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Introduction

Asthma is a chronic inflammatory condition that affects the airways and the lungs. Symptoms associated with this disease are narrowing of the airways and sensitivity is increased of the bronchial tubes (Global initiative for Asthma, 2024). This condition is caused due to a combination of genetics and environmental issues that can cause inflammation of the airways, because of extra mucus production and tightening of the muscles which are surrounding the airways. Asthma in most cases causes wheezing, shortness of breath, chest tightening and coughing (NHLBI2007). Commonly the symptoms are worse at night and early hours in the morning. Asthma is mostly diagnosed through a patient's medical history. Patients will need to be physically examined and a lung function test like spirometry is carried out, most common treatments are usually inhaled corticosteroids, bronchodilators and most importantly avoiding factors that worsen symptoms.

Asthma is a chronic inflammatory condition that primarily affects the respiratory system. This report will focus on the structures involved in breathing and will explain how asthma affects the normal function.

Asthma is a health condition that most commonly affects children and young people affecting more than 5 million people nationwide. Usually anyone with a family history of asthma or conditions like hayfever and eczema are at higher risk of developing the condition (Dharmage, Perret and Custovic, 2019). Not only health conditions but environmental factors like indoor allergens such as pet hair and dust mites and outdoor pollutants caused by traffic and industry can cause asthma. In early childhood especially in infants respiratory infections have also been linked to ongoing airway inflammation and increased risk of developing asthma later on in life (Jackson et al., 2016). Another risk of developing asthma if women in pregnancy are exposed to tobacco smoke affecting their unborn child, also inhaling tobacco smoke in childhood.

There has been an increase in people who have been diagnosed with asthma in the past twenty years. In the United Kingdom asthma affects around 10% of children and adolescents which is why it is the most common long term health condition in this age group (NHS, 2017). Due to lifestyle factors in adolescents such as smoking, vaping, attending venues where respiratory infections can spread easily and not following prescribed treatment plans can increase asthma (NICE 2021).

It is vital for adolescents to understand how the respiratory system works and living a bad lifestyle affects respiratory health. Better lifestyle choices can help manage their asthma safely and effectively.

Structure of the respiratory system

The respiratory system supplies oxygen and removes carbon dioxide, a product created due to cellular metabolism. There are eight main structures that make up the respiratory system. Ventilation is the process where air moves in and out the lungs.

Nasal Cavity

The nasal cavity plays a vital role to respiratory health it warms moistens and filters the inhaled air. Its mucous membrane traps dust, allergens which is very important for anyone individual suffering with asthma because airborne irritants can cause airway inflammation and worsen symptoms (Tortora and Derrickson 2018).

The Pharynx (throat)

This is a muscular tube that sends air from the nose to the voice box which stops food from going into the airway. For patients with asthma postnasal drip can irritate this area which can worsen asthma (Marieb and Hoehn, 2019).

The Larynx (voice box)

The larynx contains the vocal cords which helps air to pass into the lower respiratory tract. At the time of an asthma attack this can narrow the airway thereby can change the voice.

Trachea (windpipe)

The trachea is a firm tube which carries from the voice box to the bronchi with asthma sufferers who produce extra mucus that can partly block the trachea and reduce airflow (Marieb and Hoehn, 2019).

Bronchi

The trachea splits into two main bronchi, which carry air into the lungs. According to Gina, 2023. If the airways become inflamed for individuals who have asthma this can cause symptoms like wheezing and shortness of breath.

Bronchioles

Bronchioles are small airways that lead from the bronchi carrying air to the air sacs. Into the lungs. In the case for people with asthma the bronchioles may get inflamed, become narrow and get filled with extra mucus which will make it harder to breathe (marieb and hoehn, 2019).

