

Asthma pathophysiology: etiology and risk



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School nursing is one of several traditional roles for community health nurse. Providing health care for schools placed for a number of reasons. In the first place, school environment it self may create hazards which students must be protect from. Beside, children need to be healthy to learn effectively . similarly vital reason is, maintaining the health of children today produce healthy adults in years to come. Subsequently, protect and promote the health of overall community. Jocelyn Elders a former U. S surgeon stated “ you can not educate a child who isn’t healthy and you can’t keep a child healthy who isn’t educated” this common says teaches us the importance of keeping school child healthy as well as the necessity of school nurse (Clark, 2008).

An estimated 7 million U. S. kids under age 18 have been diagnosed with asthma and more than 13 million days of school are missed each year because of the condition, as indicated by the American Academy of Allergy, Asthma, and Immunology (KidsHealth, 2011) .

According to my week rotation in Tareq Bin Ziad primary school, I have notice that asthma ranked the 2nd highest disease among the school children based on the statistic done by the school nurse. Therefore, I have chosen asthma as a topic of my written assignment.

This paper aims to identify literature review about asthma definition, pathophysiology, causes, risk factor and sign and symptoms, diagnosis and treatments. Secondly, it will clarify community health nurse strategies including comprehensive assessment, intervention and prevention.

Definition and statistics

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Asthma is a disease that involves periodic episodes of severe but reversible bronchial obstruction in person with hypersensitive or hyperresponsive airway. Accordingly, a significant rise in episode of acute asthma requiring immediate hospitalization in children has occurred during the last 2 decades. On the contrary, frequent repeated attack of acute asthma may lead to irreversible disease in the lung and development of chronic asthma. It was proven that, in the age group 5 to 17 years about 140 per 1000 persons have been diagnosed with asthma. However the number of attacks peaks in school children in September, often associated with increase in incidence of common cold (Gould, 2006).

Although asthma is considering COPD group, likewise it is more common, more serious and more manageable than it is generally though. As asthma known to be chronic with some individuals so, it consider long live condition and might lead to death if not well managed in acute episodes . In UK, asthma kills about 1600 adults and 20 children annually (Hough, 2005).

Pathophysiology, Etiology and Risk factor

Asthma may be classified in different ways. It may be acute or chronic, acute referring to single episode where as chronic referring to long-term condition. A recently developed system rates a case of asthma on a clinical scale ranging from mild, intermittent, severe and persistent (Gould, 2006, P. 393). Matter of fact there are three phases of response take place in asthmatic patient. Firstly, sensitization stage, which occurs in atopic people via exposure to allergens in fetal or early life, stimulates production of excess immunoglobulin -E (IgE) antibodies in the serum. IgE becomes fixed to mast

cells, which then react to antigens by releasing bronchoconstrictor mediators such as histamine. Serum IgE is five times greater in people with asthma than in those without. Once allergic asthma has developed removal from the allergen does not always prevent continuing asthma, it might delay it only. Second stage called hyperreactive stage, what special about this stage it can occur with or without allergic component. Continued exposure to allergens or response to other stimuli leads to mast cell degranulation and release of inflammatory cytokines such as eosinophils . Also it releases bronchoconstrictor mediators such as histamine and extra mucus. Besides, chronic inflammation damages the surface of epithelial layer causing hyperreactivity of bronchial smooth muscle. Thirdly, bronchiconstrictors mediators and hyperreactive bronchial smooth muscle lead to exaggerated bronchoconstriction . These triggers might be food such as diary products, egg and acidic drink . pets, balloon, smoking, cold whether, indoor condition (dust) , some drugs, gastroesophageal reflux disorder and emotions such as depression and frustrated chest infection and exercise (Hough, 2005, P. 366). Another facts associated with asthma pathophysiology are Impaired mucociliary function, edema formation, vascular congestion, increase vascular permeability, production of thick tenacious mucus, thickening of airway wall (McCance & Huether, 2006).

There is no single cause of asthma, but certain factors may increase the likelihood of developing it. These factor can be categorized as genetic and environmental factors including: A family history of asthma or other related allergic conditions (known as atopic conditions), such as eczema, food allergy or hay fever. Having bronchiolitis as a child (a common lung infection

among children) and being born prematurely (especially if you needed a ventilator). Developing another atopic condition such as a food allergy and being exposed to tobacco smoke as a child particularly if your mother smoked during pregnancy. As well as being born with a low birth weight less than 2kg or 4.5 pounds (Asthma, 2010).

