

RESEARCH ARTICLE

Relationship of Illness Perception and Asthma Symptoms Control in Adolescents

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Abstract

Asthma has a high prevalence in Indonesia. Good self-management is necessary for therapy and greatly affects the level of asthma control symptoms. The patient's perception plays an important role in the success of asthma therapy, especially among students, because education affects a person's mindset and perception of disease conditions. The purpose was to determine the relationship between illness perception and control of asthma symptoms in adolescents. The method was cross-sectional and was conducted from November 2019 to January 2020. The variables were asthma control and illness perception. This research was conducted on a campus in Surabaya city. Respondents were asked to fill out the Illness Perception Questionnaire (IPQ) and asthma control test (ACT) questionnaire and analyze by calculating each answer point. This study used a chi-square test to analyze the relationship between ACT and Illness perception. This study involved 75 respondents. Of most of the respondents, 58 people have their asthma partially controlled. Most respondents experienced shortness of breath and wheezing symptoms, and most understood that they were related to their asthma. There was a relationship between asthma control scores and illness perception ($p > 0.05$) on the timeline ($p = 0.03$), personal control ($p = 0.03$), and causal representation ($p = 0.01$). Illness perception can affect asthma symptoms. Asthma will be experienced for a long time, and respondents will better adjust their lifestyle and have confidence that it was controlled. Material factors were also considered. If their asthma was controlled, it was hoped not to affect their finances.

Keywords: Adolescents, asthma symptoms, illness perception

Introduction

Asthma is a globally significant non-communicable disease with major consequences on the health of children and adults, including high morbidity and death in severe cases.¹ Early recognition of the level of asthma control against self-disease is highly recommended and can self-detect if asthma is not controlled because it can prevent acute asthma attacks.² One of the tools that patients can use in detecting the level of asthma control is the asthma control test (ACT) questionnaire, which can detect the worsening of the disease.³ Early recognition of the level of asthma control against self-disease is highly recommended and can self-detect if asthma is not controlled because it can prevent acute asthma attacks.⁴

This ACT questionnaire can help us identify individuals at risk for developing asthma or who may experience mild asthma symptoms. The type of screening often used is the asthma symptom score scale. The patient-completed asthma control assessment includes five domains:

activity restriction, frequency of day and night symptoms (based on criteria for frequency of night awakenings), triggers, adherence, and the patient's perceived response to treatment.^{5,6}

The goals of asthma treatment are to minimize future risks, namely to maintain lung function and lung development, achieve good symptom control, maintain normal activity levels, provide information and support to maximize compliance and provide information on how to avoid triggers that can lead to asthma attacks, and minimize drug side effects.^{7,8} Although treatment has been effective in reducing morbidity due to asthma, the effectiveness of therapy will be achieved if the use of drugs is in accordance with their use. In addition, the patient's perception also plays an important role in therapy success because each individual's perception produces a different response from one individual to another.⁹ Not a few previous studies from home and abroad have proven that illness perception plays a major role in the therapeutic outcome of a disease so that illness perception can reflect disease control in each patient.¹⁰ The Illness Perception Questionnaire

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(IPQ) is the first attempt to systematically assess core cognitive aspects of disease representation, as developed across various disease groups. Perceived personal control is stronger than perceived control over treatment.^{11,12} IPQ is a very easy and fast questionnaire to determine a person's illness perception.¹¹ This study aimed to determine the relationship between illness perception and control of asthma symptoms in adolescents.

Methods

The research method was cross-sectional. This study determined the relationship between illness perception and asthma symptom control in outpatient adolescent asthma patients. The data was collected from November 2019 to January 2020 in Surabaya city by filling out questionnaires. The ethics committee of the University of Surabaya approved the study protocols (No. 109A/KE/XI/2019).

The independent variable was asthma control, and the dependent variable was illness perception. The measuring instrument used to determine asthma control was the ACT questionnaire. In this questionnaire, there were five questions with a score range of 1–5. Of the five questions, the results summed and categorized into three categories, namely very controlled (score 20), well controlled (score 16–19), and uncontrolled (score 16).^{7,8}

Illness perception is an individual's response to the disease through a person's perception of the disease response. Each individual has a different perception of the disease.^{13,14} In this study, IPQ was the measuring instrument used to determine pain perception. In this questionnaire, there were nine questions that can be categorized into nine categories: consequences, timeline, personal control, treatment control, identity (related symptoms), disease coherence, emotional response, understanding, and concern.^{10–12,14,15}

The target population of this research was active students from one of the campuses in the Rungkut subdistrict, Surabaya city, East Java, Indonesia. Respondents were part of the population who met the criteria obtained 75 people. The non-probability sampling technique was purposive sampling.

The validated questionnaires were ACT and IPQ. Content validity is an explanation of a measuring instrument substantively, or

called substantive validity, which focuses on conceptualization and the extent to which previous concepts were presented in a literature review. The first step was to validate the content, with a questionnaire compiled based on the journal, which will then be translated from English to Indonesian. Then proceed with the validity test, namely assessing the questionnaire based on the concept or theory of the variables studied, by conducting trials on respondents who meet the criteria, totaling 30 people, and these respondents were not research samples. The data obtained were tabulated and correlated between instrument item scores with the help of a computer program, namely in this study using SPSS version 25 for Windows. In addition to considering the validity, the research instrument also considers the reliability aspect.

Respondents were asked to fill out and answer the IPQ and ACT questionnaire and analyze the questionnaire by calculating each answer point. Then, the respondents were asked to fill out and answer the Illness perception questionnaire. After the respondents filled in, the data and questionnaires were collected, and the questionnaires were analyzed and calculated for each question answer point. Then, the points/scores were added up, and the respondents were categorized by looking at the total number/score. This study used the chi-square test to analyze the relationship between ACT and Illness perception, whose data scale includes ordinal scale data.