Alveoli

Alveoli (air sacs) are small air sacs in the lungs in which oxygen is inhaled and then distributed throughout the body all while removing carbon dioxide. Asthma does not directly harm the alveoli but due to reduced airflow it lowers the amount of oxygen that reaches them (Tortora; Derrickson, 2018)

Lungs:

The lungs are made up of bronchi, bronchioles and alveoli. The lungs contract and expand while breathing, conditions like asthma can cause hyperinflated lungs due to air trapping

which causes lungs to expand more than normally. This can be due to damaged alveoli losing its elasticity or inflamed narrow airways (Marieb; Hoehn et al., 2019).

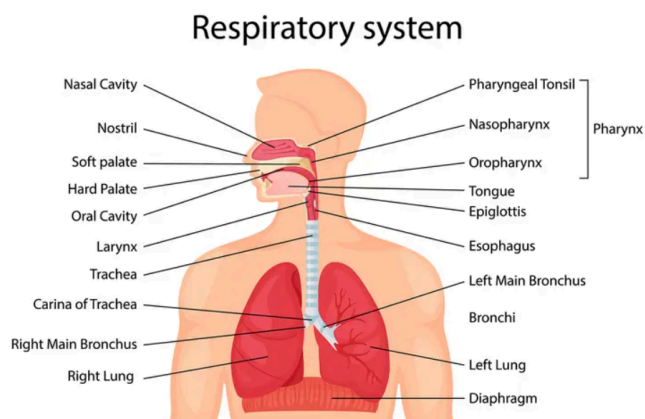
Diaphragm:

The diaphragm is the main respiratory muscle that pulls air into the lungs when it contracts. In people with asthma the diaphragm uses more effort to push oxygen through narrowed airways during asthma attacks (Wood et al., 2020).

Pleura:

A double layered membrane that surrounds the lungs and decreases breathing friction. Chest pain can increase and worsen due to inflammation in cases of severe asthma attacks which can have an impact on the pleura function (Tortora; Derrickson et al., 2018).

These functions work together and produce a continuous pathway for air from the environment to the lungs. The nose to the voice box conditions the air, while the trachea to bronchioles conveys it. The alveoli allows for gas exchange to happen. The diaphragm and intercostal muscles are the reason why people are able to breathe. Conditions like asthma can cause problems for any part of this system, specifically the bronchi and bronchioles, conditions like asthma can cause airways to become inflamed, constricted and full with mucus affecting the breathing process.



Gas exchange in Lungs:

Gas exchange takes place in the alveoli of the lungs, tiny air sacs that are surrounded with capillaries. Oxygen that's inhaled in the alveoli diffuses through the thin alveolar-capillary membrane and enters the bloodstream, carbon dioxide diffuses from the blood into the alveoli and comes out during exhalation. This movement of gas happens down their respective partial pressure gradients through diffusion and is key for cellular respiration (Tortora; Derrickson, 2020). Gas exchange is most efficient with multiple structural adaptations; large surface area of the alveoli, thin walls and the blood supply given by the capillary network (Marieb; Hoehn et al., 2019).

Result of irritants on respiratory system:

Younger people are more likely to be affected by environmental and behavioural irritants that can have a negative impact on their respiratory health. People being exposed to substances such as tobacco, vaping, aerosols, air pollutants and allergens can cause inflammatory responses in the respiratory system, swell of the airway lining, an increase in mucus production and bronchoconstriction. These changes can damage normal airflow and decrease the efficiency of gas exchange within the lungs. Even though vaping is seen as a better alternative to smoking, the aerosols can contain some harmful substances, including nicotine, propylene glycol, flavouring chemicals, many of these things have been linked to oxidative stress and pulmonary inflammation (Ghosh et al., 2018). Previous research has shown a link between vaping/ e-cigarettes and vaping associated lung injury (EVALI), a condition that is described by alveolar damage, infiltration of inflammatory immune cells and patients can experience certain symptoms like shortness of breaths, chest pain and coughing. The EVALI outbreak gained recognition in 2019 which caused investigation into harmful compounds in vaping products. Diagnostic imaging normally shows features of acute lung injury, including multifocal ground glass opacities and areas of consolidation which affects lung lobes, which emphasises the impact vaping can have on respiratory function (RSNA, 2020).

