Asthma

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Key Points
➢ Asthma is a chronic condition that affects the airways in the lungs. ➢ Asthma can run in families. ➢ Asthma is characterized into types depending upon allergic responses. ➢ Airborne allergens and respiratory infections are common causes of asthma. ➢ One can control the asthma but not cure.

Asthma is a chronic inflammatory disease of the airways. Asthma often starts at a young age (childhood-onset asthma), but some patients can develop asthma later in life (late-onset asthma). Childhood-onset and late- onset asthma differ in many ways. Late-onset asthma is more severe and less associated with allergy than childhood-onset asthma.[1] Severe asthma affects only a small percentage of the asthma population. However, these patients remain poorly understood and difficult to treat. Because the numbers are relatively small (10% or less of the asthma population).[2]

Types:

Historically, only two main forms of asthma have been identified:

- Allergic asthma.
- Nonallergic asthma. Allergic asthma tends to begin in childhood and is associated with T helper 2 (Th2) cell responses. This form of asthma is induced by early life encounters with environmental allergens but can also be induced later in life when a new, e.g., occupational allergen, is encountered. Non-allergic asthma is usually late onset, is more common in females and in obese patients and can sometimes be very difficult to treat. Late-onset asthma phenotypes were classified into:
- Th2
- Non-Th2.

The non-Th2 form is often associated with obesity, aging, and smoking. The Th2-associated form is often accompanied by recurrent and chronic rhinosinusitis with nasal polyps (CRSwNP) and with sensitivity to aspirin and can be associated with high eosinophil numbers in the airways.[1]

Asthma attack:

Asthma attack is the most dangerous health issue because it directly affects the respiratory system of the body. If the respiratory system of the body is not functioning properly then the body of that patient would lead to many health diseases including brain stroke. So, the patient with asthma or if the patient might lends to have lead on diagnosing with asthma due to inheritance then continuous medical attention should be taken. Patient should regular check-up for proper cure.[3]

Genetics:

Smoking during pregnancy is known to be associated with the development of asthma and recurrent wheeze in the child. Some recent studies have also observed that grandmaternal smoking while pregnant with the mother may increase the risk of the grandchild developing asthma, irrespective of the mother's smoking habits. The transgenerational inheritance of asthma phenotypes, mediated by epigenetic changes across the germline, has been clearly demonstrated in animal models. It is not currently known whether there is similar transgenerational transfer of asthma in humans, and the data from various cohort studies is conicting.[4]

Role of T cells in asthma:

Although several markers have been proposed to distinguish specific asthma endotypes, the most consensual distinction is based on the CD4+ T-helper (Th) cytokine profiles involved (i.e., Th2-high vs Th2-low), therefore illustrating the central role of these cells in asthma. T cells are central coordinators of the immune response. T-cell receptor (TCR) recognition is crucial for the initiation and specificity of the

adaptive immune response, while T cell dervied cytokines tailor the type of immune response. Asthma is an inflammatory lung disease and T cells have been shown to play a central role in the pathophysiology of the disease.[5] Severe eosinophilic asthma (SEA) has been associated with T-helper type 2 (Th2) inflammatory response. Regulatory T cells (Tregs) suppress inflammation by secreting cytokines that inhibit Th2 cell proliferation.[6]

Asthma Phenotypes:

Classification of asthma phenotypes has evolved into asthma endotypes such as:

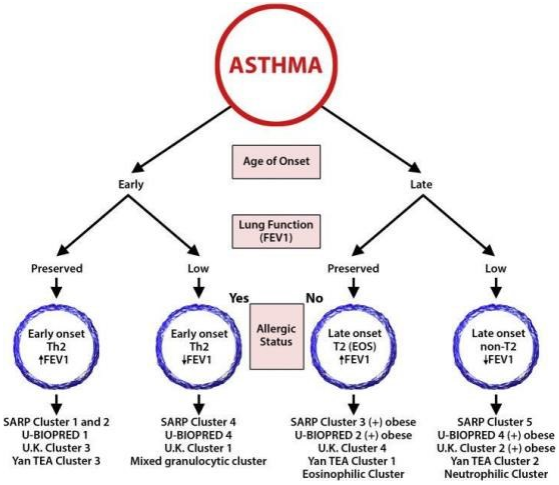
- The type 2-high or -ultra-high (essentially eosinophilic)
- Type 2-low (non-eosinophilic, sometimes neutrophilic, and metabolic).