Results

Respondents in this study were grouped by gender, age, formal education, occupation, length of illness, history of previous illness, family history of illness, history of allergies, and medication history. Most of the respondents were female, with an age in the late teenager range. Most respondent's education levels were senior high school. Most of the respondent's family history was no family illness (Table 1). Most of the respondents received oral short-acting beta-2 agonist (SABA) therapy, which was included in step 1 according to the guidelines of the Global Initiative for Asthma⁷ (Table 2).

Asthma symptom control was measured using the ACT questionnaire, which showed that most of the respondents sometimes experienced asthma, which was felt to interfere with their daily activities. Most of the respondents never

Table 1 Frequency Distribution of Respondent Characteristics

| Characteristics | n=75 | % |
|-------------------------|------|----|
| Gender | | |
| Male | 25 | 33 |
| Female | 50 | 67 |
| Age (years) | | |
| Late teenager (17–25) | 69 | 92 |
| Early adulthood (26–35) | 6 | 8 |
| Education | | |
| Senior high school | 54 | 72 |
| Bachelor degree | 18 | 24 |
| Post bachelor degree | 3 | 4 |
| Family disease | | |
| Asthma | 27 | 36 |
| Diabetes mellitus | 8 | 11 |
| Hypertension | 10 | 13 |
| No family illness | 30 | 40 |

Table 2 Asthma Control Level

| ACT Total Value | n=75 | % |
|---|------|----|
| Fully controlled (total score: 25) | 3 | 4 |
| Partially controlled (total score: 20–24) | 58 | 77 |
| Uncontrolled (total score: ≤19) | 14 | 19 |

experienced symptoms of shortness of breath. Most of the respondents had never woken up at night/early, experienced 1–2 times/day using spray/oral medication to relieve breathing, and fully controlled against the control level. Table 2 showed that most of the respondents were partially controlled, as many as 58 people.

Most respondents experienced symptoms of shortness of breath and wheezing, and most respondents understand that these symptoms are related to their asthma. The cyclical timeline showed that most respondents said that they experienced asthma symptoms suddenly, while at some high points such as on the timeline (respondents realized that asthma would be suffered for life, personal control, treatment control respondents said the treatment was very helpful to overcome asthma, illness, coherence identity, emotion, and causal (Table 3).

Based on Table 4, it was known that the five most respondents answered about the cause of asthma, namely that asthma was caused by stress.

Heredity, environmental pollution, overwork, and emotional feelings. With the answer choices, environmental pollution is the main cause (Table 5).

Table 6 showed that there was a relationship between asthma control scores and Illness perception ($p > 0.05$) on the timeline ($p = 0.03$), personal control ($p = 0.03$), and causal representation ($p = 0.01$).

Discussion

Gender can influence the development of asthma. The prevalence of asthma in boys was almost double that of girls at the age of <14 years, but the prevalence in girls was greater than in boys after 14 years.¹⁶ The relationship between sex and asthma was unknown, although men's lungs are smaller at birth but larger in adulthood than women's. This may be due to pubertal sex susceptibility to the development of asthma, including hormonal changes and sex-specific differences in environmental exposure.¹⁷

In addition to gender, age also affects the severity and type of asthma. Late-onset asthma was experienced in some adult patients, especially women, who develop asthma in adulthood. Patients with this type of asthma were less likely to have allergies (non-allergic) and often require higher doses of ICS to treat corticosteroids.¹⁸

Asthma in this type of allergic asthma is closely related to genetics and is generally influenced by heredity. Increased exposure to allergens in genetically susceptible individuals can lead to allergic sensitization.¹⁹ Continuous exposure to allergens can increase the risk of asthma and other allergic diseases. Genes can influence the pathogenesis of asthma development in the production of allergen-specific (atopic) IgE antibodies, which cause airway hypersensitivity, and inflammatory mediators (such as cytokines, chemokines, growth factors, and the ratio of the immune response ratio between Th1 and Th2).²⁰

Most of the respondents received SABA therapy (Table 2). SABA, which was commonly used, was salbutamol, which acts as a reliever. These drugs were given to patients as first aid during asthma exacerbations or exacerbations. The frequency of SABA use will affect the asthma symptom control assessment. The more frequent use of SABA as a reliever indicates that the control of asthma symptoms was low because one of the requirements for asthma symptoms to

