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EMPOWERING TELEMEDICINE AS AN EFFORT TO ASSES KNOWLEDGE, ASTHMA SYMPTOMS CONTROL AND RISK FACTORS OF ASTHMATIC PATIENTS IN THE ERA OF COVID-19 PANDEMIC

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ABSTRACT

Introduction: Asthma is heterogenous disease characterized by chronic airway inflammation. COVID-19 pandemic has an impact on health services where telemedicine could provide alternative method to evaluate patient's condition, reduce risk of infection and disease transmission. The aim of this study is to analysis knowledge, asthma symptoms control and risk factors among the asthmatic patients via telemedicine

Methods: Data was obtained from telemedicine of 28 asthmatic patients in the context of community services. Inclusion criteria is stable asthmatic patients who conducted medical interview via videocall application. Cross sectional data were taken including demographic, knowledge of subjects, profile of subjects, and assessment of asthma symptoms control and assessment of poor outcomes. Data were analyzed descriptively and variables were analyzed using chi-square.

Results: Subjects consisted of 28 stable asthmatic patients. The average of asthma onset was 17.96 years old. Clinically profile showed that 67.86% subjects were not routinely controlled, 64.29% had never performed pulmonary function test, 67.86% subjects didn't know the level of asthma control symptoms. Evaluation based on GINA symptoms control only 39.29% were in good control condition, 35.71% were partially controlled and 25% in uncontrolled condition. Use of inhaler device recently or previously prescribed on 67.86% subjects. Evaluation of knowledge about asthma still unsatisfactory, 67.86% subjects didn't know about their modifiable risk factors, 96.43% didn't know about written action asthma plan, 60.71% didn't know about asthma exercise. Self-medication was associated with poor asthma control ($p=0,036$) and knowledge about modifiable risk factors related to asthma symptoms control ($p=0,041$).

Conclusion: Self-medication is related to uncontrolled asthma and knowledge of modifiable factors is related asthma symptoms control. It is important to educate the patient about the modifiable risk factors of asthma and how to manage it. Patient knowledge about their disease is still lacking, and there is a need for ongoing education to achieve good asthma control. Alternative intervention through telemedicine especially for continuing education and may therapeutic strategies can be performed as an effort to obtain well controlled asthma in community. Telemedicine, particularly in asthma management may benefit as an alternative approach of healthcare service in the context of pandemic era.

KEYWORDS

asthma; community; telemedicine

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1. INTRODUCTION

Asthma is a heterogenous disease characterized by chronic airway inflammation with various respiratory symptoms such as shortness of breath, wheezing, chest tightness, cough. Asthma can occur at any age and globally it is estimated that 334 million people suffer from asthma. The prevalence of asthma is increasing in low-middle income countries. It is increasing of health burden, health cost, disability and mortality (Enilari & Sinha, 2019; GINA, 2022). In Indonesia, asthma including in the top ten disease that cause illness and death (National Institute of Health Research and Development (NIHRD), 2013).

The COVID-19 pandemic has had impact on health services access such as decreased physical accessibility to healthcare provider, increased use of online health services, online prescription, postponement of medical specialist consultations (von Humboldt et al., 2022). Telemedicine is defined as the use of devices along with technological resources to asses, evaluate and diagnose patient by healthcare provider (Nittari et al., 2022). Telemedicine has many positive impacts on managing several diseases (Gottlieb et al., 2022; Kittler et al., 2022; Ma et al., 2022; Shaughnessy et al., 2022). Patients education can provide easy access to telemedicine services and improve health outcome in management of chronic conditions (Nittari et al., 2022).

This is a community services via telemedicine to provide online consultation to asthmatic patients. This activity expected to achieve well controlled asthma and reduce the risk of asthma exacerbation and provide online education on asthma management.

2. MATERIAL AND METHODS

This is a cross-sectional study and the data was obtained from the implementation of community service for asthmatic patients via telemedicine using WhatsApp videocall. This telemedicine provides a

phone number as a contact person if there were subjects want to use this program and the subjects were given the pre-screening questions and consent via WhatsApp message to ensure appropriate asthmatic subjects. The activities of durance telemedicine include promotive, curative and rehabilitative efforts that can be suggested to asthmatic patients. The consultation process is divided into three parts, first is identity, second is pre-counselling questions and the last is counselling and education. The pre-counselling process is a general question, include of the question about who and where is the patient routinely control for their disease, asthma onset, having lung function test or not, knowing about their symptoms control or not, evaluating about asthma risk by healthcare provider or not, taking any inhalation drugs for asthma or not and the type of inhaler, ability using their inhaler correctly, patient's adherence, knowing about modifiable risk factors or not, knowing or currently using written asthma action plan or not, whether asthma affects daily activities or not, whether asthma affects social activities or not and knowing asthma exercise or not. The counselling is a review process of the patient's symptoms, evaluate asthma symptoms control and risk factors, evaluate their pharmacological treatment and give an education about asthma diagnosis, symptoms control, risk factors, modifiable risk factors and how to manage, asthma treatment and technique of using inhaler drugs, and written asthma action plan.

