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Prospective Management of Bronchial Asthma through Family Education and Home Environment Interventions

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ABSTRACT

Bronchial asthma is a chronic inflammatory disease of the airways characterized by recurrent episodes of wheezing, shortness of breath, and coughing, which may significantly affect a patient's quality of life. This case study aimed to describe the prospective management of a 15-year-old male with moderate persistent uncontrolled bronchial asthma using a family-centered and home environment-based approach. Data were collected through anamnesis, physical examination, family interviews, and home observation. Interventions included medicative therapy with a budesonide-formoterol inhaler and salbutamol nebulization, as well as non-medicative interventions such as family education, home environment modification, and behavioral guidance based on the Social Cognitive Theory. The intervention focused on improving family understanding of asthma control, medication adherence, and avoidance of environmental triggers. After the intervention, the patient's Asthma Control Test (ACT) score improved, symptoms became less frequent, and the family demonstrated better knowledge and supportive behavior toward asthma management. This study highlights that comprehensive, family-oriented, and environment-based management can improve asthma control and patient quality of life.

INTRODUCTION

Asthma is a chronic inflammation of the airways that causes airway narrowing (bronchial hyperreactivity), leading to recurrent episodic symptoms such as wheezing, shortness of breath, chest tightness, and coughing, especially at night or early morning. According to a WHO report, asthma affected approximately 262 million people in 2019, including 136 million women and 126 million men, and caused 461,000 deaths.

The prevalence of asthma in Indonesia in 2018, according to the Basic Health Research (RISKESDAS) conducted by the Health Research and Development Agency of the Ministry of Health of the Republic of Indonesia, placed asthma as the highest-ranking non-communicable disease at 2.4%, with the proportion of asthma recurrence in the last 12 months at 57.5%. Meanwhile, in Lampung, the prevalence of asthma was 1.6% and the proportion of asthma recurrence in the last 12 months was 64.7%.

Asthma comes from the Greek word "Ashtma," which means "difficulty in breathing." Asthma is a chronic inflammatory process of the airways involving various inflammatory cells and their elements. This chronic inflammatory process causes the airways to become hyperresponsive, facilitating bronchoconstriction, edema, and hypersecretion of mucus glands, which leads to airflow obstruction in the airways with clinical manifestations that are periodic, such as wheezing, shortness of breath, a heavy feeling in the chest, and coughing, especially at night or early in the morning. These symptoms are related to the extent of inflammation, which varies in degree and is reversible either spontaneously or with or without treatment.

Controlled asthma is a stable condition for at least one month. In determining or planning long-term treatment to achieve or maintain a state of controlled asthma, there are three factors to consider: medication (drugs), treatment steps, and self-management of asthma (asthma action plan). Asthma medication is intended to address and prevent airway obstruction symptoms and consists of controllers and relievers.

In addition to medication adherence and avoiding triggers, another factor that affects asthma control is the role of the family. Family support is expected to help reduce the frequency of bronchial asthma attacks; therefore, health education for patients and their families is very meaningful, especially in avoiding triggers, routine symptom monitoring, and understanding appropriate attitudes and actions to take during an attack. A family-centered approach in management helps to identify factors that influence the condition clinically, personally, and psychosocially. With this approach, management becomes more comprehensive and is expected to improve the patient's quality of life.

METHODS

This study used a prospective case study approach on a 15-year-old male patient diagnosed with moderate persistent uncontrolled bronchial asthma. The research was conducted at Muara Batu Health Center, Lhokseumawe, in 2025.

Data were collected through anamnesis, physical examination, home environment observation, and family interviews. Interventions included medicative therapy (budesonide-formoterol inhaler and salbutamol nebulization) and non-medicative approaches such as family education, home environment improvement, and behavioral guidance based on the Social Cognitive Theory (SCT).

Data were analyzed qualitatively and descriptively by comparing the patient's condition before and after the interventions, focusing on changes in symptoms, ACT scores, and improvements in the family's knowledge and behavior regarding asthma management.

RESULTS AND DISCUSSION

1. Identity

1 Patient Identity

Name: An. FF

Gender: Male

Age: 15 years old

Address: Tanjong Rengkam Village, Samudera Subdistrict, North Aceh Regency, Aceh

Religion: Islam

Ethnicity: Acehnese

Date of examination:

2. Patient's Mother's Identity

Name: An. FF

Gender: Male

Age: 15 years old

Address: Tanjong Rengkam Village, Samudera Subdistrict, North Aceh Regency, Aceh

Religion: Islam

Ethnicity: Aceh

Date of examination:

2. Anamnesis

1. Chief Complaint

Shortness of breath experienced since the age of 5 years

2. Additional Complaints The patient also complains of a persistent productive cough that has not improved for approximately the last two weeks.

3. History of Present Illness

Based on the anamnesis of the patient's mother during a home visit on it was found that the patient has experienced recurring shortness of breath since the age of 5. The symptoms appear periodically, especially when exposed to cold air, dust, and worsen at night. Shortness of breath is often accompanied by productive cough and wheezing. In the past two months, the patient has experienced exacerbations with symptoms occurring daily and interfering with the patient's activities. In the past week, the patient has woken up at night twice. The patient feels the need to rest after light activities at school.

