

Prevalence of Asthma and its Treatments: A ResourceShruti Agnihotri¹, Surya Kant¹, S.K. Mishra², and Prashant Mani Tripathi¹¹ Department of Pulmonary Medicine, King George's Medical University, U.P, Lucknow² Naturopath, Institute of Naturopathic and Yogic Sciences, Lucknow University, Lucknow*Corresponding Author:* Dr. Shruti Agnihotri: saishruti.agnihotri@gmail.com**Abstract**

Asthma is a chronic inflammatory respiratory disease characterized by periodic attacks of wheezing, shortness of breath, and a tight feeling in the chest. Masoli and colleagues (2004) reported the prevalence of asthma is approximately 300 million cases all over the world and India alone has 30 million asthma patients (10% of the global burden). Allergic respiratory disorders are increasing in prevalence, which is a global phenomenon. Mortality due to asthma is not comparable in size to the day-to-day effects of the disease. Although largely avoidable, asthma tends to occur in epidemics and affects young people. The human and economic burden associated with this condition is severe. Medication is not the only way to control asthma. It is also important to avoid asthma triggers -- stimuli that irritate and inflame the airways. Each person must learn what triggers he or she should avoid to control asthma. This paper is intended to highlight common triggers and current treatment methods of managing asthma. It is hoped that the information provided will be a useful resource for the public and professionals.

Key Words- hyper-responsiveness; prevalence; triggers**BACKGROUND**

Bronchial asthma is a common respiratory disease that results from genetic predisposition, exposure to various indoor as well as outdoor allergens; asthma is one of the most discomforting of respiratory ailments, known to affect around 5% of the World's population. The prevalence of Asthma is approximately 300 million cases all over the world and India alone has about 30 million asthmatic patients (Masoli et al. 2004). Out of every 250 deaths, one is due to asthma worldwide. Workplace conditions, such as exposure to fumes, gases or dust, are responsible for 11% of asthma cases worldwide. About 70% of asthmatics also have allergies (WHO 2014). Women are more likely to have asthma than men. Due to rapid industrialization & urbanization throughout the region, the prevalence of asthma is predicted to increase rapidly 50% per decade. The increase is likely to be particularly dramatic in India which is projected to become the world's most populous nation by 2050. An absolute 2% increase in the prevalence of asthma in India would result in an additional 20 million people with the disease.

Asthma affects people of all ages. Despite the improvement in understanding about various aspects of asthma, the morbidity and mortality due to the disease has increased worldwide. In a multi-center study, the prevalence of asthma has been reported to be 2.28%, 1.69%, 2.05% and 3.47% respectively at Chandigarh, Delhi, Kanpur and Bangalore with an overall prevalence of 2.38% (Sharma et al 2003). The overall burden of asthma in India is estimated to be more than 15 million patients (Brown et al 2005).

Asthma is an ongoing or chronic disease of the airways in the lungs called bronchial tubes. Bronchial tubes carry air in and out of the lungs. In people with asthma, the walls of the airways become swollen (inflamed) and oversensitive. Asthmatic airways overreact to things like viruses, smoke, dust, mould, animal hair, cockroaches and pollen. When they react they get narrower. This limits the flow of air into and out of the lungs. Hence, asthma causes wheezing, coughing, tightness in the chest and trouble breathing. Asthma in most cases starts either in childhood or in middle age. Early onset asthma is slightly more common in males and 'Late Onset' asthma in females.

'Early Onset Asthma' generally occurs in atopic individuals, i.e. those who readily form IgE antibodies to commonly encountered allergens. Such individuals can be identified by skin sensitivity tests, which produce positive reactions to a wide range of common allergens. The allergens responsible for asthma in atopic individuals generally enter the inspired air, and are derived from organic material such as pollen, mite-containing house dust, feathers, animal dander and fungal spores.

'Late Onset Asthma' generally occurs in non- atopic individuals, and it would appear that external allergens play no part in the production of this form of the disease, to which the term 'intrinsic asthma' is sometimes applied.

An immune complex allergic reaction may also be implicated in the pathogenesis of bronchial asthma, particularly where antigens derived from fungi, such as *A. fumigatus* (*Aspergillus fumigatus*), are implicated. Acute attacks of asthma may be caused by drugs such as aspirin and by exposure to chemical substances in the electronics, plastics and other industries.

Asthma is often aggravated by non-specific factors such as bronchial irritation caused by tobacco smoke, dust and acrid fumes, respiratory infection and emotional stress. Factors that precipitate an asthma attack are called triggers. They cause the air passages to get clogged and constricted, making it difficult for the patients to breathe. The inflamed bronchioles generate more mucous and also cause the muscles around them to tighten and get irritated, constricting the airways. This is called a Bronchospasm.

Factors responsible for Asthma (Triggers)

- 1. Allergens** - For most it is an allergy to foods, pollens, perfumes, body sprays, deodorizers, the weather, drugs or any other irritants. They vary from person to person. However, dust allergies seem to be the most common factor.
- 2. Combination of Factors** - For others, it is triggered by a combination of allergic and non-allergic factors including stress and tension, air pollution or infections.
- 3. Heredity** - In most cases it has been found that when one or both parents suffer from asthma, the children have similar allergic reactions.
- 4. Abnormal Body Chemistry** - Asthma may result from the abnormal body chemistry involving the body's enzymes or a defect in muscular action within the lungs.
- 5. Psychological factors** - It may be triggered by emotion, environmental extremities (extreme cold exposures) and viral infections. Asthmatic attacks may also be generate and triggered in brain itself.
- 6. Oxidant and Antioxidant Status** - Free radicals cause cellular damage which is responsible for the bronchial inflammation characteristics of asthma while antioxidants help in the prevention of consumption of oxygen and cellular damage.

