

Review Article

Pediatric Asthma: New Answers to Old Issues

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Introduction

Asthma is an early onset non communicable disease of respiratory system. There are significant new concepts have occurred which changed the management perspectives. Most of the parents face the same problems, over the years and physicians do provide updated answers. These parental questions are compiled and the updated quality educations with proper answers are provided for better management of asthmatic children.

Magnitude of Asthma

Asthma is a global health epidemic, now over a billion population affected globally and it is anticipated to rise up to 4 billion in the year 2050 [1].

Commission of macroeconomics and health government of India observations in the year 2005 show that asthma will raise from 45 million to 57.2 million by 2016 and a pose major socio economic burden [2].

In Bengaluru city, asthma in children was 9% in 1979 and steadily gone up and stabilised to 25.5% in 2009, persistent asthma gone up from 20% to 72.5%, persistent severe variety from 4% to 11% between 1994 to 2009 [3,4] as shown in Figure 1.

Our concepts in asthma management has changed over the years from simple broncho constriction to airway hyper-responsiveness, airway inflammation, remodelling, united airway concept, phenotypes and dietary habits as shown in Figure 2.

Major Issues of the Patient and Healthcare Provides

Is it Asthma?

78-85% of asthma starts in children under five years of age, since there is no objective supportive evidence many of them were called as wheezy bronchitis in 1960's [4-7] which resulted in under diagnosis of asthma and inappropriate and over use of antibiotics. In the early 80's a movement started to call wheezing as childhood asthma regardless of clinical pattern, this idea definitely resulted in more appropriate treatment and reduced the morbidity. However it just delayed in subsequent epidemiological studies to correlate with viral infections.

In the year 2000 onwards asthma predictive index and stringent

modified index came with major and minor criteria's by Castro-Rodriguez et al [8]. These indexes have more of a negative predictive value, not practical in developing countries and extrapolation of data on future risks is difficult in clinical setting.

Currently the diagnosis of asthma is based on clinical features only in children less than 5 years of age. Having features of recurrent/persistent respiratory symptoms of wheeze, cough, and dyspnea. Chest tightness which worsenes at night and early mornings, symptoms exacerbates on exposure to viral infection, dust, mold, dampness, weather changes, allergens and emotional stress (crying, laughing, and shouting) may be with personal history of atopy, eczema, allergic rhinitis and family history of asthma [4,9]. The other supportive history would be, birth by 'c' section, prematurity, respiratory problem at birth, snoring, mouth breathing, bruxism, sleep problems, hyperhidrosis, exposure to tobacco smoke, other smokes and residence near the heavy traffic area.

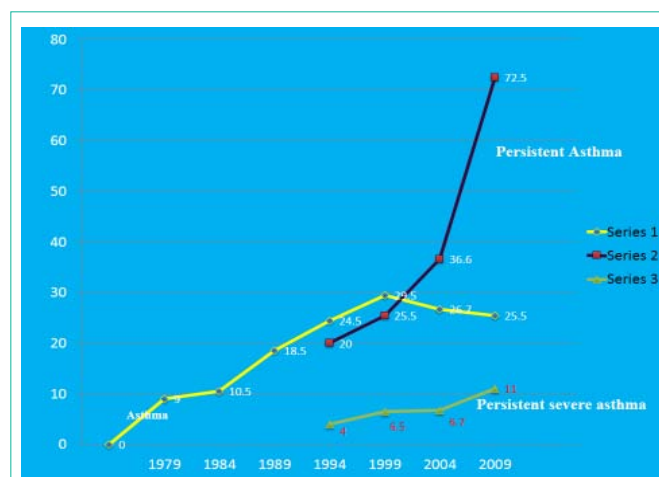


Figure 1:

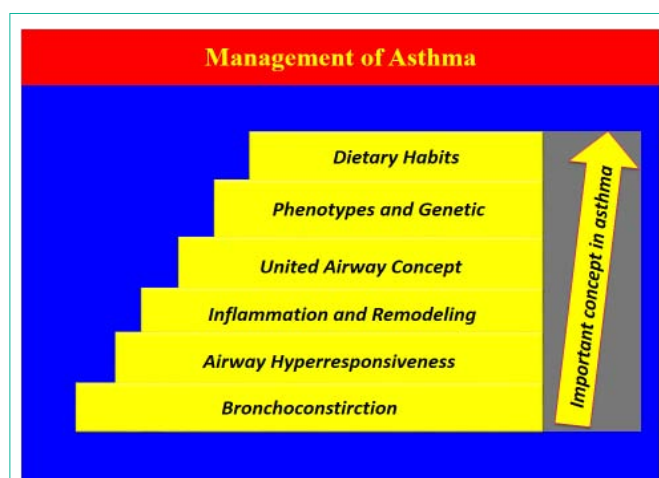


Figure 2:

Table 1: Drugs used in Asthma management [9].

Quick relievers	Controller	Long-term symptoms relievers
Used for acute attacks to relieve bronchospasm as and when needed. Short acting beta-2-agonists Salbutamol Terbutaline Adrenaline Aminophylline	Used for long – term to control the inflammation and to prevent further attacks. Leukotriene receptor antagonists Steroids: Oral Inhaled corticosteroids(ICS), Theophylline	Used to relieve bronchospasm for longer hours. Long acting beta-2-agonists Salmeterol Formoterol Bambuterol Always use with inhaled steroids

In bigger children one can use Peak Expiratory Flow (PEF) to see the reversibility of airway obstruction after bronchodilator nebulisation. No doubt Spirometry is a preferable test where facilities available.

No one has asthma in our family, how is it possible our child has asthma?