4. Past Medical History The patient has a history of upper respiratory tract infections that occurred at the age of 8.

5. Family Medical History

History of asthma in the patient's mother, who had experienced similar symptoms during her teenage years. History of allergic dermatitis in the patient's father.

6. Medication History

The patient receives regular medication for asthma, namely the use of a Symbicort inhaler twice a day; however, the patient does not use it

regularly. The patient only uses it during attacks and stops using it when the symptoms improve.

7. Social, Cultural, and Economic History The patient's father (Mr. Z) is a farmer. The patient's mother (Mrs. T) is a housewife. The patient is the second of two siblings (An.F). The patient is currently in the 9th grade of junior high school. The patient lives with both parents in a semi-permanent house with a simple condition and limited ventilation. Four people live in one house. The house consists of 2 bedrooms. There is 1 bathroom and 1 well. There is one living room and kitchen, and ventilation in the patient's house is limited (open ventilation only in the living room, and each bedroom has a window although rarely opened). Household waste is disposed of daily in the side and back yards of the house and is regularly burned. The patient's father is an active smoker. Socially, the relationships among family members are fairly close, but the family's knowledge about asthma is still limited. Both parents are actively involved in the patient's care, but they still do not understand the importance of medication adherence and asthma prevention. There is a perception in the surrounding environment that using an inhaler causes "dependence" and is only used during severe shortness of breath. Economically, the family falls into the lower-middle category. Income comes solely from the father, who works as a farmer.

3. General Examination

1. Consciousness: GCS = E4M6V5 (compos mentis)

2. Weight: 49 kg

3. Height: 158 cm

4. Vital Signs• Blood Pressure (BP): 110/70 mmHg• Pulse: 92 bpm• Respiration: 24 breaths/min• Temperature: 36.5 °C• Oxygen Saturation (SpO₂): 97%5.

Nutritional Status Interpretation:

$IMT = (Weight(kg)) / [(Height(m))]^2$

$IMT = (Weight(kg)) / [(Height(m))]^2 = 49 / (1,58)^2 = 49 / 2,49 = 19,6$ (Normal)

4. Physical Examination

- Head: normocephalic
 - Eyes: conjunctiva not anemic, sclera not icteric, eyes not sunken
 - Nose: symmetric, no secretions, no nasal flaring, no nasal septum deviation
 - Ears: no abnormalities
 - Mouth: mucosa normal, tonsils T1-T1, pharynx not hyperemic
 - Neck: normal, no tracheal deviation, no thyroid or lymph node enlargement, jugular venous pressure normal
 - Lungs
Inspection: chest symmetric at rest and during movement, no chest wall retraction
Palpation: no tenderness, tactile fremitus right = left
Percussion: resonant
Auscultation: vesicular (+/+), wheezing (+/+), rhonchi (-/-)
- Cor
- Inspection: cardiac ictus not visible
Palpation: cardiac ictus palpable in ICS
Percussion: normal heart boundaries / no heart enlargement
Auscultation: S1 > S2, regular, murmur (-), gallop (-)
- Abdomen:
Inspection: symmetrical, no distension
Auscultation: normal peristalsis
Palpation: no tenderness, no mass, liver, spleen, and kidneys not palpable
Percussion: tympany
 - Upper extremities:
Cyanosis (-/-), acral warm; CRT <2 seconds, no lacerations, no skin wounds
 - Lower extremities:
Cyanosis (-/-), acral warm; CRT <2 seconds, no lacerations, no skin wounds

5. Supporting Examination

ACT Score: 14 (asthma uncontrolled)

6. Diagnosis

The patient is diagnosed with Moderate Persistent Uncontrolled Bronchial Asthma.

7. Resume

A 15-year-old male, An. F, has been experiencing recurrent shortness of breath since the age of 5. The symptoms occur periodically, especially when

exposed to cold air or dust, and worsen at night. The shortness of breath is accompanied by productive cough and wheezing that interferes with the patient's daily activities, including participating in physical education classes at school. Over the past two months, the patient has experienced flare-ups almost every day, and in the past week, he has woken up twice at night due to shortness of breath. The patient also feels the need to rest after light activities. He lives with both parents and one older sibling in a densely populated area with poor home ventilation. The patient's father works as a daily laborer with an irregular income, while the mother is a housewife. The patient is a BPJS participant. In the family and surrounding community culture, inhalers are still considered strong medication that can cause dependency, so adherence to treatment is still low. Physical examination revealed vital signs within normal limits, with a respiratory rate of 24 breaths per minute, a weight of 49 kg, and a height of 158 cm. The patient's BMI is 19.6, which falls within the normal category. Bilateral wheezing was heard on lung auscultation, without any rhonchi. The patient uses combination inhaler therapy with budesonide-formoterol (Symbicort) as a controller medication, but usage is still irregular due to lack of understanding and embarrassment at school. The patient's ACT score is 14, indicating uncontrolled asthma. The patient is diagnosed with moderately persistent uncontrolled bronchial asthma and is under ongoing follow-up for education family as well as home environment interventions.