Table 3 Respondent's Perceptions of Asthma

| Illness Perception | | | Respondent's Perceptions of Asthma | | | |
|--------------------|-----------------------|---|------------------------------------|--------------------------------|------|----|
| Code | Domain | Question | No | Answer Category | n=75 | % |
| B1 | Consequence | How much does asthma affect activity? | 1 | Doesn't affect me at all | 0 | 0 |
| | | | 2 | Slightly affect | 10 | 13 |
| | | | 3 | Doubtful | 9 | 12 |
| | | | 4 | Enough Influence | 25 | 33 |
| | | | 5 | Very influential | 31 | 41 |
| B2 | Timeline | How long have you had asthma? | 1 | Just a few days | 8 | 10 |
| | | | 2 | Several months | 4 | 5 |
| | | | 3 | Doubtful | 12 | 16 |
| | | | 4 | Several years | 23 | 30 |
| | | | 5 | Forever | 28 | 37 |
| B3 | Personal control | How much do you feel about asthma? | 1 | Totally out of control | 0 | 0 |
| | | | 2 | A little control | 17 | 22 |
| | | | 3 | Doubtful | 6 | 8 |
| | | | 4 | Controlled | 35 | 46 |
| | | | 5 | Perfectly controlled | 17 | 22 |
| B4 | Treatment control | How much do you believe that the treatment that has been done so far can help asthma? | 1 | Not helpful | 1 | 1 |
| | | | 2 | A little help | 6 | 8 |
| | | | 3 | Doubtful | 3 | 4 |
| | | | 4 | Help | 31 | 41 |
| | | | 5 | Very helpful | 34 | 45 |
| B5 | Timeline cyclical | How often do you experience asthma symptoms? | 1 | Never | 15 | 20 |
| | | | 2 | 1-2× a month | 0 | 0 |
| | | | 3 | Don't know (suddenly appeared) | 57 | 76 |
| | | | 4 | 1-2× a week | 1 | 1 |
| | | | 5 | Every day | 2 | 2 |
| B6 | Illness | How much do you experience anxiety about asthma? | 1 | Not worried at all | 26 | 3 |
| | | | 2 | A little worried | 15 | 20 |
| | | | 3 | Doubtful | 9 | 12 |
| | | | 4 | Worry | 17 | 22 |
| | | | 5 | Very worried | 8 | 10 |
| B7 | Coherence identity | How much do you understand asthma? | 1 | Do not understand | 0 | 0 |
| | | | 2 | Understand a little | 19 | 25 |
| | | | 3 | Doubtful | 6 | 8 |
| | | | 4 | Understand | 39 | 52 |
| | | | 5 | Really understand | 11 | 14 |
| B8 | Emotion | How much does asthma affect your emotions? | 1 | Doesn't make me emotional | 23 | 30 |
| | | | 2 | A little emotion | 20 | 26 |
| | | | 3 | Doubtful | 5 | 6 |
| | | | 4 | Emotion | 9 | 12 |
| | | | 5 | Very emotional | 18 | 24 |
| B9 | Causal representation | How much does asthma affects your financial condition? | 1 | Not affect | 25 | 33 |
| | | | 2 | Slightly affect | 23 | 30 |
| | | | 3 | Doubtful | 4 | 5 |
| | | | 4 | Influence | 6 | 8 |
| | | | 5 | Very influential | 17 | 22 |

Table 4 Respondent's Perceptions Regarding the Causes of Asthma Experienced

| No | Asthma Cause | Number of Respondents Who Answered | | | | | Total |
|-----|----------------------------|------------------------------------|----|----|----|----|-------|
| | | STS | TS | R | S | SS | |
| C1 | Stress or anxiety | 0 | 31 | 0 | 36 | 8 | 75 |
| C2 | Hereditiy/genetics | 0 | 35 | 2 | 24 | 14 | 75 |
| C3 | Germs, viruses, infections | 9 | 40 | 8 | 14 | 4 | 75 |
| C4 | Eating patterns or habits | 0 | 40 | 6 | 20 | 9 | 75 |
| C5 | Bad luck | 4 | 54 | 4 | 6 | 7 | 75 |
| C6 | Bad treatment in the past | 6 | 52 | 4 | 8 | 0 | 75 |
| C7 | Environmental pollution | 3 | 0 | 0 | 52 | 17 | 75 |
| C8 | My behavior | 2 | 31 | 5 | 28 | 7 | 75 |
| C9 | Always think negative | 4 | 32 | 11 | 28 | 0 | 75 |
| C10 | Problems in the family | 4 | 36 | 7 | 27 | 1 | 75 |
| C11 | Too much work | 0 | 5 | 7 | 55 | 8 | 75 |
| C12 | Emotional feeling | 4 | 27 | 4 | 33 | 7 | 75 |
| C13 | Aging/getting older | 1 | 61 | 6 | 7 | 0 | 75 |
| C14 | Alcohol consumption | 10 | 58 | 7 | 0 | 0 | 75 |
| C15 | Smoke | 9 | 48 | 0 | 9 | 11 | 75 |
| C16 | Due to injury/accident | 10 | 58 | 7 | 0 | 0 | 75 |
| C17 | Decreased immunity | 3 | 45 | 11 | 10 | 8 | 75 |

Note: STS: strongly disagree, SS: totally agree, R: hesitated, S: agree, TS: disagree

Table 5 Respondent's Perceptions Regarding the Three Highest Factors that Cause Asthma

| No | Asthma Cause | Number of Respondents Who Answered | | |
|-----|---|------------------------------------|-----------------|-----------------|
| | | 1 st | 2 nd | 3 rd |
| C1 | Stress or anxiety | 5 | 4 | 0 |
| C2 | Hereditiy/genetics | 6 | 0 | 2 |
| C3 | Germs, viruses, infections | 2 | 6 | 2 |
| C4 | Eating patterns or habits | 2 | 4 | 4 |
| C5 | Bad luck | 2 | 0 | 0 |
| C6 | Bad treatment in the past | 0 | 0 | 0 |
| C7 | Environmental pollution | 25 | 26 | 8 |
| C8 | My own behavior | 2 | 7 | 4 |
| C9 | Always think negative | 0 | 0 | 2 |
| C10 | Problems in the family | 0 | 0 | 0 |
| C11 | Too much work | 18 | 12 | 6 |
| C12 | Emotional feelings (such as feeling sad, lonely, anxious) | 7 | 6 | 0 |
| C13 | Aging/getting older | 0 | 0 | 0 |
| C14 | Alcohol consumption | 0 | 0 | 0 |
| C15 | Smoke | 1 | 4 | 0 |
| C16 | Due to injury/accident | 0 | 0 | 0 |
| C17 | Decreased immunity | 0 | 0 | 2 |

Table 6 Cross-tabulation of Pain Perception and Asthma Control

| No | Aspect | P |
|----|-----------------------|-------|
| 1 | Consequences | 0.92 |
| 2 | Timeline | 0.03* |
| 3 | Personal control | 0.03* |
| 4 | Treatment control | 0.61 |
| 5 | Timeline cyclical | 0.49 |
| 6 | Illness coherence | 0.25 |
| 7 | Identity | 0.36 |
| 8 | Emotional response | 0.06 |
| 9 | Causal representation | 0.01* |