Additionally causes are viral upper respiratory infection, sedentary life style, poor ventilation and increased air pollution (Gould, 2006). Few risk factors related to asthma including gender, obesity, smoking and population differences. Before puberty asthma occurs more often in males while after adolescence, it appears to be more common in females. Some experts argue that excess weight pressing on the lungs may trigger the hyperreactive response in the airways typical of asthma. Others believe that asthma leads to obesity by inhibiting physical activity, although several studies have found no difference in activity levels between people with or without asthma (health central, 2011).

Sign and symptoms and Diagnoses

The sign and symptoms of asthma vary from person to person and in any individual from time to time. Some of these are Shortness of breath (especially with exertion or at night), Wheezing sounds, coughing may be chronic (worse at night and early morning), sweating, bluish color to the lips and face, anxiety and chest tightness (Medicine Net, 2011). Similarly important symptoms including: Pulling in of the skin between the ribs when breathing (intercostal retractions), Abnormal breathing pattern, tachycardia,

hypoxia, thick tenacious or sticky mucus, chronic dry cough in some and others have productive cough (Copstead & Banasik, 2010)

Actually, there is no simple test to diagnose asthma. Nevertheless, general practitioners normally diagnose asthma by asking about the symptoms, what trigger it, how often and what settle it down. Coupled with some questions about medications patient use, life style, occupational and home and work environment. Other test are spirometry, to assess how well your lungs work and Peak expiratory flow rate test which defined as a small hand-held device known as a peak flow meter can be used to measure how fast you can blow air out of your lungs in one breath (Medicine Net, 2011).

Further more, asthma can be diagnosed based on physical finding, sputum examination, pulmonary function test, and blood gases analysis and chest radiography. Complete blood count can show an elevated number of white blood cells with increased eosinophils. Equally important test is skin testing and inhalation test to determine type of allergens. Conversely, skin testing is usually more helpful in young patient who have extrinsic asthma. Arterial blood gases may be normal in mild condition but as long as it become severe respiratory alkalosis and hypoxia will be shown (Copstead & Banasik, 2010).

As it is mentioned previously, asthma classified as mild, intermittent, severe and persistent. Other classifications are status asthmaticus and it characterized by prolonged attack more than 24 hours, leading to dehydration. Asphyxia asthma, this attack leads to arrest within hours or minute. Another one is nocturnal asthma, related to asthma at night and it considers symptoms free in the day. Besides, occupational asthma, usually

seen in adults and attribute to substance in work place. in addition to drug induced asthma , aspirin intolerance occurs in about 10% of asthmatic people because it reacts with in hours after ingesting it . one more is premenstrual asthma, it present as particularly severe monthly asthma attack during the 5- 10 days leading up to menstruation. As well as, exercise induced asthma; this is common in children and adolescents. Bronchospasm often occur within three minute after the end of exercise and resolve in 60 minute (Hough, 2005).

Prevention and treatment

Minimizing the number and severity of acute attacks is crucial to prevent permanent lung damage, reduce risk of infection and to prevent chronic lung disease such as asthma. General measures to reduce asthma include avoidance of common triggering factors, doing skin test to determinate the stimuli casing allergy and avoid it. Good ventilation at home and school area, regular swimming sessions are of great benefit for school age children to strengthen chest muscle. Administer prophylactic medication as children go back to schools and at first sign of cold. During acute attack many individuals carry inhalers so they can self administer bronchodilator, usually beta adrenergic agent such as (ventolin). This medication can be also used prior to exercise or known stimuli to avoid attack happening. Controlled breathing techniques and a reduction of anxiety often decrease the severity of attack. When chronic inflammation develops it is recommended to use glucocorticoids such as (Beclovent) because this medication is more effective in reducing the second stage of inflammation in the airway. In cases like status asthmaticus hospital care is essential because patients do

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not respond to bronchodilators. In chronic condition prophylaxis is given to the patients such as Cromolyn sodium; a prophylactic medication administered by inhaler on a regular daily basis. The drug inhibits the release of chemical mediators from sensitized mast cell and decreases the number of eosinophils, thus reduce hyperresponsiveness (Gould, 2006).