No doubt genetics is brick and mortar and environment is an architect in bringing out the disease. It is the interaction of genes and environment brings out asthma. Change in epigenetics is responsible for few children suffer from severe asthma and few children develop airway remodelling [10,11].

Rapid urbanisation, change in demography, air pollution from heavy traffic are the major causes for increased prevalence of asthma, use of biofuel in ill ventilated huts changed the sex ratio of asthma in children Air pollution from fossil fuel not only exacerbates the existing asthma it also contributes the new onset of asthma as well [6,12,13].

Is it contagious?

Asthma disease is not a contagious disease, but the children with viral infections are contagious, however over 40% of asthma attacks are triggered by viral infections from rhinovirus, respiratory syncytial virus and influenza viruses. After about of viral cold infection, a cough threshold is low and lasts for 3weeks to reach back the normal threshold.

How to choose medicine?

There are three groups of medicines are used in the management of asthma as shown in Table 1.

The selection of these medicines is based on severity of your disease. The inhalation therapy should be used in a spacer as directed by the physicians.

How Long to Give the Medicines?

The quick relieves are given until the symptoms of asthma are subsided completely.

The controller’s medications are given until the inflammations subsided completely, and the dose has to be reduced by 25-50% every 3 months for atopic asthma. Unfortunately there are no reliable clinical features to recognise the inflammation of the airways.

There are three ways to recognise airway inflammation: (1) Eosinophils in the sputum of tracheal aspiration. It is not recommended in children, it is an invasive procedure. (2) FENO Fraction of exhaled nitric oxide a non-invasive procedure and indicates the eosinophilic airway inflammation and steroid responsiveness, not widely used in Pediatric practice. (3) Serum periostin-IL-4 and IL-13. Predicts the type2 inflammation and tissue remodelling, low response to steroids and predicts the efficacy of Omalizumab therapy.

Does it have Steroids?

Many parents and health provides are worried about the usage of steroids for their ill effects.

Yes growth retardation is seen in high dose steroid patients even in inhalation therapy. It is also true that uncontrolled or severe asthma can also affect the growth of children.

Children aged 4-10 years are more susceptible and changes in the growth rate during first year of treatment appear to be temporary. Usually they attain mid parental height at later age.

There is no effect on development of cataract with inhaled steroids, no increase incidence of lower respiratory tract infection and tuberculosis.

The increase incidence of dental carries is from decreased oral ph. from inhalation of β eta-2 agonists than steroids.

It is preferable to select Fluticasone, Mometasone or Ciclosonide since they have less than 1% bio availability in comparison to Beclomethasone or budesonide [4].

Why Inhalers, Is it not Addictive in Children?

Inhalation therapy historically started in India and Egypt. It acts locally and effects are quicker. It is only 1/10 the dose used hence minimal or no side effects, it is not addictive but a good habit.

What Food to Give?

Asthma episodes are due to imbalance in oxidative stress between Reaction Oxygen Species (ROS) verses antioxidants which affects the smooth muscles contraction, excess mucus secretions and decreased ciliary movement and inflammation.

We should encourage food with higher antioxidants like fresh fruits, vegetables, traditional foods and food with higher omega3 fatty acids, fish, fish oil, butter, and food with protective germs like in yogurt, and curds. Discourage spicy foods, fast food and take away food snacks with high salt content carbonated drinks [6-8, 14-17].

Can Our Child Play in School?

It is true 10% of normal children, 40% of allergic rhinitis children and 80% of asthmatic children have exercise induced asthma.

All the children should be are encouraged in school play. They should be trained.

1. To double up the warm-up time from 5 to 10 min before any game.
2. During that time let them breath through the nose.
3. Preferably to play in the afternoon when the lung capacity

is always better.

Use quick relievers like salbutamol spray 15 min before the sport event, or montelukast 6 hrs before.

Always encourage sports in children individual sports, swimming are the best exercises. It is hearting to know that several asthmatics won Olympic gold medals.

In India nearly 27% of urban children never do any skeletal muscle exercise as recommended by WHO of 1 hr of skeletal muscle exercise per day [7].

How can we Manage the Adolescent?

One has to understand the perceptions of asthma disease in adolescents. Many adolescent express that- I never thought of asthma is a chronic disease, I feel hurt that I can't go to public places for fear of smoke or perfume, I am not sure when I get an attack, I hate the idea of taking medicines daily or in front of others, during on emergency [18]. Especially girls with social stigma attached to the disease don't want to use inhaler for the fear of marriage and mother in law [4].

Over 60% of persistent asthmatic children have behaviour problems and 3% of children have suicidal tendency. All these children need individual counselling by the physicians and getting their confidence in the management.

Is My Child Going to Outgrow the Disease?

Usually most of the children do outgrow their asthma especially viral induced asthma phenotypes by 5 years of age when our defence system reaches adult level. Since the airway calibre attain adult size by age of 8 years some more do outgrow.

Many do outgrow during adulthood any children who are atopic, early onset frequent, wheezers, smoking of tobacco, early sensitised children, low FEV₁ at 6 years of age and female children tend to be persistent with indefinite period.

One of the longest follow-up study by Phelan in Australia where 295 infants followed for 42 years showed asthma children relapsed by 70% and severe asthma by 90% [19].

No doubt with good environment control regular medicine and follow-up one can lead a quality life.

Can we use Immunotherapy?

Immunotherapy is a method by administering the increasing dose of allergen extract one can develop persistent clinical tolerance. Sub lingual immunotherapy is child friendly. Usually it is recommended

for persistent allergic rhinitis, mild to moderate persistent asthma with FEV₁>65%. Where environment control is not feasible, not responding to medicines and patient develop adverse reaction to drugs and patients don't want pharmacotherapy. These children are referred for a specialist to do immunotherapy [4].

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