Note: *p<0.05 significant

be well controlled was using a reliever maximum of twice a week.²¹ Salbutamol belonged to the beta-2 agonist class (adrenoceptor agonists), having a smooth muscle relaxing action by activating 2 (β_2 AR) receptors and inhibiting the release of several mast cell substances, inhibiting microvascular leakage and increasing mucociliary transport by increasing ciliary activation or affecting the composition of mucus secretion.²²

Assessment of asthma control will affect the therapy used. Asthma treatment/management based on asthma control includes three things that need to be evaluated continuously, namely: assessment, including diagnosis, symptom control and risk factors (including lung function), inhaler technique and adherence (adherence).⁷ Then the dose adjustment (adjust treatment) was carried out based on the results of the previous assessment, and then the response review was based on the previous dose adjustment. If the results of the response assessment have yet to be maximized, it needs to be considered for a return assessment.^{7,9}

Most of the respondents' asthma control level was partly controlled. Factors that affect asthma control include obesity, stress, cigarette, and physical activity. Obese people with asthma have lower lung function and more comorbidities than normal-weight people.²³

Asthmatic patients who experience stress and anxiety can trigger an attack; stress can trigger aldosterone secretion and the release of catecholamines in response to low cardiac output, thereby accelerating the decline in serum potassium levels. Stress also reduces the body's immune system's ability to fight off pathogenic bacteria. So those asthmatics who experience stress have a greater chance of

experiencing exacerbations. The basic theory is that psychological stress works by changing the magnitude of the airway inflammatory response that causes irritation, allergens, and infections in people with asthma. This suggests that stress alone cannot modify immune function in a way that leads to asthma symptoms.²⁴

Tobacco smoke in cigarettes accelerates the decline in lung function in people with asthma, increases asthma severity, and makes patients less responsive to treatment with inhaled and systemic glucocorticosteroids, but smokers tend to achieve control and remain at risk of exacerbations.²⁵

Asthma patients believed that physical activity can worsen asthma symptoms, to the risk of the disease in the long term. Patients with serious illnesses had the belief that physical activity was not good for asthma. Reluctance to do physical activity was not only due to worsening asthma symptoms but also caused by psychological factors. Exercise-induced asthma is a symptom in non-asthmatic patients due to excessive physical activity. This can happen when a person is doing strenuous physical activity, and they will breathe faster through the mouth.^{7,12}

Most respondents experienced symptoms of shortness of breath and wheezing (Table 5). This was in line with many respondents saying asthma-related symptoms are shortness of breath and wheezing. This was in accordance with the symptoms of asthma that do occur. The whistling sound was caused by interference with the respiratory tract or excessive mucous production. If breathing is difficult, then the body's cells experience a lack of oxygen supply, which could cause difficulty sleeping or waking up at night, in addition to causing the body to become tired. While sore throat, nausea, abdominal pain, stiff joints, eye pain, headache, dizziness, and weight loss were symptoms unrelated to asthma. However, it was likely that these symptoms might be caused by the side effects of medications used by patients.^{7,12}

Respondent's perception of asthma had a low point in consequence (asthma greatly affected daily activity at 41.33%). Asthmatics do have limitations in their activities. Therefore, if it was known what activities can cause asthma, patients should be counseled to take medication first to prevent asthma attacks.⁷

Illness perception will affect the way asthma patients cope and self-management of the disease. This data can inform healthcare

providers about a patient's psychosocial response to their asthma, whether they were responsive to changes in clinical meetings or through self-management intervention training. Therefore, exploring the patient's perception of the disease was an important component of good clinical care.⁹ One factor affecting self-management is illness perception, the patient's cognitive picture of the disease. This image was identified through five dimensions: identity, consequences, disease causes, timeline, healing, or control.¹¹ Knowing a person's perception of the disease can be done by providing education and more information to patients. In addition, efforts can be made to develop good health approaches and promotion strategies to reduce the number of patients exposed to asthma attacks and participate in improving the quality of life of patients.

There was a relationship between asthma control scores and illness perception on a timeline, personal control, and causal representation (Table 6). This was different from previous research by Lorensia et al.,¹³ which states that there was a relationship between asthma control and illness perception (on control and identity). Other research showed that most of the highest illness perceptions were about asthma symptoms experienced by respondents on individual scores related to permanent symptoms. When the influence of illness perception on symptoms, the results obtained were significant, such as how long asthma had been suffered and illness perception about the cause, which was significant for changes in asthma symptoms.¹³

Conclusions

Most of the respondents have their asthma partially controlled. Most respondents experienced shortness of breath and wheezing symptoms, and most understand that these symptoms are related to their asthma. There was a relationship between asthma control and illness perception on the timeline dimensions, personal control, and causal representation.

Conflict of Interest

The authors declare no conflict of interest.

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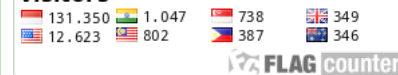
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RELATIONSHIP OF ILLNESS PERCEPTION WITH ASTHMA SYMPTOMS CONTROL IN ADOLESCENTS

Amelia Lorensia, Ayu Lestari

Abstract

Asthma has a high prevalence in Indonesia. Good self-management is necessary for therapy and greatly affects the level of asthma control symptoms. The patient's perception plays an important role in the success of asthma therapy, especially among students, because education affects a person's mindset and perception of disease conditions. The purpose was to determine the relationship between illness perception and control of asthma symptoms in adolescents. The method was cross-sectional and was conducted from November 2019 to January 2020. The variables were asthma control and illness perception. This research was conducted on a campus in Surabaya city. Respondents were asked to fill out the Illness Perception Questionnaire (IPQ) and asthma control test (ACT) questionnaire and analyze by calculating each answer point. This study used a chi-square test to analyze the relationship between ACT and Illness perception. This study involved 75 respondents. Of most of the respondents, 58 people have their asthma partially controlled. Most respondents experienced shortness of breath and wheezing symptoms, and most understood that they were related to their asthma. There was a relationship between asthma control scores and illness perception ($p > 0.05$) on the timeline ($p = 0.03$), personal control ($p = 0.03$), and causal representation ($p = 0.01$). Illness perception can affect asthma symptoms. Asthma will be experienced for a long time, and respondents will better adjust their lifestyle and have confidence that it was controlled. Material factors were also considered. If their asthma was controlled, it was hoped not to affect their finances.