Type 2-high endotype is orchestrated by Th2-associated cytokines such as IL-4, IL-5, and IL-13 which leads to asthma features with the accumulation of type 2-associated cells such as eosinophils and mast cells in lung tissue and to mucus production, with ultra-type 2-high asthma reflecting a more severe form of the disease. Type 2 low is characterized by lack of type 2 biomarkers, presence of neutrophils, obesity, and/or unresponsiveness to corticosteroids.[1]

Age of onset:

Based on the age of first asthma diagnosis, patients were classified as having either:

- Childhood-onset asthma
- Adult-onset asthma
- Late-onset asthma Childhood-onset asthma was defined as asthma diagnosis before the age of 18 years.
- Adult- Onset asthma as asthma diagnosis between 18 and 40 years. Late- onset asthma diagnosis from the age of 40 years onward.[7]



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Symptoms:

Asthma is a major global health issue. Over 300 million people worldwide suffer from this chronic inflammatory airway disease. Typical clinical symptoms of asthma are characterized by:

- Recurrent wheezy cough
- Chest tightness
- Shortness of breath.[8]

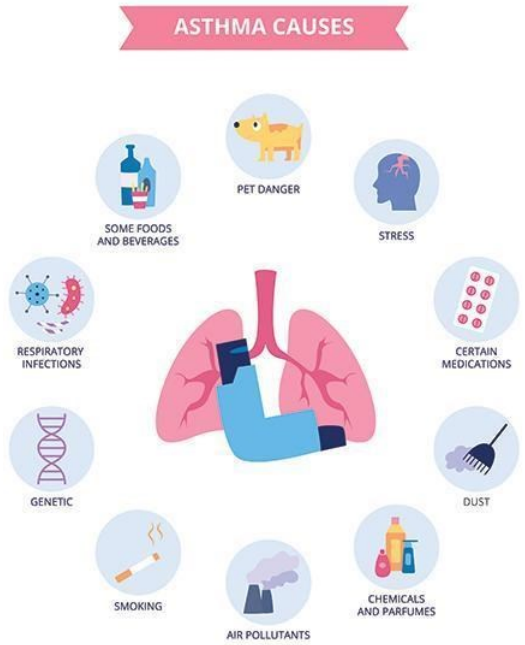
Causes:

Air pollution is a worrisome risk factor for global morbidity and mortality and plays a special role in many respiratory conditions. The complex interaction between pollutant exposures and human host factors has an implication in the development and rise of asthma as a public health problem. The routes through which pollutants induce asthma are multiple, and include the epigenetic changes that occur in the respiratory tract microbiome, oxidative stress, and immune dysregulation. Chemical exposures associated with occupational asthma, especially in atopic individuals, include:

- Pharmaceuticals
- Cosmetic products
- lame-retardants, and many others.

Climatic phenomena increase exposure to various risk factors present in the inhaled air, such as pollens, fungi, toxic gases, and particulate matter. Global warming prolongs the vegetation periods of plants and, if followed by extreme climate events like heavy precipitation, provokes a sudden release of massive amounts of allergens. These allergens interact with sensitized mast cells, inducing the release of

inflammatory mediators and, thereby, leading to severe asthma attacks. Indoor smoking and pollution caused by cooking using biomass, kerosene or diesel derivatives are factors significantly associated with respiratory health aggression.[9] Tobacco smoking is associated with more severe asthma symptoms, an accelerated decline in lung function, and reduced responses to corticosteroids.[10]



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Prevention:

The global prevalence of atopic diseases such as asthma, allergic rhinitis and atopic dermatitis is remarkable and has been expanding over the years. Parental reduction in smoking has proven to reduce asthma.[11]

Gender and Asthma:

Asthma is more frequent in boys than in girls due to their smaller airways relative to their lung size, with a turnaround during puberty, as the prevalence in women is 20% higher than in men.[11]

Treatment:

For some persons this asthma will occur as minor problem and for some persons it will occur as major issue, depending on the body system. The symptoms can be cured but not the disease.

Drugs to cure asthma:

- Usually, Doctors suggest Inhaler for asthma patients. In the inhaler the medicine used will be in tablet form. The medicine contains inhaled corticosteroids like fluticasone, budesonide Leukotriene modifiers montelukast zafirlukast, and zileuton. Long acting beta agonists like salmetrol, formetrol, olodaterol. In some cases patients can use *both* inhalers and beta agonists.

Source: *https://www.google.com*

- A new drug is discovered for asthma called DUPIXENT (dupilumab). The drug helps in preventing severe asthma attacks (exacerbations) and also improves the breathing problem.
- There are few cases in which Dupilumab drug should be used because Dupilumab drug cannot treat any sudden breathing/panic attacks.
- Clinical trials and Studies find out that Benralizumab reduces asthma when given high doses of Long acting beta agonists and Inhaled corticosteroids.
- Patients with Moderate and severe asthma omalizumab is the treatment drug to cure.[3]

Side Effect of Medications:

By using some medications, it can cause

- Dysphonia which means different in voice or pitch.
- Tachycardia or heart beat faster due to exercise, anxiety, fear, or more physical stress.
- Throat irritation when usinginhaled corticosteroids.[3]

Conclusion:

Asthma attack is the most dangerous health issue because it directly affects the respiratory system of the body. If the respiratory system of the body is not functioning properly then the body of that patient would lead to many health diseases including brain stroke. So, the patient with asthma or if the patient might lends to have lead on diagnosing with asthma due to inheritance then continuous medical attention should be taken. Patient should regular check-up for proper cure.[3]

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