The inclusion criteria were adult stable asthmatic patients > 18 years old and the exclusion criteria were non asthmatic patients and also other obstructive pulmonary disease like Chronic Obstructive Lung Disease (COPD, chronic bronchitis).

The level of asthma control assessed by GINA Symptoms Control by asking 4 yes/no question in the past 4 weeks includes of daytime asthma symptoms more than twice/week, any night waking due to asthma, Short Acting Beta Agonist (SABA) as reliever

for symptoms more than twice/week and any activity limitation due to asthma (such as daily activities and activities at work). The level of asthma symptoms control divided into 3 categories: well controlled if none of the question, partly controlled if 1-2 the question answered yes and uncontrolled if 3-4 of the question answered yes.

Risk factors of poor asthma outcome is defined by having uncontrolled symptoms and having potentially risk factors for exacerbations include high use SABA, inadequate ICS, not prescribed ICS, poor adherence, incorrect inhaler technique, obesity, chronic rhinosinusitis, GERD, confirmed food allergy, pregnancy, smoking, allergen exposure, air pollution, major psychological or socioeconomic problems, history of severe asthma that need intubation or intensive care and history of ≥ severe exacerbations in the last 12 months (GINA, 2022).

The data was obtained from one visit online study and has not been continued as a follow up study. Data analysis related symptoms control was grouped into 2, well controlled and uncontrolled (uncontrolled and partly controlled) (GINA, 2022). Counselor or educators are Pulmonary Specialist or Resident of Pulmonology and Respiratory Medicine Specialist Program. Cross sectional data were taken including demographic, knowledge of subjects, profile of subjects, and assessment of asthma control symptoms and assessment of poor outcomes. Data were analyzed descriptively and variables were analyzed using chi-square by SPSS 26.0.

3. RESULTS

Subjects consisted of 28 asthmatic patients were interviewed and educated through telemedicine. Subject characteristic can be seen in Table 1. Most of subjects were female (85,71%). The mean age of subjects was 39,71 years old. The most education level was bachelor degree (46,43%). The average weight, height and Body Mass Index were 58,21 kg; 158,39 cm; 23,15 kg/m² respectively. The mean of asthma onset is 17,96 years old.

The profile and knowledge of asthma can be seen in Table 2. Our data showed that 19 subjects (67,86%) are not routinely controlled, 18 subjects (64,29%) are not evaluated lung function test previously, 19 subjects (67,86%) didn't know about their level asthma control, 19 subjects (67,86%) had used inhaler therapy where inhaler therapy that previously or recently used were salbutamol, fenoterol, budesonide-formoterol, salmeterol fluticasone, tiotropium (13,04%; 17,29%; 43,48%; 17,39%; 8,7% respectively). Based on asthma symptoms control, our data showed that 11 subjects (39,29%) is well controlled, 10 subjects (35,71%) is

Table 1. Subjects Demographic and Characteristic

Variable	Value
Sex	
Male	4 (14.29%)
Female	24 (85.71%)
Age (years)	39.71 (21-71)
Education	
Master	1 (3.57%)
Bachelor	13 (46.43%)
Diploma	6 (21.43%)
Senior High school	7 (25.00%)
Elementary school	1 (3.57%)
Occupation	
Housewife	10 (35.71%)
Government worker	2 (7.14%)
Trader	1 (3.57%)
Administration	2 (7.14%)
Teacher	1 (3.57%)
Tailor	1 (3.57%)
Nurse	4 (14.29%)
Lecturer	1 (3.57%)
Marketing	1 (3.57%)
Equipment worker	1 (3.57%)
Shipping worker	1 (3.57%)
Barber	1 (3.57%)
Factory ex-worker	1 (3.57%)
Student	1 (3.57%)
Weight (kg)	58.21 (41-87)
Height (cm)	158.39 (147-172)
BMI (kg/m ²)	23.15 (17.08-29.40)
Asthma onset (year)	17.96 (4-60)
The first diagnosis asma by	
Pulmonologist	12 (42.86%)
Internist	1 (3.57%)
General Practitioner	12 (42.86%)
Self	3 (10.71%)

Data is displayed as n (%) or mean (lowest-highest value). Abbreviation: BMI = Body Mass Index