Keywords

Adolescents; asthma symptoms; illness perception

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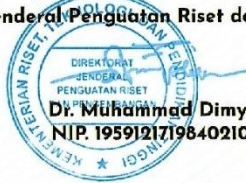
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Relationship of Illness Perception and Asthma Symptoms Control in Adolescents

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RESEARCH ARTICLE

Relationship of Illness Perception and Asthma Symptoms Control in Adolescents

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Amelia Lorensia,¹ Ayu Lestari²

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Abstract

Asthma has a high prevalence in Indonesia. Good self-management is necessary for therapy and greatly affects the level of asthma control symptoms. The patient's perception plays an important role in the success of asthma therapy, especially among students, because education affects a person's mindset and perception of disease conditions. The purpose was to determine the relationship between illness perception and control of asthma symptoms in adolescents. The method was cross-sectional and was conducted from November 2019 to January 2020. The variables were asthma control and illness perception. This research was conducted on a campus in Surabaya city. Respondents were asked to fill out the Illness Perception Questionnaire (IPQ) and asthma control test (ACT) questionnaire and analyze by calculating each answer point. This study used a chi-square test to analyze the relationship between ACT and Illness perception. This study involved 75 respondents. Of most of the respondents, 58 people have their asthma partially controlled. Most respondents experienced shortness of breath and wheezing symptoms, and most understood that they were related to their asthma. There was a relationship between asthma control scores and illness perception ($p > 0.05$) on the timeline ($p = 0.03$), personal control ($p = 0.03$), and causal representation ($p = 0.01$). Illness perception can affect asthma symptoms. Asthma will be experienced for a long time, and respondents will better adjust their lifestyle and have confidence that it was controlled. Material factors were also considered. If their asthma was controlled, it was hoped not to affect their finances.

Keywords: Adolescents, asthma symptoms, illness perception

Introduction

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Asthma is a globally significant non-communicable disease with major consequences on the health of children and adults, including high morbidity and death in severe cases.¹ Early recognition of the level of asthma control against self-disease is highly recommended and can self-detect if asthma is not controlled because it can prevent acute asthma attacks.² One of the tools that patients can use in detecting the level of asthma control is the asthma control test (ACT) questionnaire, which can detect the worsening of the disease.³ Early recognition of the level of asthma control against self-disease is highly recommended and can self-detect if asthma is not controlled because it can prevent acute asthma attacks.⁴

This ACT questionnaire can help us identify individuals at risk for developing asthma or who may experience mild asthma symptoms. The type of screening often used is the asthma symptom score scale. The patient-completed asthma control assessment includes five domains:

activity restriction, frequency of day and night symptoms (based on criteria for frequency of night awakenings), triggers, adherence, and the patient's perceived response to treatment.^{5,6}

The goals of asthma treatment are to minimize future risks, namely to maintain lung function and lung development, achieve good symptom control, maintain normal activity levels, provide information and support to maximize compliance and provide information on how to avoid triggers that can lead to asthma attacks, and minimize drug side effects.^{7,8} Although treatment has been effective in reducing morbidity due to asthma, the effectiveness of therapy will be achieved if the use of drugs is in accordance with their use. In addition, the patient's perception also plays an important role in therapy success because each individual's perception produces a different response from one individual to another.⁹ Not a few previous studies from home and abroad have proven that illness perception plays a major role in the therapeutic outcome of a disease so that illness perception can reflect disease control in each patient.¹⁰ The Illness Perception Questionnaire

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(IPQ) is the first attempt to systematically assess core cognitive aspects of disease representation, as developed across various disease groups. Perceived personal control is stronger than perceived control over treatment.^{11,12} IPQ is a very easy and fast questionnaire to determine a person's illness perception.¹¹ This study aimed to determine the relationship between illness perception and control of asthma symptoms in adolescents.

Methods

The research method was cross-sectional. This study determined the relationship between illness perception and asthma symptom control in outpatient adolescent asthma patients. The data was collected from November 2019 to January 2020 in Surabaya city by filling out questionnaires. The ethics committee of the University of Surabaya approved the study protocols (No. 109A/KE/XI/2019).

The independent variable was asthma control, and the dependent variable was illness perception. The measuring instrument used to determine asthma control was the ACT questionnaire. In this questionnaire, there were five questions with a score range of 1–5. Of the five questions, the results summed and categorized into three categories, namely very controlled (score 20), well controlled (score 16–19), and uncontrolled (score 16).^{7,8}

Illness perception is an individual's response to the disease through a person's perception of the disease response. Each individual has a different perception of the disease.^{13,14} In this study, IPQ was the measuring instrument used to determine pain perception. In this questionnaire, there were nine questions that can be categorized into nine categories: consequences, timeline, personal control, treatment control, identity (related symptoms), disease coherence, emotional response, understanding, and concern.^{10–12,14,15}

The target population of this research was active students from one of the campuses in the Rungkut subdistrict, Surabaya city, East Java, Indonesia. Respondents were part of the population who met the criteria obtained 75 people. The non-probability sampling technique was purposive sampling.