The family medicine approach emphasizes the biopsychosocial aspects, where the patient is not only viewed from the perspective of medical complaints but also psychological, social, and environmental factors. From the perspective of external risk factors, there are several issues, including a house located in an area with a sandy yard that is prone to dust, unpredictable weather conditions such as cold weather that trigger asthma, the patient's father being an active smoker, and the family's knowledge, particularly the father's, being

limited in managing asthma attacks at home. Regarding internal family aspects, the patient's relationship with their family is fairly close, and the patient receives family support in managing the illness. This can help patients undergo treatment, as can be seen from the support provided by all family members. Family education has a significant influence on treatment adherence and asthma control. In this case, the patient's mother considers the inhaler as a "strong medicine" that causes dependency. This perception needs to be corrected through ongoing education. Studies show that patients with good family support are up to twice as likely to have better asthma control compared to those without support [3]. The education provided includes proper inhaler usage, the difference between control and reliever medications, and the importance of regular use even without symptoms. Family doctors play an important role as communicative facilitators of education who understand the family's socio-cultural conditions.

The home environment is one of the important triggers for asthma, especially exposure to dust, smoke, animal fur, and poor ventilation. In this case, the patient lives in a small house with limited ventilation and high dust exposure. Environmental interventions are key to long-term control. Simple steps that the patient can take include avoiding carpets and stuffed toys, regularly cleaning the house with a damp cloth, improving cross-ventilation, and avoiding kitchen smoke, cigarettes, and burning trash. The family medicine approach views these interventions not only from a medical perspective but also considering the family's economic capacity and cultural habits.

The interventions provided are both medicative and non-medicative related to the disease suffered by the patient. Medicative interventions aim to reduce complaints and prevent complications, thereby improving the patient's quality of life. Non-medicative interventions include educating the patient's mother about disease risk factors, the patient's diet, and physical activity. Some interventions that can be carried out include:

- Patient-Centered Interventions

Preventive - Promotional:

- a. Education for parents regarding the causes and diagnosis of the patient's illness, as well as potential complications if the disease is not treated.
 - b. Education for the patient's mother about external risk factors, especially the environment and home conditions.
 - c. Identification and control of triggering factors: Educating the patient's mother to avoid cold weather and dust, educating the patient's mother about dietary patterns and avoiding trigger foods, namely those containing preservatives.
 - d. Educating the family on maintaining a clean and healthy lifestyle.
 - e. Education regarding regular doctor visits to check the condition in order to assess and monitor asthma severity periodically, as well as planning and providing long-term treatment.
 - f. Educating the patient's father to quit smoking and not to smoke around the home environment.
 - g. Establishing treatment for acute attacks.
 - h. Education to recognize early symptoms of asthma attacks and when the patient should seek medical care.
 - i. Education to understand reliever and controller medications, as well as how and when to use them.
- (Sinatra, 2019) Curative:
- a. Reliever: Salbutamol nebulization, 1 respule (2.5mg/2.5mg) for 20 minutes.
 - b. Controller: Combination of inhaled glucocorticosteroids and long-acting beta-2 agonists (LABA).
- Interventions Focused on the Individual Sick Community (Community-Oriented)
 - a. Providing information to the patient's family and explanations about maintaining cleanliness around the house to minimize pollution and dust, which can be trigger factors.
 - b. Educating the patient's mother on avoiding asthma triggers such as cold weather. The intervention carried out is based on patient-centered and family-focused approaches, where the intervention is not only directed at the patient but also at the family. Patient-Centered Care involves managing patients by acknowledging and respecting their individual preferences, needs, and values, and ensuring that all

clinical decisions consider the values desired by the patient. Family-focused care is an approach that involves the patient as part of the family, so the family participates in the patient's disease progression.

The application of the Social Cognitive Theory (SCT) behavior change theory, the intervention strategy for this family targeting community-level behavior change can be achieved through three types of strategies: setting small, gradual, and achievable goals; using formalized behavioral contracts to set goals and determine rewards; and monitoring and reinforcement, including client self-monitoring by keeping records. (Noar, 2008) The changes resulting from the implementation of these family medicine principles are expected to improve the quality of life of patients and their families.

CONCLUSION

Asthma is the most common chronic respiratory disease found in children. In this case, the patient was diagnosed with moderate acute exacerbation asthma, requiring comprehensive and holistic management. Patient management involves both non-pharmacological and pharmacological interventions based on family medicine. Patient and family education is conducted through infographic media to improve understanding of asthma, along with a counseling approach to build family support and address internal barriers. Pharmacological intervention involves administering medications according to the patient's condition. An analysis of external and internal risks is also conducted, and interventions were implemented based on the Social Cognitive Theory approach to achieve behavioral changes at the community level. Post-intervention visit evaluations showed positive changes in the clinical conditions and health behaviors of patients and their families, indicating the success of the intervention strategies applied. Thus, the application of family medicine principles and holistic-comprehensive interventions based on patient-centered and community-oriented strategies can have a positive impact on asthma management at the

family level and serve as a reference for controlling asthma in pediatric patients.

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