Table 2. Subjects Profile and Knowledge

Variable/Question	Value
Routinely control for management asthma	
No	19 (67.86%)
Yes	9 (32.14%)
Performing Lung Function Test Previously	
No	18 (64.29%)
Yes	10(35.71%)
Knowing the level of asthma control	
No	19 (67.86%)
Yes	9 (32.14%)
Using/previously used inhaler therapy	
No	9 (32.14%)
Yes	19 (67.86%)
Type of inhaler therapy	
Salbutamol	3 (13.04%)
Fenoterol	4 (17.39%)
Budesonide-Formoterol	10 (43.48%)
Salmeterol-Fluticason	4 (17.39%)
Tiotropium	2 (8.70%)
Ability to use inhaler device	
Not sure	6 (21.43%)
Doubtful	7 (25%)
Convinced	13 (46.43%)
n/a	2 (7.14%)
Knowledge of modifiable risk factors	
Do not know	19 (67.86%)
Know	9 (32.14%)
Knowledge about management of modifiable risk factors	
Do not know	19 (67.86%)
Know	9 (32.14%)
Knowledge about Written Action Asthma Plan	
Do not know	27 (96.43%)
Know	1 (3.57%)
Knowledge about asthma exercise/gymnastic	
Do not know	17 (60.71%)
Know	11 (39.29%)
Interfere with daily activities	
No	18 (64.29%)
Yes	10 (35.71%)
Asthma association with social impact	
No	26 (92.86%)
Yes	2 (7.14%)
Level of asthma control	
Well controlled	11 (39.29%)
Partly controlled	10 (35.71%)
Uncontrolled	7 (25%)

Data is displayed as n (%)

partly controlled, and 7 subjects (25%) is uncontrolled. The majority subjects state that their asthma doesn't interfere with daily activities.

Knowledge of subject about their disease can be seen in Table 2. Our data showed that 19 subjects (67,86%) didn't know about their modifiable risk factors and didn't know how to manage their

modifiable risk factors, 27 subjects (96,43%) didn't know about Written Action Asthma Plan, 17 subjects (60,71%) didn't know about asthma exercise especially gymnastic of asthma. The majority of subjects stated that their asthma didn't affect their social life.

Table 3. Association of Several Variables with Asthma Symptoms Control

Variable	Uncontrolled (n)	Well Controlled (n)	p-value
SABA medication			0.172
SABA only	10	7	
Using ICS contain medication	7	8	
Self-medication			0.036
Yes	8	1	
Routine control	9	10	
Asthma onset			0.315
≤ 12 tahun	6	6	
> 12 tahun	11	5	
Recently/history of using inhaler therapy			0.954
Yes	11	7	
No	6	4	
Knowledge of modifiable risk factors			0.041
Know	3	6	
Didn't know	14	4	
Number of risk factors of poor asthma control			0.823
One risk factor	7	5	
More than one	10	6	

Analysis data using chi-square test. Statistically significant describe by p-value < 0.05

Analysis of various variables based on asthma control can be seen in Table 3. Our data showed that using Short Acting Beta Agonist (SABA) alone tends to associated with uncontrolled asthma although is not statistically significant (p=0,172). Self-medication is associated with asthma control (p=0,0036). Onset of asthma symptoms with cut-off 12 years old (childhood vs adolescent and adult-onset asthma) isn't associated with asthma control (p=0,315). Using of inhaler therapy (recently or previously) isn't associated with asthma control (p=0,954). Knowledge of modifiable risk factors associated with asthma control (p=0,041). The number of risk factors of poor outcome (one vs more than one) isn't associated with asthma control (p=0,823).

4. DISCUSSION

Asthma is a global health problem that cause of burden of disease particularly in low and middle-income countries (LMICs). According to Riskesdas 2018, asthma prevalence in Indonesia around 2,4% (1,0-4,5% based on the survey location)(National Institute of Health Research and Development (NIHRD), 2018). This data was taken from physician diagnosis which is the value is lower than Riskesdas 2013. In general, our data show female subjects have a higher asthma prevalence then male with the mean

of the age is 39,71 years of age. Our data has different results from Riskesdas that showed asthma prevalence to be more likely same between female compared than male (2,5% vs 2,3%) and the most prevalence of asthma age distribution in the >75 years age group³. In our opinion, this discrepancy should be evaluated. There is a clear sex disparity in asthma that the data show the greater in number of asthma prevalence in boys under age 13 (65% prevalence) and the rates are higher in adult women compared than man (65% prevalence) (Chowdhury et al., 2021). It is important to establish asthma diagnosis not only by clinical symptoms but also demonstration of variable expiratory airflow limitation (GINA, 2022). At a global level, spirometry before and after bronchodilator is the most useful initial investigation. However, in Indonesia there are still lacking diagnostic test for asthma in primary care or less likely using lung function test in the context of asthma diagnostic. In general asthma only diagnosis by history taking and clinical symptoms and this problem may affect asthma prevalence in Indonesia.