The validated questionnaires were ACT and IPQ. Content validity is an explanation of a measuring instrument substantively, or

called substantive validity, which focuses on conceptualization and the extent to which previous concepts were presented in a literature review. The first step was to validate the content, with a questionnaire compiled based on the journal, which will then be translated from English to Indonesian. Then proceed with the validity test, namely assessing the questionnaire based on the concept or theory of the variables studied, by conducting trials on respondents who meet the criteria, totaling 30 people, and these respondents were not research samples. The data obtained were tabulated and correlated between instrument item scores with the help of a computer program, namely in this study using SPSS version 25 for Windows. In addition to considering the validity, the research instrument also considers the reliability aspect.

Respondents were asked to fill out and answer the IPQ and ACT questionnaire and analyze the questionnaire by calculating each answer point. Then, the respondents were asked to fill out and answer the Illness perception questionnaire. After the respondents filled in, the data and questionnaires were collected, and the questionnaires were analyzed and calculated for each question answer point. Then, the points/scores were added up, and the respondents were categorized by looking at the total number/score. This study used the chi-square test to analyze the relationship between ACT and Illness perception, whose data scale includes ordinal scale data.

Results

Respondents in this study were grouped by gender, age, formal education, occupation, length of illness, history of previous illness, family history of illness, history of allergies, and medication history. Most of the respondents were female, with an age in the late teenager range. Most respondent's education levels were senior high school. Most of the respondent's family history was no family illness (Table 1). Most of the respondents received oral short-acting beta-2 agonist (SABA) therapy, which was included in step 1 according to the guidelines of the Global Initiative for Asthma⁷ (Table 2).

Asthma symptom control was measured using the ACT questionnaire, which showed that most of the respondents sometimes experienced asthma, which was felt to interfere with their daily activities. Most of the respondents never

Table 1 Frequency Distribution of Respondent Characteristics

| Characteristics | n=75 | % |
|-------------------------|------|----|
| Gender | | |
| Male | 25 | 33 |
| Female | 50 | 67 |
| Age (years) | | |
| Late teenager (17–25) | 69 | 92 |
| Early adulthood (26–35) | 6 | 8 |
| Education | | |
| Senior high school | 54 | 72 |
| Bachelor degree | 18 | 24 |
| Post bachelor degree | 3 | 4 |
| Family disease | | |
| Asthma | 27 | 36 |
| Diabetes mellitus | 8 | 11 |
| Hypertension | 10 | 13 |
| No family illness | 30 | 40 |

Table 2 Asthma Control Level

| ACT Total Value | n=75 | % |
|---|------|----|
| Fully controlled (total score: 25) | 3 | 4 |
| Partially controlled (total score: 20–24) | 58 | 77 |
| Uncontrolled (total score: ≤19) | 14 | 19 |

experienced symptoms of shortness of breath. Most of the respondents had never woken up at night/early, experienced 1–2 times/day using spray/oral medication to relieve breathing, and fully controlled against the control level. Table 2 showed that most of the respondents were partially controlled, as many as 58 people.

Most respondents experienced symptoms of shortness of breath and wheezing, and most respondents understand that these symptoms are related to their asthma. The cyclical timeline showed that most respondents said that they experienced asthma symptoms suddenly, while at some high points such as on the timeline (respondents realized that asthma would be suffered for life, personal control, treatment control respondents said the treatment was very helpful to overcome asthma, illness, coherence identity, emotion, and causal (Table 3).

Based on Table 4, it was known that the five most respondents answered about the cause of asthma, namely that asthma was caused by stress.

Heredity, environmental pollution, overwork, and emotional feelings. With the answer choices, environmental pollution is the main cause (Table 5).

Table 6 showed that there was a relationship between asthma control scores and Illness perception ($p>0.05$) on the timeline ($p=0.03$), personal control ($p=0.03$), and causal representation ($p=0.01$).

Discussion

Gender can influence the development of asthma. The prevalence of asthma in boys was almost double that of girls at the age of <14 years, but the prevalence in girls was greater than in boys after 14 years.¹⁶ The relationship between sex and asthma was unknown, although men's lungs are smaller at birth but larger in adulthood than women's. This may be due to pubertal sex susceptibility to the development of asthma, including hormonal changes and sex-specific differences in environmental exposure.¹⁷

In addition to gender, age also affects the severity and type of asthma. Late-onset asthma was experienced in some adult patients, especially women, who develop asthma in adulthood. Patients with this type of asthma were less likely to have allergies (non-allergic) and often require higher doses of ICS to treat corticosteroids.¹⁸

Asthma in this type of allergic asthma is closely related to genetics and is generally influenced by heredity. Increased exposure to allergens in genetically susceptible individuals can lead to allergic sensitization.¹⁹ Continuous exposure to allergens can increase the risk of asthma and other allergic diseases. Genes can influence the pathogenesis of asthma development in the production of allergen-specific (atopic) IgE antibodies, which cause airway hypersensitivity, and inflammatory mediators (such as cytokines, chemokines, growth factors, and the ratio of the immune response ratio between Th1 and Th2).²⁰

Most of the respondents received SABA therapy (Table 2). SABA, which was commonly used, was salbutamol, which acts as a reliever. These drugs were given to patients as first aid during asthma exacerbations or exacerbations. The frequency of SABA use will affect the asthma symptom control assessment. The more frequent use of SABA as a reliever indicates that the control of asthma symptoms was low because one of the requirements for asthma symptoms to