Assessment

Physical assessment for asthma patient includes examine nose, mouth, throat, sinuses, ears, chest and skin. Community health nurse is responsible for this assessment by examine patient nose for signs of increased nasal drainage, swelling inside the nose, check throat for signs of drainage, indicating inflammation and infection in the sinuses. Listen to child chest for wheezing, indicating blockage of airflow in the airways. Observe chest muscle for breathing and examine patient skin for signs of an allergy (Essig, 2011) Moreover, asthma can cause tiredness and weakness therefore child lacks energy and unable to perform simple tasks (Haines & Clarke, 2009).

Asthma can be affected by psychological aspect such as stress, anxiety, sadness and can be provoked by environmental irritants or allergens, exercise, and infection. It also is associated with an elevated prevalence of anxiety and depressive disorders (Lehter, Feldman, Giardino, Song & Schmaling, 2011). Regarding social assessment nurse can find that asthmatic child tend to stay alone always because of feeling embarrassed about their condition and medication taking in school or in public area(Essig, 2007) . Due to asthma some children lose their self-esteem ; others may

fear of having asthma attack if they are at school or around friends (Roberts , 2010).

Children with asthma who live in economically deprived urban areas tend to have more-severe asthma and poorer outcomes over the course of the illness. Frankly there is evidence that in some low-income children with asthma, parents have problems with treatment compliance and adhering to home management guidelines factors that clearly affect the course of the illness in children (Nelson , Awad, Alexander & Clark , 2009).

To perform environmental assessment nurse need to collect information about patient area of living, home environment, work environment and school environment. Importance of this assessment is to reduce irritant and allergens in the settings where asthmatic patient spends more time. Tobacco smoke and air pollution are the mainly two respiratory irritant that asthma patient suffer from (NHLBI , 2011)

Prevention and Intervention

Primary prevention asthma patient are mainly education and awareness about the condition. It is recommended to avoid smoking and exposure to environmental tobacco smoke, particularly during pregnancy and early childhood. About infant regular and exclusive breast feeding reduce risk for asthma. Let the patient be aware about all risk factor associated with developing asthma such as allergen from food, animal, infection and bad life style (Arshad , 2005).

Secondary prevention of asthma defined as intervention for child or patients who are at high risk for the development of asthma but who have not yet developed asthma symptoms or signs. Beside those who are at initial development of the disease. These patients have family history of allergic disease or atopic conditions. Secondary prevention of asthma falls in to three phases: pharmacological treatment, control of environmental allergy and allergen -specific immunotherapy which reduced the progression of asthma and prevented an associated increase in bronchial hyperreactivity.

(Canadian medical association, 2005)

Tertiary prevention is the stage where patient already have the disease however community health nurse role is to decrease attacks and reduce complications. Patient with allergic asthma , ezema and atopic dermatitis must reduce exposure dust and animal such as dogs and cats. Thus, improve system control and prevent excecipation. Also pharmotherapy is very important in this stage (WHO, 2002).

There are many nursing intervention for asthmatic patient like Maintain respiratory function and relieve bronchoconstriction while allowing mucus plug discharge. Let the patient have enough rest and relaxation. As ordered, administer oxygen by nasal cannula breathing and to increase arterial oxygen saturation during an acute asthma attack. Place the patient in semi-fowler position and encourage diaphragmatic breathing. Reassure the patient during an asthma attack and stay with him . Encourage the patient to express his fears and concerns about his illness. Encourage regulate exercise as a part of asthma treatment; promote good nutrition and good hygiene. Demonstrate the proper use of metered dose inhaler properly. Educate client

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(recognize triggers: smoke, dust, mold, weather changes, and animals).

Administer drugs and I. V. fluids as ordered (Nursing file, 2009).

Conclusion

Asthma is a chronic condition characterized by obstructing the bronchial airway. Usually it developed in childhood and symptoms decrease while grow up. Number of asthmatic children is increasing yearly due to the environmental factors. Simply asthma happened when inflammation of airway occurs, bronchospasm of airway muscle, edema of air way and increase mucus secretion. Many factors can cause asthma like environmental factor, family history, infection and allergy. Main sign and symptoms are wheezing sounds, coughing, more secretions and chest tightness. It can be diagnosed by asking patient about the symptoms, pulmonary function test, sputum examination, blood gasses analysis and chest X-ray. In treating asthma ventolin , beclovent and prophylaxis like cromolyn sodium are common . Physical, pychological, economical, environmental and social assessment is needed to done for asthmatic patient. Prevention of asthma categorized in to primary, secondary and tertiary. Nursing intervention for asthmatic patient vary. Some of these interventions are maintain respiratory rate, let patient complete rest and administer medications and oxygen.