The one of the important assesment of asthmatic patients is an assesment of asthma symptoms control (GINA, 2022). For adult and adolescent, we can use several tools to asses of asthma symptoms control

like GINA symptoms control, Primary Care Asthma Control Screening Tools (PACS), The 30-second Asthma Test, RCP Three Questions Tools, Asthma APGAR Tool, Asthma Control Questionnaire, Asthma Control Test (GINA, 2022). Our data show that 60,71% subjects still in partially or uncontrolled condition by evaluate of GINA symptoms control. Tomisa et al stated that there are several factors that cause of uncontrolled condition in asthma, including inappropriate of inhaler use, history of severe exacerbations, overuse of SABA, low of Forced Expiratory Volume in 1 second (FEV₁), smoking, and obesity (Tomisa et al., 2019). Our study revealed that unprescribed medication or self-medication is associated with more uncontrolled condition and knowledge about modifiable risk factors associated with symptoms control. SABA only use also tend to make an uncontrolled condition. This finding is consistent with SABINA (SABA Use IN Asthma) study that overuse SABA was associated with risk of exacerbation and mortality in asthma (Nwaru et al., 2020). Other factors that associated with poorly controlled condition are airway infections, concomitant with other diseases, and animals allergy (Ghanname et al., 2018).

A most of our subjects (96,43%) didn't know about written asthma action plan. Written asthma action plan is a self-management of exacerbations that helps patients to recognize and respond appropriately to worsening asthma condition, how to use oral corticosteroid and when and how to access medical care¹. Study Gibson and Powell made a conclusion that individualized written action plans based on personal Peak Expiratory Flow (PEF), using 2-4 action points and recommending both ICS and OCS (Oral Corticosteroid) for treatment of exacerbations consistently improve asthma health outcomes (Gibson & Powell, 2004). Interestingly, study Sheares et al stated that using a written asthma action plan for patients with persistent asthma at the first time doesn't improve outcome compared with

verbal instructions given pulmonologist or allergist and further studies are needed to clarify whether there is a benefit of using written asthma action plan in primary care settings where most patients are treated (Sheares et al., 2015). However, it is still important using written asthma action plan to provide early management if worsening condition occur at home and it also important to make a standard of written asthma action plan in Indonesia.

Our data show that 67,86% subjects didn't know about their modifiable risk factors. Modifiable risk factors are any factors that may affect asthma outcomes, particularly modifiable risk factors for exacerbation such as overuse SABA, inadequate ICS, not prescribed ICS, poor adherence, incorrect inhaler technique, obesity, chronic rhinosinusitis, GERD (Gastro-esophageal Reflux Disease), confirmed food allergy, pregnancy, major psychological or socioeconomic problems, low FEV₁, elevated FeNO (Fractional Exhaled Nitric Oxide), sputum eosinophilia history of severe exacerbation in last year, allergen exposure (GINA, 2022; Hallit et al., 2017; Ribó et al., 2020)

Our data show that 46,43% subjects are uncertain using their inhaler device. This needs special concern because of incorrect inhaler technique associated with poorly controlled asthma and frequently emergency room visit (AL-Jahdali et al., 2013). The common errors inhaler technique of MDI (Metered Dose Inhaler) such as failure to remove the cap, not holding inhaler upright, actuation before inhalation, actuation is too late, failure to actuate, failure to inhale, inhale too fast, inhalation through nose, patients doesn't know that their device is empty (Price et al., 2013). The common errors of DPI (Dry Powder Inhaler) using turbobhaler such as failure to remove cap, shaking during preparation, device not held upright when the base is twisted during dose preparation, twisting the base until it clicks, turning it back to the original position, device not held upright after the base is twisted until inhalation, shaking after

dose preparation, failure to put in mouth and seal lips around mouthpiece, inhalation is not as fast as the patient can achieve, inhalation is not forceful from the start, failure to inhale through mouthpiece, inhalation through the nose, failure to slide cover as far as possible and then lever to open mouthpiece, failure to breath out slowly to empty the lungs, breathing out into the device before inhalation, failure to tilt head such that the chin is slightly upwards, inhalation is not as long as the patient can achieve, failure to hold breath (or to hold for < 3 second), failure to replace cap after second inhalation (Price et al., 2013).

5. CONCLUSION

Knowledge of asthma patient about their disease is still lacking and it is needed continuing education to obtain well controlled asthma. Alternative intervention through telemedicine especially for continuing education and may therapeutic strategies can be performed as an effort to obtain well controlled asthma in community. Telemedicine may benefit as an alternative approach of healthcare service in the context of pandemic era. This community service program may give an insight as an alternative of conventional medical services in pandemic era but further studies is still needed with a large number of subjects and using pre and post evaluation to get the clear benefits of telemedicine in asthmatic patients.

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