Table 3 Respondent's Perceptions of Asthma

| Illness Perception | | | Respondent's Perceptions of Asthma | | | |
|--------------------|-----------------------|---|------------------------------------|--------------------------------|------|----|
| Code | Domain | Question | No | Answer Category | n=75 | % |
| B1 | Consequence | How much does asthma affect activity? | 1 | Doesn't affect me at all | 0 | 0 |
| | | | 2 | Slightly affect | 10 | 13 |
| | | | 3 | Doubtful | 9 | 12 |
| | | | 4 | Enough Influence | 25 | 33 |
| | | | 5 | Very influential | 31 | 41 |
| B2 | Timeline | How long have you had asthma? | 1 | Just a few days | 8 | 10 |
| | | | 2 | Several months | 4 | 5 |
| | | | 3 | Doubtful | 12 | 16 |
| | | | 4 | Several years | 23 | 30 |
| | | | 5 | Forever | 28 | 37 |
| B3 | Personal control | How much do you feel about asthma? | 1 | Totally out of control | 0 | 0 |
| | | | 2 | A little control | 17 | 22 |
| | | | 3 | Doubtful | 6 | 8 |
| | | | 4 | Controlled | 35 | 46 |
| | | | 5 | Perfectly controlled | 17 | 22 |
| B4 | Treatment control | How much do you believe that the treatment that has been done so far can help asthma? | 1 | Not helpful | 1 | 1 |
| | | | 2 | A little help | 6 | 8 |
| | | | 3 | Doubtful | 3 | 4 |
| | | | 4 | Help | 31 | 41 |
| | | | 5 | Very helpful | 34 | 45 |
| B5 | Timeline cyclical | How often do you experience asthma symptoms? | 1 | Never | 15 | 20 |
| | | | 2 | 1-2× a month | 0 | 0 |
| | | | 3 | Don't know (suddenly appeared) | 57 | 76 |
| | | | 4 | 1-2× a week | 1 | 1 |
| | | | 5 | Every day | 2 | 2 |
| B6 | Illness | How much do you experience anxiety about asthma? | 1 | Not worried at all | 26 | 3 |
| | | | 2 | A little worried | 15 | 20 |
| | | | 3 | Doubtful | 9 | 12 |
| | | | 4 | Worry | 17 | 22 |
| | | | 5 | Very worried | 8 | 10 |
| B7 | Coherence identity | How much do you understand asthma? | 1 | Do not understand | 0 | 0 |
| | | | 2 | Understand a little | 19 | 25 |
| | | | 3 | Doubtful | 6 | 8 |
| | | | 4 | Understand | 39 | 52 |
| | | | 5 | Really understand | 11 | 14 |
| B8 | Emotion | How much does asthma affect your emotions? | 1 | Doesn't make me emotional | 23 | 30 |
| | | | 2 | A little emotion | 20 | 26 |
| | | | 3 | Doubtful | 5 | 6 |
| | | | 4 | Emotion | 9 | 12 |
| | | | 5 | Very emotional | 18 | 24 |
| B9 | Causal representation | How much does asthma affects your financial condition? | 1 | Not affect | 25 | 33 |
| | | | 2 | Slightly affect | 23 | 30 |
| | | | 3 | Doubtful | 4 | 5 |
| | | | 4 | Influence | 6 | 8 |
| | | | 5 | Very influential | 17 | 22 |

Table 4 Respondent's Perceptions Regarding the Causes of Asthma Experienced

| No | Asthma Cause | Number of Respondents Who Answered | | | | | Total |
|-----|----------------------------|------------------------------------|----|----|----|----|-------|
| | | STS | TS | R | S | SS | |
| C1 | Stress or anxiety | 0 | 31 | 0 | 36 | 8 | 75 |
| C2 | Heredity/genetics | 0 | 35 | 2 | 24 | 14 | 75 |
| C3 | Germs, viruses, infections | 9 | 40 | 8 | 14 | 4 | 75 |
| C4 | Eating patterns or habits | 0 | 40 | 6 | 20 | 9 | 75 |
| C5 | Bad luck | 4 | 54 | 4 | 6 | 7 | 75 |
| C6 | Bad treatment in the past | 6 | 52 | 4 | 8 | 0 | 75 |
| C7 | Environmental pollution | 3 | 0 | 0 | 52 | 17 | 75 |
| C8 | My behavior | 2 | 31 | 5 | 28 | 7 | 75 |
| C9 | Always think negative | 4 | 32 | 11 | 28 | 0 | 75 |
| C10 | Problems in the family | 4 | 36 | 7 | 27 | 1 | 75 |
| C11 | Too much work | 0 | 5 | 7 | 55 | 8 | 75 |
| C12 | Emotional feeling | 4 | 27 | 4 | 33 | 7 | 75 |
| C13 | Aging/getting older | 1 | 61 | 6 | 7 | 0 | 75 |
| C14 | Alcohol consumption | 10 | 58 | 7 | 0 | 0 | 75 |
| C15 | Smoke | 9 | 48 | 0 | 9 | 11 | 75 |
| C16 | Due to injury/accident | 10 | 58 | 7 | 0 | 0 | 75 |
| C17 | Decreased immunity | 3 | 45 | 11 | 10 | 8 | 75 |

Note: STS: strongly disagree, SS: totally agree, R: hesitated, S: agree, TS: disagree

Table 5 Respondent's Perceptions Regarding the Three Highest Factors that Cause Asthma

| No | Asthma Cause | Number of Respondents Who Answered | | |
|-----|---|------------------------------------|-----------------|-----------------|
| | | 1 st | 2 nd | 3 rd |
| C1 | Stress or anxiety | 5 | 4 | 0 |
| C2 | Heredity/genetics | 6 | 0 | 2 |
| C3 | Germs, viruses, infections | 2 | 6 | 2 |
| C4 | Eating patterns or habits | 2 | 4 | 4 |
| C5 | Bad luck | 2 | 0 | 0 |
| C6 | Bad treatment in the past | 0 | 0 | 0 |
| C7 | Environmental pollution | 25 | 26 | 8 |
| C8 | My own behavior | 2 | 7 | 4 |
| C9 | Always think negative | 0 | 0 | 2 |
| C10 | Problems in the family | 0 | 0 | 0 |
| C11 | Too much work | 18 | 12 | 6 |
| C12 | Emotional feelings (such as feeling sad, lonely, anxious) | 7 | 6 | 0 |
| C13 | Aging/getting older | 0 | 0 | 0 |
| C14 | Alcohol consumption | 0 | 0 | 0 |
| C15 | Smoke | 1 | 4 | 0 |
| C16 | Due to injury/accident | 0 | 0 | 0 |
| C17 | Decreased immunity | 0 | 0 | 2 |