Asthma is characterized by episodic symptoms and variable airflow obstruction that occur either spontaneously or in response to environmental exposures. Current therapeutic approaches are based on an understanding of allergen induced airway responses and, when optimally applied, minimize the day to day variability of asthma and lead to significant improvements in quality of life. These exacerbations are frequently triggered by viral respiratory infection and current treatment approaches are of limited value during these exacerbations.

In recent years the importance of asthma exacerbations has been increasingly recognized. It has also become apparent that severe asthma exacerbations can occur in patients with mild disease.

Table 1 - Allergens & other substances liable to provoke attacks of Asthma

Causative Agents	Preventive Measures	Efficacy
Pollens	Try to avoid exposure to flowering vegetation	Low
Mites in house dust	Keep bedrooms windows closed Vacuum- clean mattress daily Shake out blankets daily Dust bedroom thoroughly	Doubtful
Animal Dander	Avoid contact with dogs, cats, horses or other animals	High
Feathers in pillows or quilts	Substitute latex from pillows & terylene quilts	High
Drugs (beta- blockers)	Use of relevant drugs	Low
Industrial Chemicals (e.g. isocyanate, epoxy resins)	Avoid exposure to chemical, or change Occupation	High

The major environmental exposures are-

- Viral infection
- Allergen
- Environmental pollutants
- Occupational sensitizers/ irritants
- Medication: aspirin

Investigation

1. Radiological examination - Usually chest X-ray is normal in Asthmatics. In an acute attack of asthma the lungs appear highly inflated. In long standing cases the appearances may be indistinguishable from emphysema, and the lateral view may demonstrate a 'pigeon chest' deformity.

2. Pulmonary function tests - Measurements of the forced expiratory volume in one second (FEV) and vital capacity (VC) or of peak expiratory flow (PEF) provide a fairly reliable indication of the degree of airflow obstruction and can also be used to determine whether and to what extent it can be relieved by bronchodilator drugs or corticosteroids, or to confirm that it is provoked by exercise or hyperventilation. Such tests have an important place in the diagnosis of bronchial asthma. Serial recording of PEF are useful in the assessment of those patients whose asthma shows marked diurnal variations in the severity.

3. Skin sensitivity tests - Tests are usually performed with a group of common allergens known to cause Bronchial Asthma. It is seldom possible with these tests to identify one particular allergen as the cause of asthma in an individual case, and their chief value is to distinguish atopic from non-atopic subjects.

Treatment of Asthma

Asthma is a chronic disease that cannot be cured but medicines and life style changes can help to control the symptoms. One way to relieve asthma is to avoid things in the environment that make symptoms worse. A number of types of medicines are also used to treat asthma. They fall into two groups – quick-relief medicines & long-term control medicines.

1. Quick-Relief Medicines - Quick relief medicines are used when needed. They should be taken when symptoms are getting worse to prevent a full blown asthma attack. They can also be used to stop attacks once they have started. These medicines relieve symptoms in minutes. They are short acting inhaled bronchodilators. They quickly relax tightened muscles around the airways. The commonly used quick relief medicines are –

- Salbutamol
- Livosalbutamol

2. Long-Term Control Medicines - Long-term control medicines or controller medicines are taken every day usually over a long period of time. Over time, these medicines relieve symptoms and prevent asthma attacks in those with mild or moderate persistent asthma. These medications help control inflammation in the lungs. To be effective, they must be used every day. These medicines are not intended to relieve symptoms immediately. Some may even take a few weeks to have their full effect. Some long-term medicines include-

- *Cromolyn & Nedocromil* - These inhaled medicines keep airways from swelling when a person comes in contact with a trigger.
- *Corticosteroids* - These medicines can be inhaled or taken in a pill form. These can prevent and decrease swelling in the airways. It can also decrease the amount of mucous. These are ***Beclamethasone, Budesomide, Fluticasone and cidosenide (inhaled), Prednisolone, Methyl Prednisolone, Dexamethsone (oral & injectable), and Deflazacort (oral)***.
- *Anti-leukotrienes* - These medicines can be inhaled in the form of pills. They open the airways, control swelling and inflammation & reduce the mucous, e.g. ***Montelenkast***.
- *Long-acting beta 2 bronchodilators (LABA)* - Overtime, these inhaled medicines help relieve symptoms. They are often combined with anti-inflammatory medicines. These are ***Salmetrol & Formetrol***.
- *Methyl Xanthines* - Oral & injectable bronchodilators, e.g. ***Theophylline, Doxophylline and aminophylline***.

The following measures may be of value in the management of patients with bronchial asthma:-

- Avoidance of relevant allergens.
- Hypo-sensitization (rare of great benefits).
- Drugs such as sodium cromoglycate, bronchodilators, or corticosteroids to control or suppress the clinical manifestations of asthma.
- Measures to counter the effects of aggravating factors such as exercise, infection and emotional stress.

Alternative and complementary strategies

A number of studies examine the benefits of yoga practice which help to manage asthma. People incorporating a holistic program such as yoga that helps with meditation, asana (posture) and pranayama (breathing), had fewer weekly asthma attacks, improved breathing and responded better to their medication see Agnihotri et al (2015).

Conflict of Interest (If present, give more details): None

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