Environmental factors like vehicle emissions, industrial pollutants and indoor air contaminants are common causes of respiratory irritation and inflammation. As well as airborne allergens such as pollen, mould spores and dust mites can trigger hypersensitivity reactions in certain adolescents which can lead to airway inflammation and respiratory conditions such as asthma (Kanchongkittiphon et al., 2015). Asthma is an inflammatory disorder of the airways and is linked to immune system function. In younger people hormonal fluctuations and ongoing physiological development can increase the severity of asthma symptoms and an individual's response to treatment. The condition causes airway inflammation, bronchoconstriction, increased mucus production and airway hyperresponsiveness which all can cause breathing difficulties. The immune system plays a key role in the development and progression of asthma. In allergic asthma which is common in younger people, the immune system overreacts to other harmless environmental allergens such as pollen and dust mites. This response produces immunoglobulin E antibodies which activate mast cells and eosinophils which leads to the release of inflammatory mediators and subsequent airway inflammation (Lambrecht; Hammad et al., 2015). Due to this people with poorly controlled immune response often experience more severe symptoms and more asthma exacerbations. The respiratory and immune system are interconnected in the pathophysiology of asthma. The immune system initiates and sustains inflammatory response while the respiratory system displays physical symptoms. During adolescence the interactions between the immune system maturation, airway development and hormonal changes can make asthma management harder in this age group (Simon; Akinbami et al., 2016).

Monitoring Respiratory Function and Asthma Management:

Monitoring respiratory function is a key to asthma management. One common measure is peak expiratory flow which shows how fast air leaves the lungs. Regular monitoring allows for identification of worsening airway obstruction at an early stage, can adjust treatments according to their asthma and avoid triggers before symptoms become severe (Reddel et al., 2009). Having a peak flow diary can allow for self management, improve symptom awareness and support decision making in regards to seeking medical advice. Regular monitoring allows for healthcare professionals to assess asthma control and optimise treatment options.

A personalised written action plan is important for supporting youth in recognising and managing asthma symptoms. This guide makes it clear on what medication to use, symptom monitoring and the actions needed during asthma exacerbation. Previous research shows that AAPs improve medication adherence, prompt self management and reduce hospital admissions (Global Initiative for Asthma, 2023). Nurses play a key role in the development of these plans as it provides a clear explanation and encourages independence in managing the condition. Education is vital to patients when it comes to asthma management. Younger patients should receive age appropriate information about avoiding common triggers including smoking, vaping, dust mites, pet dander and environmental pollutants. Nurses should work alongside families to identify and reduce exposure to these triggers helping create environments that support respiratory health (National Institute for Health and Care Excellence, 2021). Furthermore, education on correct inhaler technique is important as it improves symptom control and medical adherence (Gibson et al., 2003). While caring for patients, nurses should respect their growth while maintaining professional boundaries regarding confidentiality. Ethically, patients have a right to participate in decisions about their care with parental involvement while following professional guidelines (Nursing and Midwifery Council, 2018).

Lifestyle Recommendations:

Patients with asthma should be advised to avoid smoking and vaping as both can cause more severe effects in patients dealing with asthma. Another lifestyle recommendation is physical activity. It can improve lung function, cardiovascular fitness and overall wellbeing. Fitness plans should be catered to the individuals and the use of pre exercise bronchodilator medication may be recommended in patients who experience exercise induced symptoms (Lang et al., 2013). Psychological stress and less sleep can have a negative impact on asthma control. Young people should be encouraged to have healthy sleep routines and engage in stress management strategies (Chiang et al., 2012).

Conclusion:

Asthma management in younger people involves a combination of medical treatment, education and healthy lifestyle choices. Nurses play an important role in supporting the youth by providing action plans, monitoring their respiratory function and teaching them the correct ways on how to use an inhaler. Healthy lifestyle habits like getting enough sleep,

avoiding smoking and vaping can improve asthma control. Nurses must respect adolescents' autonomy and confidentiality while also supporting them into taking responsibility for their own health to improve their quality of life.

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