Table 6 Cross-tabulation of Pain Perception and Asthma Control

| No | Aspect | p |
|----|-----------------------|-------|
| 1 | Consequences | 0.92 |
| 2 | Timeline | 0.03* |
| 3 | Personal control | 0.03* |
| 4 | Treatment control | 0.61 |
| 5 | Timeline cyclical | 0.49 |
| 6 | Illness coherence | 0.25 |
| 7 | Identity | 0.36 |
| 8 | Emotional response | 0.06 |
| 9 | Causal representation | 0.01* |

Note: *p < 0.05 significant

be well controlled was using a reliever maximum of twice a week.²¹ Salbutamol belonged to the beta-2 agonist class (adrenoceptor agonists), having a smooth muscle relaxing action by activating 2 (β_2 AR) receptors and inhibiting the release of several mast cell substances, inhibiting microvascular leakage and increasing mucociliary transport by increasing ciliary activation or affecting the composition of mucus secretion.²²

Assessment of asthma control will affect the therapy used. Asthma treatment/management based on asthma control includes three things that need to be evaluated continuously, namely: assessment, including diagnosis, symptom control and risk factors (including lung function), inhaler technique and adherence (adherence).⁷ Then the dose adjustment (adjust treatment) was carried out based on the results of the previous assessment, and then the response review was based on the previous dose adjustment. If the results of the response assessment have yet to be maximized, it needs to be considered for a return assessment.^{7,9}

Most of the respondents' asthma control level was partly controlled. Factors that affect asthma control include obesity, stress, cigarette, and physical activity. Obese people with asthma have lower lung function and more comorbidities than normal-weight people.²³

Asthmatic patients who experience stress and anxiety can trigger an attack; stress can trigger aldosterone secretion and the release of catecholamines in response to low cardiac output, thereby accelerating the decline in serum potassium levels. Stress also reduces the body's immune system's ability to fight off pathogenic bacteria. So those asthmatics who experience stress have a greater chance of

experiencing exacerbations. The basic theory is that psychological stress works by changing the magnitude of the airway inflammatory response that causes irritation, allergens, and infections in people with asthma. This suggests that stress alone cannot modify immune function in a way that leads to asthma symptoms.²⁴

Tobacco smoke in cigarettes accelerates the decline in lung function in people with asthma, increases asthma severity, and makes patients less responsive to treatment with inhaled and systemic glucocorticosteroids, but smokers tend to achieve control and remain at risk of exacerbations.²⁵

Asthma patients believed that physical activity can worsen asthma symptoms, to the risk of the disease in the long term. Patients with serious illnesses had the belief that physical activity was not good for asthma. Reluctance to do physical activity was not only due to worsening asthma symptoms but also caused by psychological factors. Exercise-induced asthma is a symptom in non-asthmatic patients due to excessive physical activity. This can happen when a person is doing strenuous physical activity, and they will breathe faster through the mouth.^{7,12}

Most respondents experienced symptoms of shortness of breath and wheezing (Table 5). This was in line with many respondents saying asthma-related symptoms are shortness of breath and wheezing. This was in accordance with the symptoms of asthma that do occur. The whistling sound was caused by interference with the respiratory tract or excessive mucous production. If breathing is difficult, then the body's cells experience a lack of oxygen supply, which could cause difficulty sleeping or waking up at night, in addition to causing the body to become tired. While sore throat, nausea, abdominal pain, stiff joints, eye pain, headache, dizziness, and weight loss were symptoms unrelated to asthma. However, it was likely that these symptoms might be caused by the side effects of medications used by patients.^{7,12}

Respondent's perception of asthma had a low point in consequence (asthma greatly affected daily activity at 41.33%). Asthmatics do have limitations in their activities. Therefore, if it was known what activities can cause asthma, patients should be counseled to take medication first to prevent asthma attacks.⁷

Illness perception will affect the way asthma patients cope and self-management of the disease. This data can inform healthcare

providers about a patient's psychosocial response to their asthma, whether they were responsive to changes in clinical meetings or through self-management intervention training. Therefore, exploring the patient's perception of the disease was an important component of good clinical care.⁹ One factor affecting self-management is illness perception, the patient's cognitive picture of the disease. This image was identified through five dimensions: identity, consequences, disease causes, timeline, healing, or control.¹¹ Knowing a person's perception of the disease can be done by providing education and more information to patients. In addition, efforts can be made to develop good health approaches and promotion strategies to reduce the number of patients exposed to asthma attacks and participate in improving the quality of life of patients.

There was a relationship between asthma control scores and illness perception on a timeline, personal control, and causal representation (Table 6). This was different from previous research by Lorensia et al.,¹³ which states that there was a relationship between asthma control and illness perception (on control and identity). Other research showed that most of the highest illness perceptions were about asthma symptoms experienced by respondents on individual scores related to permanent symptoms. When the influence of illness perception on symptoms, the results obtained were significant, such as how long asthma had been suffered and illness perception about the cause, which was significant for changes in asthma symptoms.¹³

Conclusions

Most of the respondents have their asthma partially controlled. Most respondents experienced shortness of breath and wheezing symptoms, and most understand that these symptoms are related to their asthma. There was a relationship between asthma control and illness perception on the timeline dimensions, personal control, and causal representation.

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Conflict of Interest

The authors declare no conflict of interest.

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