this study did not explore other factors that may be related, such as whether the patient received proper education about asthma as a disease and the medication that was used.¹⁹ Furthermore, Al-Jahdali and colleagues demonstrated that almost half of asthma patients in the emergency setting were not formally educated about asthma and majority used asthma devices improperly.²⁰

Relation between ACT scores and asthma exacerbation

In this study, based on ACT score in the Puskesmas, percentage of asthma exacerbation in uncontrolled and partially controlled categories was greater



compared to fully controlled group (54.5%, 41.8% and 21.1%, respectively). Same results were obtained based on ACT score in the embarkation



site, percentage of asthma exacerbations in uncontrolled and partially controlled categories was greater compared to that in the fully controlled group (61.5%, 47.2% and 10.5%, respectively).

Figure 2: Proportion of Asthma Exacerbation Events Based on the First Round of ACT Score (at the Puskesmas)

Figure 3: Proportion of Asthma Exacerbation Events Based on the Second Round of ACT Score (at Embarkation)

The ACT is an assessment tool that can be used to evaluate asthma control. Advantage of using the ACT is that it improves the quality of doctor-patient communication because the questions in the ACT are clear and consistent. Hence, patients are more likely to be open and answer the questions honestly. The validity of the ACT can be increased by using a spirometry examination and expert judgment.^{10,11} The ACT sensitivity and specificity in this study were 68.4% and 76.2%, respectively. Our study found significant relationship between ACT scores at embarkation with asthma exacerbation incidence in Saudi Arabia with value of 10.195 and p = 0.006. The ROC curve in this study was in the upper left region, which indicates good results (Figure 1). In line with this, the AUC calculation with the value of 0.717 showed that the ACT score had medium predictive ability.

There are some studies that search about ACT score and its effectivity to predict asthma exacerbation. Cajjal et al. studied 1,180 participants and found the ACT score to be modestly sensitive and specific with 42.7% and 73.1%, respectively for predicting asthma exacerbations out to 6 months.²¹ In a retrospective study of 78 individuals with asthma, Sato et al. used classification and regression tree (CART) modeling to identify the combined ACT and lung function cutpoints to best discriminate whether patients had an asthma exacerbation within a 12-month period. An ACT score threshold of ≤23 demonstrated an AUC of 0.613, a sensitivity of 50%, and a specificity of 73%.²³

In a prospective study of 379 ethnically Chinese individuals from Hong Kong, Ko et al. found that an ACT composite score threshold of ≤ 19 , had an AUC, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of 0,71, 74%, 67%, 55%, and 82%, respectively, for asthma exacerbations within 6 months.²⁴ In study that conducted by Hoda et al., in the group defined as having controlled asthma (as defined by ACT < 20), 88.4% of patients were also classified as controlled by clinicians. However, in the group with % predicted $FEV_1 < 0.8$, only 53.7% of patients were classified as controlled by clinicians. The results of this study show that an ACT score of < 20 had a strong association with the physicians assessment of asthma control and correlated better with treatment decisions than did the severity of asthma as defined by FEV_1 .²² Therefore, we can state that ACT score has the ability to predict the incidence of asthma exacerbations in pilgrims. The ACT could serve as a useful in the assessment and management of asthma by guiding physicians with regards to asthma control.

Strengths and limitations of the research

To the best of our knowledge, there have been no reports on the ACT score as a predictor of asthma exacerbations in Hajj pilgrims. The ACT has the potential to be widely applied as asthma exacerbation predictor that can be used among pilgrims before their departure to Saudi Arabia. There were some limitations in this research. There may be some pilgrims with undetected or unrecorded asthma from SISKOHAT registry data. Then, the Rockport Test or 6 Minutes Walking Test that need to calculate VO_2 max was did by the Puskesmas and not directly by researchers. This could make bias in the VO_2 max results. Also, the

difference of knowledge about diagnosis of asthma exacerbation in Indonesian Hajj Health Team Doctor/TKHI could become a bias in determining subjects' exacerbation. In order to reduce bias in asthma exacerbation diagnosis, several steps must be taken. For example, the researchers in this study can provide holistic education and training on asthma exacerbation to the TKHI before their departure with their Hajj groups. The Rockport Test / 6 Minutes Walking Test can be done directly by researchers to prevent bias from the result.

Conclusion

Many factors had to be considered when comparing the uncontrolled and partially controlled ACT categories to the fully controlled ACT group. In addition, the ACT score in embarkation was statistically significant and had the ability to predict asthma exacerbations in pilgrimage. This assessment can be used as a benchmark for health workers to provide optimum benefits for pilgrims with asthma at embarkation and while performing Hajj so that asthma exacerbation will not occur when they reach Saudi Arabia.

Ethical Approval

This study was performed after being approved by Medical Research Ethics Committee of Faculty of Medicine University of Indonesia, Jakarta (No 0369 / UN2.F1 / ETIK / 2018).

Conflict Of Interest

None

Authors' Contribution

Idea owner of this study: Zaini Nasir U. Study design and Data gathering: Saifuddin A. Writing and submitting manuscript: Saifuddin A. Editing and approval of final draft: Zaini Nasir U, Saifuddin A.

Supplementary 1

Category of Fitness Level Based on Oxygen Consumption (VO_2 max) According to *American Heart Association* (AHA)

Age (years)	VO_2 max Value (ml/kg/min)				
	Very Poor	Poor	Fair	Good	Very Good
Women					
20 – 29	< 24	24 – 30	31 – 37	38 – 48	49+
30 – 39	< 20	20 – 27	28 – 33	34 – 44	45+
40 – 49	< 17	17 – 23	24 – 30	31 – 41	42+
50 – 59	< 15	15 – 20	21 – 27	28 – 37	38+
60 – 69	< 13	13 – 17	18 – 23	24 – 34	35+
Men					
20 – 29	< 25	25 – 33	34 – 42	43 – 52	53+
30 – 39	< 23	23 – 30	31 – 38	39 – 48	49+
40 – 49	< 20	20 – 26	27 – 35	36 – 44	45+
50 – 59	< 18	18 – 24	25 – 33	34 – 42	43+
60 – 69	< 16	16 – 22	23 – 30	31 – 40	41+

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